I hereby give notice that a meeting of the Strategy and Policy Committee will be held on:

Date: **Wednesday, 9 August 2017**
Time: **10.30am**
Venue: **Tararua Room**
Horizons Regional Council
11-15 Victoria Avenue, Palmerston North

STRATEGY AND POLICY COMMITTEE

AGENDA

MEMBERSHIP

Chair	Cr EB Gordon JP
Deputy Chair	Cr PW Rieger, QSO JP
Councillors	Cr JJ Barrow
	Cr LR Burnell, QSM
	Cr DB Cotton
	Cr RJ Keedwell
	Cr PJ Kelly, JP
	Cr GM McKellar
	Cr NJ Patrick
	Cr BE Rollinson
	Cr CI Sheldon
	Cr WK Te Awe Awe

Michael McCartney
Chief Executive

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Postal Address: Private Bag 11025,
Palmerston North 4442

Full Agendas are available on Horizons Regional Council website
www.horizons.govt.nz

Note: The reports contained within this agenda are for consideration and should not be construed as Council policy unless and until adopted. Items in the agenda may be subject to amendment or withdrawal at the meeting.

for further information regarding this agenda, please contact:
Julie Kennedy, 06 9522 800

CONTACTS	**24 hr Freephone : 0508 800 800**	**help@horizons.govt.nz**		**www.horizons.govt.nz**
SERVICE CENTRES	**Kairanga** Cnr Rongotea & Kairanga-Bunnythorpe Rds, Palmerston North	**Marton** Hammond Street	**Taumarunui** 34 Maata Street	**Woodville** Cnr Vogel (SH2) & Tay Sts
REGIONAL HOUSES	**Palmerston North** 11-15 Victoria Avenue	**Whanganui** 181 Guyton Street		
DEPOTS	**Levin** 11 Bruce Road	**Taihape** Torere Road Ohotu		
POSTAL ADDRESS	Horizons Regional Council, Private Bag 11025, Manawatu Mail Centre, Palmerston North 4442			
FAX	06 9522 929			

TABLE OF CONTENTS

12 Public Excluded Section

AGENDA

1 Welcome / Karakia

2 Apologies and Leave of Absence

At the close of the Agenda no apologies had been received.

3 **Public Forums:** Are designed to enable members of the public to bring matters, not on that meeting's agenda, to the attention of the local authority.

Deputations: Are designed to enable a person, group or organisation to speak to an item on the agenda of a particular meeting.

Requests for Public Forums / Deputations must be made to the meeting secretary by 12 noon on the working day before the meeting. The person applying for a Public Forum or a Deputation must provide a clear explanation for the request which is subsequently approved by the Chairperson.

Petitions: Can be presented to the local authority or any of its committees, so long as the subject matter falls within the terms of reference of the council or committee meeting being presented to.

Written notice to the Chief Executive is required at least 5 working days before the date of the meeting. Petitions must contain at least 20 signatures and consist of fewer than 150 words (not including signatories).

Further information is available by phoning 0508 800 800.

4 Supplementary Items

To consider, and if thought fit, to pass a resolution to permit the Committee/Council to consider any further items relating to items following below which do not appear on the Order Paper of this meeting and/or the meeting to be held with the public excluded.

Such resolution is required to be made pursuant to Section 46A(7) of the Local Government Official Information and Meetings Act 1987 (as amended), and the Chairperson must advise:

(i) The reason why the item was not on the Order Paper, and

(ii) The reason why the discussion of this item cannot be delayed until a subsequent meeting.

5 Members' Conflict of Interest

Members are reminded of their obligation to declare any conflicts of interest they might have in respect of the items on this Agenda.

Minutes of the sixth meeting of the tenth triennium of the Strategy and Policy Committee held at 9.33am on Wednesday 7 June 2017, in the Tararua Room, Horizons Regional Council, 11-15 Victoria Avenue, Palmerston North.

PRESENT	Crs EB Gordon JP (Chair), JJ Barrow, LR Burnell QSM, DB Cotton, RJ Keedwell, PJ Kelly JP, GM McKellar, NJ Patrick, JP, BE Rollinson, CI Sheldon, WK Te Awe Awe	
IN ATTENDANCE	Chief Executive	Mr MJ McCartney
	Group Manager Corporate and Governance	Mr C Grant
	Committee Secretary	Ms K Booth
ALSO PRESENT	At various times during the meeting: Dr N Peet (Group Manager Strategy & Regulation), Dr J Roygard (Group Manager Natural Resources & Partnerships), Mr R Strong (Group Manager River Management), Mr G Shirley (Group Manager Regional Services & Information), Mr J Twomey (Policy Analyst – iwi), Ms A Matthews (Science & Innovation Manager), Ms C Morrison (Media & Communications Manager), Mr G Albert, Mr J Ferguson and Te Awa Tupua representatives, Mr C Wilson, Dr J Wood, Mr T Saunders and Whangaehu Catchment Entity representatives.	

The Chair welcomed everyone to the meeting and invited Cr Te Awe Awe to say a karakia.

APOLOGIES

SP 17-31 ***Moved*** ***Gordon/Sheldon***

That an apology be received from Cr Rieger.

CARRIED

PUBLIC SPEAKING RIGHTS
There were no requests for public speaking rights.

SUPPLEMENTARY ITEMS
A copy of a draft letter from Horizons to the Environmental Defence Society Inc, and Wellington Fish & Game Council, was distributed; also a copy of a letter from Rangitikei District Council.

MEMBERS' CONFLICTS OF INTEREST
There were no conflicts of interest declared.

CONFIRMATION OF MINUTES

SP 17-32 ***Moved*** ***Keedwell/Te Awe Awe***

That the Committee:

confirms *the minutes of the Strategy and Policy Committee meeting held on 23 May 2017 as a correct record, and notes that the recommendations were adopted by the Council on 7 June 2017.*

CARRIED

CHAIR'S REPORT

The Chair referred to his report which had been circulated to Members prior to the meeting. He commented on the visit to Te Apiti Manawatu Gorge with the Minister of Conservation, Hon. Maggie Barry which was well attended despite the bitterly cold weather. He also commented on his relationship meeting with the Rangitikei MP, Ian McKelvie.

MEMBERS' REPORTS

Members provided an update on their activities over the past month, in addition to meeting and workshop attendances, and responded to any questions of clarification.

Cr Te Awe Awe commented on a visit to the Horowhenua district organised by Cr Sheldon, attended with several other Horizons' Councillors.

Cr Sheldon attended the Manawatu District Council Submissions Hearings when the Horizons' submission was presented. She also attended the Horowhenua district visit.

Cr Rollinson had no further activities to report on.

Cr Patrick attended an Horizons education trip with Durie Hill School, attended recent meetings and hearings at Whanganui District Council, attended a presentation by Russell Death on water quality, and connected with Whanganui partners on social enterprise.

Cr McKellar attended the Kitchener Forest Park re-opening, the Kelloggs Leadership conference in Wellington, attended the Ballance Farm Environment Award Winners' Field Day at Pongaroa, and an LGNZ training for New Chairs.

Cr Kelly's report had been distributed to Members prior to the meeting. He represented the Chair at the Gunners Day celebrations at the Linton Army Camp, attended the LGNZ Freshwater Symposium, and the Ballance Farm Environment Award Winners' Field Day at Pongaroa.

Cr Keedwell attended the Ballance Farm Environment Award Winners' Field Day at Pongaroa, and the visit to the Horowhenua district.

Cr Cotton's report had been distributed to Members prior to the meeting. He attended the Ballance Farm Environment Award Winners' Field Day at Pongaroa, the visit to the Horowhenua district, and the LGNZ training for New Chairs.

Cr Burnell attended the visit to the Horowhenua District. He also met with a local ratepayer, concerned about the odour beyond the boundary of the Levin landfill.

Cr Barrow attended the Ballance Farm Environment Award Winners' Field Day at Pongaroa, met with interest groups in regard to the Environment Court decision, and attended the opening of a bridge on a QEII covenanted farm at Hopelands, which was also attended by QEII National Trust members.

There was discussion about the appropriateness of elected members assisting members of the public to complete application documents, for instance to a consent process. It was suggested that elected members only assist with the actual process of completing the form.

UPDATE ON NUTRIENT MANAGEMENT

Report No 17-98

The report updated Council on progress with adjustments to the nutrient management consenting process in response to the recent Environment Court declarations. Council had previously received expert planning and legal advice of its own. Dr Peet (Group Manager Strategy and Regulation) introduced the report, noting that Horizons Regional Council was legally obliged to continue to implement the One Plan, including nutrient-management consenting. He then explained the recommendations to Members, and referred to recommendation (i) and the draft response letter to the Environmental Defence Society Inc and Wellington Fish and Game Council that had been distributed to Members. The Chair said Members would be advised when a meeting date was received from the two organisations as a result of the letter. Dr Peet clarified Members' questions in regard to consenting processes following the Environment Court decision, and also referred them to information contained in the report and annexes. He anticipated a report to the Strategy and Policy Committee meeting on 9 August 2017, would provide further information.

SP 17-33 ***Moved*** ***Burnell/Barrow***

That the Committee recommends that Council:

a. *receives the information contained in Report No. 17-98 and Annexes.*

b. *notes that Horizons is legally obliged to implement the intensive land use rules in the One Plan;*

c. *notes that the under the intensive farming land use rules new and existing intensive farming land uses require resource consents for the activity to occur in defined areas of the region (existing land use) and the whole region (new land use);*

d. *notes that expert planning advice, previously supplied to Council (PX17-79), is that there is uncertainty about whether Council will, in practice, be able to consent existing and new intensive farming activities to operate at nitrogen leaching rates that exceed those specified in Table 14.2 (except in the two circumstances described in policy 14-6);*

e. *notes that expert planning advice, previously supplied to Council (PX17-79), is that while the granting of resource consents to exceed the Table 14.2 leaching rates, outside the two exceptions in Policy14-6 may be theoretically possible, the information requirements on applicants and on Council could be potentially very onerous and reliant on significant assumptions;*

f. *notes that given the legal requirement for intensive farming land uses to be consented in order to continue as land uses, officers are working through implementation of the intensive land use rules of the plan in accordance with the recent Declarations in the Environment Court;*

g. *notes that staff are preparing the background material required for applicants in applying for consents for intensive land use;*

h. *notes that staff are updating application and decision templates to ensure that they are legally robust and practicable as possible to use;*

i. *notes that officers are engaging with the Environmental Defence Society and Fish and Game initially via a reply to their letter of 8th May as requested by those parties and that officers remain willing to meet the parties when they are ready.*

CARRIED

ACCELERATE 25 UPDATE

Report No 17-99

This paper updated Members on the implementation of the Manawatū-Whanganui Economic Action Plan, occurring under the banner of Accelerate25. Dr Peet (Group Manager Strategy and Regulation) explained it was a regular update and referred Members to the background information in the report. The annexed documents included progress with the Action Plan opportunities/enablers, and also the latest edition of 'Growing our Region'. There was a brief update about the Whanganui Port and the ferry proposals.

SP 17-34 ***Moved*** ***Burnell/Patrick***

That the Committee recommends that Council:

a. receives the information contained in Report No. 17-99 and Annexes.

CARRIED

STATE OF ENVIRONMENT REPORT 2018

Report No 17-100

This report provided an overview of the planned work programme for the State of Environment 2018 report (SoE). Dr Roygard introduced the report which informed Members of the process through to the release of the SoE in June 2018. Ms Matthews (Science and Innovation Manager) referred to paragraph 8.3 which noted the traditional information that would be included in the SoE, together with information on work carried out by the community and other agencies, including cultural monitoring.

SP 17-35 ***Moved*** ***McKellar/Burnell***

That the Committee recommends that Council:

a. receives the information contained in Report No. 17-100 and Annex.

b. notes that Horizons' State of Environment report will be delivered to Council in 2018 and that regular progress updates will be provided to Council via the Environment Committee throughout 2017-18.

CARRIED

AIR QUALITY MONITORING

Report No 17-101

This report provided an update on the review of the National Environmental Standards for Air Quality and identified potential implications for the management of Horizons' designated air sheds and current air quality monitoring programme. Ms Matthews (Science and Innovation Manager) explained why Taihape and Taumarunui were monitored sites, and about the possible change in measurement technique for the standards by the Ministry for the Environment (MfE). It was explained that Council would wait until any change was known before upgrading any equipment. She also explained that any upgrade to the equipment would require additional funding through the Long-term Plan process. There was discussion around the possible mobility of future equipment to allow monitoring in other areas of the Region.

SP 17-36 ***Moved*** ***Rollinson/Patrick***

That the Committee recommends that Council:

a. receives the information contained in Report No. 17-101.

CARRIED

TUIA LEADERSHIP PROGRAMME 2017
Report No 17-97

The Committee was notified that Ripeka Goddard would speak to elected members at the Council meeting to be held later that day.

PROCEDURAL MOTION TO EXCLUDE THE PUBLIC

SP 17-37 ***Moved*** ***Cotton/Barrow***

THAT the public be excluded from the following part(s) of the proceedings of this meeting. The general subject of each matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48(1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution follows.

This resolution is made in reliance on section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 and section 7 of that Act which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public, as follows:

CARRIED

General subject of each matter to be considered	Reason for passing this resolution	Ground(s) under section 48(1) for the passing of this resolution
PX1 Confirmation of Public Excluded Meeting held on 9 May 2017	s7(2)(g) - the withholding of the information is necessary to maintain legal professional privilege. s7(2)(b)(ii) – the withholding of the information is necessary to protect information where the making available of the information would be likely unreasonably to prejudice the commercial position of the person who supplied or who is the subject of the information.	s48(1)(a) The public conduct of the part of the meeting would be likely to result in the disclosure of information for which good reason for withholding exists under section 7.
PX2 Ngāti Rangi Treaty Settlement Whangaehu Catchment Entity	s7(2)(g) - the withholding of the information is necessary to maintain legal professional privilege. Ngāti Rangi and OTS are still negotiating the Settlement.	s48(1)(a) The public conduct of the part of the meeting would be likely to result in the disclosure of information for which good reason for withholding exists under section 7.

	S7(2)(I) – the withholding of the information is necessary to enable the local authority to carry on, without prejudice or disadvantage, negotiations (including commercial and industrial negotiations). Ngāti Rangi and OTS are still negotiating the Settlement.	
PX3 Council / Committee to consider whether any item in the Public Excluded minutes can be moved into the public domain and define the extent of the release		
PX4 Members' Questions		

The meeting adjourned to the Public Excluded part of the meeting at 11.26am and resumed at 11.44am.

TE AWA TUPUA (WHANGANUI RIVER CLAIMS SETTLEMENT) ACT 2017

Report No 17-109

On behalf of Council, Cr Te Awe Awe welcomed Gerrard Albert, Chairperson of Ngā Tāngata Tiaki, the Post Governance Settlement Entity managing the Settlement, Jamie Ferguson, Legal Counsel, and other representatives to the meeting. Dr Peet (Group Manager Strategy & Regulation) provided the introductions.

Mr Albert thanked the Chair for the invitation to speak to Council about the Settlement, and acknowledged Cr Te Awe Awe for his welcome. Mr Albert played a video '*Ruruku Whakatupua : The Whanganui River Settlement : An Introduction*'. Mr Albert then introduced the presentation entitled '*Ruruku Whakatapua : Whanganui River Settlement : Te Awa Tupua Act*', and he and Mr Ferguson explained the Te Awa Tupua Act, and explained about the Whanganui River. They spoke of opportunities to provide for the health and wellbeing of the River, and about other opportunities, and what the River meant to the whole community. Mr Albert referred to Annex A and noted some changes to the chart. He then clarified that the three people had not yet been appointed to the advisory group, Te Karewao, as it was important for the appropriate people to be appointed. Mr Ferguson spoke about the Legal Effect of the Te Awa Tupua Act, and explained the requirements for decision-makers, the legal weightings, and acknowledged the work of Horizons and technical officers. They clarified Members' questions. Cr Te Awe Awe thanked them, on behalf of Council, for attending the meeting.

SP 17-38 ***Moved*** ***Keedwell/Cotton***

That the Committee recommends that Council:

a. receives the presentation from Gerrard Albert of Ngā Tāngata Tiaki.

CARRIED

The meeting adjourned to the Public Excluded part of the meeting at 12.30pm and resumed at 1.01pm.

The meeting closed at 1.02pm.
Confirmed

CHIEF EXECUTIVE CHAIRMAN

Report No.	17-143
Decision Required	

IMPLEMENTATION OF INTENSIVE LAND-USE RULES UNDER THE ONE PLAN

1. PURPOSE

1.1. The purpose of this paper is to update Members on changes to intensive land-use consenting processes, required as a result of the recent Environment Court declaratory proceedings. The paper outlines the process we are to apply in considering consent applications, and our understanding of the likely implications of that process for applicants.

2. EXECUTIVE SUMMARY

2.1. The Environment Court's declarations, in effect, confirm that the One Plan requires all existing intensive land use in target catchments to meet the cumulative nitrogen leaching targets specified in Table 14.2 of the One Plan no later than 2020, and earlier in many areas. Throughout the Region, conversions to intensive land use can only be consented where they meet Table 14.2 for the full term of the consent. Exceptions will be difficult to justify.

2.2. A consenting process is now in place that aligns with the Court's direction. Revised application forms and guidance material have been prepared, and are attached to this Report.

2.3. Considerably more information will now be required for applicants to lodge an application for intensive land-use consent. Officers are working to make information we hold more readily available. Even so, many farmers will require input from several technical experts, and may struggle to gather the evidence required for a complete application.

2.4. Our current understanding is that a significant number of existing farms are likely to be unable to meet the One Plan's nitrogen-reduction requirements while remaining economically viable. No practicable consenting pathway exists for these activities. Further advice is being sought on likely social and macroeconomic impacts.

2.5. A plan change appears necessary to resolve this impasse. This would require additional resource, and would be at least a year away from becoming operative.

3. RECOMMENDATION

That the Committee recommends that Council:

a. receives the information contained in Report No. 17-143 and Annexes;

b. notes that consenting processes for intensive land-use activities (including applications forms and guidance material) have been amended, in line with the Environment Court's direction;

c. notes that preparation of an adequate application for Restricted Discretionary consent will be technically challenging for applicants;

d. notes that the circumstances under which a Restricted Discretionary consent can be issued are limited, and that no practicable consenting pathway appears to exist for a significant number of affected farms;

e. instructs Officers to investigate plan change options.

4. FINANCIAL IMPACT

4.1. Current work is being carried out within existing budgets. Should Council embark on a plan change process, significant costs will be incurred.

5. COMMUNITY ENGAGEMENT

5.1. The intensive land use policies and rules in the One Plan are contentious. Officers have kept famers informed of progress via the Council's Dairy E-news. Several workshops have been held with rural consultants, most recently on 27 July 2017. Further engagement with both groups is planned following this advice to Council.

5.2. Staff have also met with Federated Farmers, Horticulture New Zealand and the Federation for Arable Research.

5.3. Staff attended a farmers drop in day organised by Dairy NZ in Dannevirke.

5.4. The Chair, Chief Executive and Group Manager Strategy and Regulation have met with the Mayor of Tararua District Council and the Tararua Economic Impact Society

5.5. Officers responded in detail to a letter from Fish & Game and the Environmental Defence Society on June 8th setting out Council's detailed response to the planning and legal letter previously received from Fish and Game and the Environmental Defence Society.

5.6. The Chief Executive further wrote to Fish and Game and the Environmental Defence Society updating them on implementation and offering to meet. This letter is attached as Annex B. A response was expected from Fish and Game as this agenda item was being finalised.

6. SIGNIFICANT BUSINESS RISK IMPACT

6.1. Initiating a plan change process can be costly and is a significant step for Council. Whilst this paper does not recommend that Council notify a prepared plan change it does recommend to Members that officers be instructed to prepare options for plan change.

6.2. A plan change will likely require Council to consider how it funds a plan change and the pathway it chooses to consider in initiating a plan change.

6.3. In the meantime Council is faced with the potential for a legal challenge over progress with implementation given there are existing intensive land uses that are not currently consented and would appear unlikely or unable to be consented under the current plan.

7. BACKGROUND

7.1. This paper contains a long series of annexes. For clarity these annexes are listed below:

Annex A One Plan Chapter 14 rules and policies for intensive land use

Annex B Letter of 26th July to Fish and Game and the Environmental Defence Society

Annex C Planning opinion on consenting pathways for intensive farming - Enfocus

Annex D One Plan – Intensive Farming land use activities – van Voorthuysen

Annex E Application - overview

Annex F Application – cover sheet

Annex G Application – activity description

Annex H Application – activity assessment

Annex I Application – nutrient management plan

Annex J Application – guide

Annex K Application – guide to RMA

Annex L Application – measures not covered through Overseer

Annex M Memo on AEE – van Voorthuysen

Annex N GSL modelling – Barrie Riddler

Annex O Impact of One Plan rule – Terry Parminter

7.2. The One Plan is a combined regional policy statement and regional plan that sets out the policy and rules for managing natural resources in the Horizons region.

7.3. The plan became fully operative on 19 December 2014.

7.4. The majority of the plan has not been contentious and officers continue to implement the plan across a wide range of activities and generally with good community acceptance. Essentially the majority of the plan has become business as usual.

7.5. The most contentious area of plan during both its development and implementation have been policies and rules requiring land use consents for intensive agriculture. The rules are primarily designed to limit the loss of diffuse contaminants to water and have a strong emphasis on nitrogen leaching.

7.6. A number of other regional plans around New Zealand have sought to tackle the issue of diffuse nutrient loss. It would be fair to say that a number of these plans have been informed by the challenges faced in implementing the land use policies and rules in the One Plan in the way they are being designed.

7.7. The intensive land use rules were first considered by the One Plan commissioners but their decision was appealed to the Environment Court and then to the High Court. Ultimately it was the Courts that decided the final approach in the One Plan to the policies and rules for intensive land use.

7.8. Council was concerned to continue to progress improvements to water quality and also of the impact of the operative policies and rules on communities.

7.9. The policies and rules for intensive land use are attached to this report as Annex A.

7.10. The plan evaluation process that has been previously reported to Council has already identified weaknesses in the construction of the One Plan and the likely need for Council to consider a plan change in order to give effect to the National Policy Statement for Freshwater Management.

7.11. The Environment Court's declarations of 21 March 2017 clarified matters that must be considered in relation to intensive land-use consents under the One Plan. Council has previously been briefed on the substance of those declarations.

7.12. Applicants must satisfy a number of requirements before their resource-consent applications can be considered by Council. These include: undertaking an assessment of environmental effects (AEE), which takes into account cumulative effects; assessing the proposed activity against the relevant objectives and policies of the One Plan; consideration of alternatives; and an assessment against the National Environmental Standards for Sources of Human Drinking Water (NESHDW) 2007.

7.13. Council staff must then consider a number of factors in making a decision. We must make a robust assessment of the relevant objectives and policies of the One Plan and of the National Policy Statement for Freshwater Management (NPSFM); consider sections 105 and 107 of the Resource Management Act (RMA) 1991; and assess the effects against the NESHDW. We are to consider the environmental effects (including cumulative effects) of the application, and the extent of non-compliance with the cumulative nitrogen leaching maxima (CNLM) identified in Table 14.2. In the event that CNLM are not achieved, Council is to assess the impact of the activity on Schedule B values and Schedule E targets.

7.14. Further, the Court instructed that numerical nitrogen leaching restrictions must be imposed as a condition of consent. Specific conditions relating to other contaminants, such as phosphorus and sediment, may also be required.

7.15. The Court made clear that Council cannot consider certain matters in determining an intensive land-use consent. Principle among these is the economic impact of any conditions imposed (such as reducing nitrogen leaching to the levels specified in Table 14.2). Put simply, economic and social effects are not matters over which discretion is reserved under the relevant rules; as such, they cannot form part of the decision-making process.

7.16. Changes to the consenting process to align with the Court's instructions have been a major focus for the Regulatory Group over the past four months. Work to date has confirmed the two major challenges presented by the One Plan's nutrient management framework: whether a viable consenting pathway exists for farms unable to meet Table 14.2; and, if such a pathway exists, whether applicants will be able to produce the information necessary to support such an application. These issues were outlined in Report 17-98, presented to this Committee on 7 June 2017.

7.17. As signalled to members in June, work has proceeded on three tracks:

- Ensuring process and documentation are legally robust and practically workable;
- Understanding what is required to generate a consent application that satisfies consenting requirements, and the likely impact on individual applicants and community as a whole; and
- Communication and engagement.

7.18. We indicated that, by the time this Committee next met, we would have completed work to revise consenting processes and documentation. We also undertook to update Members on the likely impact of those changes.

8. HORIZONS' OBLIGATIONS

8.1. This section addresses Council's statutory duty to give effect to its plan. Council is required to process consent applications, in accordance with the relevant legal and planning provisions, and to enforce others' compliance with those provisions. The following paragraphs outline the decision-making process we are required to follow. This advice is supported by the expert planning opinions of Mr Gerard Willis (Annex C) and Mr Rob van Voorthuysen (Annex D).

8.2. This section is not a commentary on the practicability of the plan as it stands. Whether the process described here provides a viable consenting pathway for affected properties is addressed separately, in Section 9 below.

8.3. Revised application forms and guidance material have been produced for intensive land-use consenting. These are attached as Annexes E-L. They have been externally peer reviewed to ensure they fulfil our legal obligations.

Applications that meet Controlled Activity requirements

8.4. The consenting process for activities – whether existing activities or conversions – that meet the Controlled Activity conditions remains relatively unproblematic. If intensive farming activities meet the matters of control listed in Rule 14-1 / 14-3, the Council must grant the resource consent and may impose conditions related to the matters of control.

8.5. The Court has instructed that all applications are to include an AEE and an assessment of the relevant objectives and policies of the One Plan and of the NPSFM. In accordance with the NESHDW, applicants must also identify any human drinking-water sources that may be

affected by the activity and the extent of any such effects. These requirements have been incorporated into the revised application forms.

8.6. It should be noted that, for activities in target catchments, the 'clock' on Table 14.2 starts on the date specified in Table 14.1 – not, for instance, on the date on which application for consent is lodged or when the consent is granted. The Mangapapa target catchment has just entered year 4; the Upper Manawatū target catchment is now in year 2. This is likely to have a limited impact in the context of Controlled Activities, but becomes more challenging in relation to applications for Restricted Discretionary consent (discussed below).

Applications that do not meet Controlled Activity requirements

8.7. Difficulties arise primarily in relation to activities that do not meet Controlled Activity requirements. Under the plan, all such activities are required to apply for a Restricted Discretionary consent. The Council can only decline consent, or impose consent conditions, in relation to the matters over which discretion is reserved.

Existing Use: clear Restricted Discretionary pathways

8.8. The One Plan's policies provide guidance as to how that available discretion should be exercised. The plan envisaged, and provides a pathway to consent for, existing operations that found themselves in the following situations when the rules came into effect:

- CNLM *are* met, but other matters of control (e.g. stock crossings) are not;
- CNLM are *not* met immediately, but will be met within four years;
- CNLM *are* not met, but half or more of the property comprises LUC IV to VIII and has an average annual rainfall of 1500mm or greater.

8.9. In each of these cases, an assessment of objectives and policies will be required, along with a thorough AEE. This will need to address particularly carefully the environmental effects associated with the Controlled Activity conditions that the applicant is unable to meet (e.g., the effects of a four-year delay in reaching the target nitrogen leaching levels). If the environmental effects can be shown to be acceptable, then a Restricted Discretionary consent may be granted.

Existing Use: Where no clear policy pathway exists

8.10. It is questionable whether a consent can be issued for an intensive land-use that neither meet Controlled Activity requirements nor fall into one of the categories listed at 8.8 above. This situation does not appear to have been foreseen in the One Plan's drafting – or, at least, it does not appear to have been foreseen that significant numbers of applicants would fall into it.

8.11. While the matters over which discretion is reserved under Rule 14-2 (and 14-4) include the extent of non-compliance with the CNLM, the challenge for planners is deciding how that discretion should be exercised. Any decision to grant consent where Table 14.2 is to be exceeded beyond the fourth year would hinge on reading Policy 14-6(c) separately from 14-6(b). There is an argument for this, but it is highly contestable.

8.12. Even were we to read Policy 14-6(c) separately from 14-6(b), a number of other directive policies in the One Plan (e.g. 5-7, 5-8, 14-5) make it difficult to justify exceptions. Since the activity (and its putative effects) departs from the framework envisaged by the plan, a more robust case would need to be made. The applicant will need to show that water quality is enhanced to meet either the Schedule E targets or the Schedule B values (that the targets are designed to protect). A series of questions are relevant in determining the sustainable limits for the resource including:

- The nature and cause of existing cumulative effects in the sub-zone;
- the significance of any such effects (impact on Schedule B values);

- the point at which those effects become unacceptable in that sub-zone;
- the reliability of the evidence regarding the cause and impact of existing effects;
- whether existing cumulative effects are already such that no further consent should be granted, or such that later consents should be granted with more stringent conditions;
- the likely nature and degree of the additional cumulative effect caused by the proposed land-use activities; and
- whether the cumulative effects of the additional nutrients can be adequately avoided, remedied or mitigated by way of conditions and adaptive management.

8.13. The responsibility for demonstrating these effects rests with the applicant. Moreover, any such application is likely to be notified. While a pathway *may* legally exist, it is likely to be *very difficult* in practice to apply. It will be viable for rare exceptions, if at all.

Conversions: Restricted Discretionary pathways

8.14. As has been noted above, if applications for new intensive land-use activities meet the Controlled Activity conditions, resource consent must be granted. This does not differ substantially from the situation with existing activities. It also makes no practical difference whether a proposed activity is inside or outside a target catchment.

8.15. If, however, a proposed conversion does not meet the Controlled Activity criteria, no provision exists to extend timeframes to meet CNLM. This is because the Policy 14-6(b) exceptions apply only to existing intensive land uses.

8.16. Consideration of any application for consent under Rule 14-4 (Restricted Discretionary conversion) is extremely difficult, due to the same directive policies mentioned in paragraph 8.12 above. If Schedule E targets are currently met in the relevant water management sub-zone, the applicant would have to show that water quality is *maintained* – that is, that the proposed activity does not make matters worse. If water quality in the catchment does not meet the Schedule E targets (which by definition includes, but is not restricted to, all target catchments), the applicant would need to demonstrate that the proposed activity could be operated in a way that *enhances* water quality.

8.17. Where CNLM are met, but other conditions are not, this would require a thorough AEE. That assessment would need to focus particularly on the areas of non-compliance (for example, fertiliser application, or how feedpads are used) and their associated effects. This should be achievable, albeit at increased cost. Indeed, the fact that Rule 14-4 (enabling a Restricted Discretionary pathway for conversions) exists alongside Policy 14-5(e) (requiring *all* conversions to meet Table 14.2) suggests that the plan's authors envisaged just this situation arising.

8.18. Where CNLM are *not* met, especially within a target catchment, it is very difficult to see how the proposed activity would enhance water quality – except, perhaps, if it could be demonstrated that the prior 'non-intensive' land use had a greater environmental effect (including, specifically, on Schedule B values and Schedule E targets) than the proposed 'intensive' activity. The considerations an applicant must address would mirror those outlined above at 8.12. The case, if anything, is more difficult because of Policy 14-5(e), mentioned above.

Industry compliance

8.19. These difficulties notwithstanding, the legal requirement for intensive land uses to obtain consent in order to continue to operate remains. Under the RMA, an existing activity may continue without consent for six months after a rule requiring consent come into effect (RMA section 20A). That period has now passed in all target catchments. All intensive land uses in those areas that have not yet sought consent are thus unauthorised.

8.20. This is tempered by the reality that the timeframes laid out in Table 14.1 for catchment consenting have proven to be unachievable. Neither Council nor industry has the resource to prepare and process resource consents at the rate the plan envisaged. Unforeseen difficulties with the rule framework only exacerbate this situation.

8.21. Given the practical difficulties with continued implementation of the consenting process, we are conscious that any regulatory action must be carefully considered. To this end, legal advice is presently being sought to provide guidance to staff.

9. APPLICANTS' ABILITY TO OBTAIN AND EXERCISE CONSENT

9.1. The next question to be addressed is the workability of the framework described above from an applicant's perspective. There are two dimensions to this: the feasibility of preparing a suitable application, and the feasibility of exercising the resulting resource consent. These will be addressed separately.

Obtaining consent

9.2. Applicants will need to include substantially more information in their consent applications than they have hitherto. This includes explicit assessment against the objectives and policies of the One Plan and the NPSFM, the NESHDW, consideration of alternatives, and an AEE.

9.3. These requirements apply to all consent applications – whether Controlled Activity or Restricted Discretionary, whether existing use or conversion. For activities that do not meet the Controlled Activity conditions, more information is required. The further the proposed activity departs from the plan's presumptions, the more scrutiny consent planners are required to exercise, and therefore the greater the need for supporting evidence.

9.4. The RMA requires (and the Court has confirmed) that AEEs are to be prepared by the applicant. The Court has instructed that AEEs are to consider both the effects of the individual operation to be consented, and cumulative effects across the catchment. Such effects may need to be considered at multiple scales: the farm's local tributary, the target catchment, the river system as a whole, and potentially the coastal-marine area.

9.5. Our understanding of catchment dynamics continues to evolve, and the pieces do not always fit together neatly. The very uncertainties that have opened a gap between Table 14.2 and current OVERSEER estimates are likely to make it difficult in the extreme for an individual applicant to demonstrate (for better or worse) the cumulative effect of land use on instream values – indeed, this is an area that remains challenging for Council itself, notwithstanding the substantial resource we dedicate to it.

9.6. Horizons may be able to assist by making the information it holds on cumulative effects more readily available to applicants, in the form of catchment summaries. We are presently working to produce such a summary for the Upper Manawatū catchment – both to assist applicants in that area and as a template for other catchments. This, tentatively, will cover state and trend of water quality indicators, and their consistency with One Plan targets; total nutrient and sediment loads, and source attribution. These summaries will have their limitations: we expect that applicants will have to undertake significant investigation to assess the effects of their particular operation.

9.7. It is estimated that a Controlled Activity application (pathway A) will cost around $10,000 to prepare (roughly three times the cost of preparing a Controlled activity consent application to date). This could still be completed by the farm consultant, after some training on planning and AEE matters.

9.8. Producing the necessary information to support applications for Restricted Discretionary consents is likely to require the involvement of technical experts such as planners and environmental scientists as well as a farm consultant. As a result, the cost to the applicant

is likely to be in the order of $20,000–30,000. Costs associated with notification (if required), and Council processing, would be in addition to that figure.

9.9. There remains some doubt as to whether it is technically *possible* to produce an AEE sufficient to support an application for an activity that is unable to reach the Table 14.2 maxima.

9.10. This represents a significant increase in cost and complexity for the applicant. Mr van Voorthuysen has expressed concerns about the workability of the process for applicants (attached at Annex M). This may be the direction that environmental regulation is inevitably taking. We have recently seen an example of an application for conversion of a medium-sized property to dairy in another region: it was several centimetres thick and represented the work of at least five different technical specialists.

Exercising consent

9.11. One inexorably arrives at the conclusion that, other than the small number to which Policy 14-6(b)(i) applies, the One Plan does require that all farms reduce their leaching to the levels specified in Table 14.2 within four years of the Table 14.1 dates. Should they fail to obtain consent, or fail to comply with nitrogen limits to be written into their consent, Council staff will be required to consider enforcement action.

9.12. This, of course, was broadly what the Court intended when it wrote this part of the plan. Judge Thompson stated in his 2012 decision on the then-proposed One Plan (paragraph 5-8):

"We will never know all there is to know. But what we undoubtedly do know is that in many parts of the region the quality of the natural water is degraded … We also know what is causing that decline, and we know how to stop it, and reverse it. To fail to take available and appropriate steps … would be inexcusable."

9.13. Whether the One Plan's policies are 'right' and Table 14.2 set at the correct level is a question for plan review. The reality in the interim is that significant numbers of farms are likely to have estimated nitrogen leaching rates well in excess of the relevant CNLM. What is the likely effect of having to change farming systems to achieve year 1 target leaching rates no later than 2020 (and earlier in many catchments)?

GSL modelling

9.14. Work conducted for Horizons by Barrie Ridler in 2016 suggested that for many farms, reductions in nitrogen leaching were possible without compromising profitability. A version of his report, redacted to remove details of specific properties, is attached at Annex N.

9.15. The key to this is farm-system optimisation. A series of measures aimed at making more efficient use of resources (reducing cow numbers, eliminating brought-in feed, increasing effluent area, grazing off, etc.) can produce better environmental and economic results.

9.16. A crucial caveat is that Mr Ridler's brief was not to model the effects of operating at any particular nitrogen-leaching rate. The study's purpose was to inform evaluation of how well the One Plan is meeting the intent of Policy 5-8 (achieve water quality strategies; recognise the productive capability of land; be achievable on most farms through good management practice; provide appropriate timeframes for large changes). For each of the three farms modelled in the Tararua District, the 'optimal' point identified by this study was well above Table 14.2. For the two farms modelled in the Rangītikei, the optimal level fell below Table 14.2. This is illustrated in Table 1 below:

Area	Base N-loss (kg/ha)	Optimised N-loss (kg/ha)	Change in profitability
Mangatainoka (dairy)	66	40	+22%
Mangatainoka (dairy)	62	45	+21%
Mangatainoka (dairy)	47	20	+30%
Rangītikei (dairy)	26	23	+27%
Rangītikei (dairy)	20	13	+437%

Table 1: Optimised N-leaching rates for five farms, GSL modelling

Farmax modelling

9.17. More recently, we commissioned Terry Parminter to investigate the financial implications for farmers of meeting the requirements set out in this paper (see Annex O).

9.18. Whereas Mr Ridler looked at optimisation of five specific dairy farms, Dr Parminter looked at six modelled scenarios: Four dairy farming systems under conditions typical of the Tararua District and two arable farm systems typical of the Rangītikei. A 'farm management' approach was taken, to determine the costs to individual farmers of obtaining and implementing their land-use consents. This analysis was reviewed by Dr Katie Bicknell (Lincoln University), and is a common approach to exploring the farm-level impact of policy changes.

9.19. The nitrogen-loss targets Dr Parminter uses mimic year 20 targets for soils typical of the area in question. Most of the reduction required is to reach the year 1 target, with the lid sinking relatively slowly (and slightly) after that.

Area	Base N-loss (kg/ha)	Target N-loss (kg/ha)	Change in profitability
Tararua (self-contained dairy)	32	18	-61%
Tararua (low-intensity dairy)	42	17	-42%
Tararua (medium-intensity dairy)	54	17	-24%
Tararua (high-intensity, irrigated dairy)	64	17	-25%
Rangītikei (arable, with livestock)	45	20	-48%
Rangītikei (arable, with potatoes)	50	19	-64%

Table 2: Change in profitability for six farm systems to comply with CNLM, Farmax

9.20. All farming systems were required to reduce their stocking rates to reach target nitrogen levels. All farming systems became less profitable, by between 24 and 64 percent (see Table 2 above). The arable farms modelled, and the two lower-intensity dairy systems, would struggle to survive; to do so, they would have to operate with significantly less debt than is typical. Return on investment would likely be insufficient to attract off-farm investment – restricting their ability to introduce the systemic changes necessary to operate at target leaching rates.

9.21. While the more-intensive dairy systems also became significantly less profitable, they would likely still be in a position to service their debts and deliver an adequate return on investment. This would involve measures such as installing a covered barn – so that even as they reduced stocking rates, these farms would become more capital-intensive.

9.22. Realistically, farms would likely need a number of years to put all the mitigations in place. This is not only due to the capital investment required; operating at a reduced stocking rate requires careful pasture management, implying a step up in monitoring infrastructure and probably also expertise. They would thus require a Restricted Discretionary consent.

Anticipated farm-scale effects

9.23. A large proportion of farms left to be consented (approximately 140) are in the Upper Manawatū. Most are likely to have estimated leaching rates well above Table 14.2; most will broadly mirror the two lower-intensity dairy systems modelled by Dr Parminter.

9.24. There are methodological differences between the reports. Both necessarily involve constraints and assumptions. This should not distract from the bigger picture. Accepting Mr Ridler's findings, affordable on-farm improvements to reduce nitrogen leaching will be possible in many cases. Driving reductions in nitrogen leaching to Table 14.2, however, would drive many farms well beyond the point of optimisation.

9.25. Dr Parminter's study suggests that many farms would not survive the magnitude and pace of change the One Plan requires. The farms likely to be more resilient, paradoxically, are the more intensive ones, even as stocking rates decline. Less intensive operations are unlikely to be able to attract the investment they need or provide their owners with financial security.

9.26. Although this is, perhaps, suggestive of the direction of travel of the industry nationally, at a local scale the rate of change could be expected to cause significant economic and social disruption. Those wider effects will be the focus of a further block of work currently being commissioned.

10. CONSULTATION

10.1. Planning aspects of this report have been informed by advice procured from Gerard Willis and Rob van Voorthuysen – both respected independent planning experts. Updated consent application forms and guidance material have been reviewed by Buddle Findlay to ensure it complies with the Court's directions. Our understanding of the likely impacts on typical farming operations draws on advice from Dr Terry Parminter, in particular, and also an earlier report produced by Mr Ridler.

10.2. We have sought to engage with representatives of Fish & Game and the Environmental Defence Society (including their planning practitioners) to check that our understanding of the process requirements aligns with theirs; they have not yet responded to that invitation.

11. NEXT STEPS

11.1. In his commentary on the recent Declarations (paragraph 185), Judge Thompson made it clear that, if Council had concerns about any part of the plan, it should propose changes to it. It seems hard to avoid the conclusion that a plan change is what we now face.

11.2. Issues go beyond the obvious difficulties with consenting dairy farms. Land treatment of Foxton's wastewater – in accordance with Policy 5-11 of the One Plan – is problematic because the proposed 'conversion' cannot meet CNLM as required by Policy 14-5. This seems a perverse outcome, and may affect other proposals to discharge wastewater to farm land.

11.3. We have previously advised the Committee that a broad programme of plan review will be necessary to fully give effect to the NPSFM, and to address unforeseen consequences of the way the One Plan was drafted. We may, in due course, wish to consider a fundamental rethink of the plan's approach to nutrient management. That, however, is several years' work and beyond the scope of this paper. It is necessary, but will not resolve the more immediate impasse we face with intensive land-use consenting.

11.4. Relatively small, targeted amendments could address the more pressing inconsistencies between objectives, policies and rules, providing a viable pathway to bring farms into a consenting regime. To achieve this reasonably swiftly, we must remain focused on addressing the immediate issues as surgically as possible – and set aside wider changes to the nutrient management framework or intended water quality outcomes for another day. This means, among other things, continuing to work towards achieving Schedule E targets where they are not met, and maintaining them where they are.

11.5. Any plan change proposal must be supported by analysis of the policy's anticipated environmental, economic, social, and cultural effects. By convention, this includes consideration of the status quo. The information discussed in this paper will feed into that policy analysis. Further work is being commissioned to better understand effects on the horticultural sector, and on a wider social and macroeconomic scale.

11.6. The Resource Legislation Amendment Act 2017 introduced alternative processes for plan change – a 'streamlined' planning process and a 'collaborative' planning process. We are currently working through the details of those provisions, and will provide further advice to Council on the relative merits of the available options.

11.7. Whichever process we adopt, it is likely to be at least twelve months before any change could be made operative. No plan change that deals with nutrient management – however 'surgical' its intended effect – will be straightforward.

11.8. The major hurdle, in the interim, is how to deal with existing intensive land-use activities for which no viable consenting pathway presents itself. Management is seeking further legal advice on our best approach. We will keep Members informed of progress.

12. SIGNIFICANCE

12.1. This is not a significant decision according to the Council's Policy on Significance and Engagement. Triggering the Council's significance policy under the Local Government Act would mean a need for Council to consult on an issue. Triggering a plan change under the Resource Management Act results in the need for public consultation. Council has not triggered a RMA process via the recommendations in this report.

Tom Bowen
MANAGER STRATEGY & POLICY

Greg Bevin
REGULATORY MANAGER

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GROUP MANAGER STRATEGY & REGULATION

ANNEXES

A One Plan Chapter 14 rules and policies for intensive land use
B Follow up letter to Fish & Game dated 26 July
C Planning opinion on consenting pathways for intensive farming
D Intensive farming land use activities
E Nutrient management consenting overview
F Application: Cover sheet
G Application: Activity description
H Application: Activity Assessment
I Farm nutrient management plan template
J Guide to preparing an AEE
K Statutory Provisions

L Mitigations outside OVERSEER

M Memo on AEE

N The feasibility of nutrient leaching reductions (redacted)

O An impact assessment of One Plan policies and rules

(c) adopting different treatment and *discharge*^ options for different receiving *environments*^ or at different times (including different flow regimes or levels in surface *water bodies*^).

Policy 14-5: Management of intensive farming *land*^ uses

In order to give effect to Policy 5-7 and Policy 5-8, intensive farming *land*^ use activities affecting groundwater and surface water quality must be managed in the following manner:

(a) The following land uses have been identified as intensive farming *land*^ uses:

- (i) *Dairy farming**
- (ii) *Commercial vegetable growing**
- (iii) *Cropping**
- (iv) *Intensive sheep and beef**

(b) The intensive farming *land*^ uses identified in (a) must be regulated where:

- (i) They are existing intensive farming *land*^ uses, in the targeted *Water Management Sub-zones** identified in Table 14.1.
- (ii) They are new (ie., established after the Plan has legal effect[1]) intensive farming *land*^ uses, in all *Water Management Sub-zones** in the Region.

(c) Nitrogen leaching maximums have been established in Table 14.2.

(d) Existing intensive farming *land*^ uses regulated in accordance with (b)(i) must be managed to ensure that the leaching of nitrogen from those *land*^ uses does not exceed the *cumulative nitrogen leaching maximum** values for each year contained in Table 14.2, unless the circumstances in Policy 14-6 apply.

(e) New intensive farming *land*^ uses regulated in accordance with (b)(ii) must be managed to ensure that the leaching of nitrogen from those *land*^ uses does not exceed the *cumulative nitrogen leaching maximum** values for each year contained in Table 14.2.

(f) Intensive farming *land*^ uses regulated in accordance with (b) must exclude cattle from:

- (i) A wetland or lake that is a *rare habitat**, *threatened habitat** or *at-risk habitat**.
- (ii) Any river that is permanently flowing or has an *active bed** width greater than 1 metre.

(g) All places where cattle cross a river that is permanently flowing or has an *active bed** width greater than 1 metre must be culverted or bridged and those culverts or bridges must be used by cattle whenever they cross the river.

[1] The Plan has legal effect in the case of *dairy farming** from 24 August 2010 and for *commercial vegetable growing**, *cropping** and *intensive sheep and beef** it has legal effect from 9 May 2013.

Policy 14-6: Resource consent decision-making for intensive farming land^ uses

When making decisions on *resource consent*^ applications, and setting consent *conditions*^, for intensive farming *land*^ uses the Regional Council must:

(a) Ensure the nitrogen leaching from the land is managed in accordance with Policy 14-5.

(b) An exception may be made to (a) for existing intensive farming *land*^ uses in the following circumstances:

(i) where the existing intensive farming *land*^ use occurs on land that has 50% or higher of LUC Classes IV to VIII and has an average annual rainfall of 1500 mm or greater; or

(ii) where the existing intensive farming *land*^ use cannot meet year 1 *cumulative nitrogen leaching maximums** in year 1, they shall be managed through conditions on their resource consent to ensure year 1 *cumulative nitrogen leaching maximums** are met within 4 years.

(c) Where an exception is made to the *cumulative nitrogen leaching maximum** the existing intensive farming *land*^ uses must be managed by consent conditions to ensure:

(i) Good management practices to minimise the loss of nitrogen, phosphorus, faecal contamination and sediment are implemented.

(ii) Any losses of nitrogen, which cannot be minimised, are remedied or mitigated, including by other works or environmental compensation. Mitigation works may include but are not limited to, creation of wetland and riparian planted zones.

(d) Ensure that cattle are excluded from surface water in accordance with Policy 14-5 (f) and (g) except where landscape or geographical constraints make stock exclusion impractical and the effects of cattle stock movements are avoided, remedied or mitigated. In all cases any unavoidable losses of nitrogen, phosphorus, faecal contamination and sediment are remedied or mitigated by other works or environmental compensation. Mitigation works may include (but are not limited to) creation of wetland and riparian planted zones.

Policy 14-7: Management of discharges^ of domestic wastewater*

When making decisions on *resource consent*^ applications, and setting consent *conditions*^, for on-site *discharges*^ of *domestic wastewater**, the Regional Council must generally ensure that the *discharge*^ is in accordance with the Manual for On-site Wastewater Systems Design and Management (Horizons Regional Council 2010).

For *discharges*^ that are not in accordance with the Manual for On-site Wastewater Systems Design and Management (Horizons Regional Council 2010) the Regional Council must make decisions on *resource consent*^ applications, and set consent *conditions*^, for on-site *discharges*^ of *domestic wastewater**, to ensure that:

(a) the *site** is suitable for the intended on-site wastewater management system,

14.3 Rules - Agricultural Activities

Table 14.1 sets out the target *Water Management Sub-zones** where management of existing intensive farming *land*^ use activities must be specifically controlled.

Table 14.1 Targeted *Water Management Sub-zones**

Catchment	*Water Management Sub-zone**	Date the Rules of the Plan have legal effect[2] in relation to Rule 14-1
Mangapapa	Mangapapa Mana_9b	1 July 2014
Waikawa	Waikawa West_9a Manakau West_9b	1 July 2014
Other south-west catchments (Papaitonga)	Lake Papaitonga West_8	1 July 2014
Mangatainoka	Upper Mangatainoka Mana_8a Middle Mangatainoka Mana_8b Lower Mangatainoka Mana_8c Makakahi Mana_8d	1 July 2015
Other coastal lakes	Northern Manawatu Lakes West_6 Kaitoke Lakes West_4 Southern Wanganui Lakes West _5	1 July 2015
Coastal Rangitikei	Coastal Rangitikei Rang_4	1 July 2015
Lake Horowhenua	Lake Horowhena Hoki_1a Hokio Hoki_1b	I July 2015
Upper Manawatu above Hopelands	Upper Manawatu Mana_1a Mangatewainui Mana_1b Mangatoro Mana_1c Weber-Tamaki Mana_2a	1 July 2016

2 The Plan has legal effect in the case of *dairy farming** from 24 August 2010 and for *commercial vegetable growing**, *cropping** and *intensive sheep and beef** it has legal effect from 9 May 2013.

Catchment	*Water Management Sub-zone**	Date the Rules of the Plan have legal effect[2] in relation to Rule 14-1
	Mangatera Mana_2b Upper Tamaki Mana_3 Upper Kumeti Mana_4 Tamaki-Hopelands Mana_5a Lower Tamaki Mana_5b Lower Kumeti Mana_5c Oruakeretaki Mana_5d Raparapawai Mana_5e	
Manawatu above gorge	Hopelands-Tiraumea Mana_6 Upper Gorge Mana_9a Mangaatua Mana_9c	1 July 2016

Table 14.2 sets out the *cumulative nitrogen leaching maximum** for the *land*^ used for intensive farming *land*^ use activities within each specified *land use capability class**.

Table 14.2 *Cumulative nitrogen leaching maximum** by *Land Use Capability Class**

Period (from the year that the rule has legal effect[3])	*LUC** I	*LUC** II	*LUC** III	*LUC** IV	*LUC** V	*LUC** VI	*LUC** VII	*LUC** VIII
Year 1	30	27	24	18	16	15	8	2
Year 5	27	25	21	16	13	10	6	2
Year 10	26	22	19	14	13	10	6	2
Year 20	25	21	18	13	12	10	6	2

3 The Plan has legal effect in the case of *dairy farming** from 24 August 2010 and for *commercial vegetable growing**, *cropping** and *intensive sheep and beef** it has legal effect from 9 May 2013.

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
14-1 Existing intensive farming *land*^ use activities	The use of *land*^ pursuant to s9(2) RMA for any of the following types of intensive farming: (i) *dairy farming** (ii) *commercial vegetable growing** (iii) *cropping** (iv) *intensive sheep and beef farming** that was existing in *the Water Management Sub-zones** listed in and from the dates specified in Table 14.1 and any of the following *discharges*^ pursuant to ss15(1) or 15(2A) RMA associated with that intensive farming: (a) the *discharge*^ of *fertiliser** onto or into *land*^ (b) the *discharge*^ of *contaminants*^ onto or into *land*^ from (i) the preparation, storage, use or transportation of stock feed on *production land*^ (ii) the use of a *feedpad** (c) the *discharge*^ of *grade Aa biosolids*^ or *compost** onto or into *production land*^ (d) the *discharge*^ of *poultry farm litter** onto or into *production land*^ (e) the *discharge*^ of farm *animal effluent** onto or into *production land*^ (or upon expiry or surrender of any existing consent for that *discharge*^) including: (i) effluent from dairy sheds and	**Controlled**	(a) A *nutrient management plan** must be prepared for the *land*^, and provided annually to the Regional Council. (b) The activity must be undertaken in accordance with the *nutrient management plan** prepared under (a). (c) The *nutrient management plan** prepared under (a) must demonstrate that the nitrogen leaching loss from the activity will not exceed the *cumulative nitrogen leaching maximum** specified in Table 14.2. (d) Cattle must be excluded from: (i) *wetlands*^ and *lakes*^ that are a *rare habitat** or *threatened habitat**, *and* (ii) the *beds*^ of *rivers*^ that are permanently flowing or have an *active bed** width greater than 1 m. (e) *Rivers*^ that are permanently flowing or have an *active bed** width greater than 1 m, that are crossed by cattle must be bridged or culverted, and the cattle must cross via that bridge or culvert, and run-off originating from the carriageway of the bridge or culvert must be *discharged*^ onto or into *land*^. (f) The *discharge*^ of *fertiliser** onto or into *land*^ and any ancillary *discharge*^ of *contaminants*^ into air must comply with the *conditions*^ of Rule 14-5. (g) 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 14-6. (h) The *discharge*^ of grade Aa *biosolids** or *compost** onto or into *production land*^ and any ancillary	Control is reserved over: (a) the implementation of the *nutrient management plan** (b) compliance with the *cumulative nitrogen leaching maximum** specified in Table 14.2 (c) the matters of control in Rule 14-11 (d) avoiding, remedying or mitigating the effects of odour, dust, *fertiliser** drift or effluent drift (e) provision of information including the *nutrient management plan** (f) duration of consent (g) review of consent *conditions*^ (h) compliance monitoring. *Resource consent*^ applications under this *rule*^ will not be notified and written approval of affected persons will not be required (notice of applications need not be *served*^ on affected persons).

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	*feedpads** (ii) effluent received from piggeries (iii) sludge from farm effluent ponds (iv) poultry farm effluent and any ancillary *discharge*^ of *contaminants*^ into air pursuant to ss15(1) or 15(2A) RMA. Where the existing intensive farming *land*^ use is located partly on land within one or more of the *water management sub-zones** listed in Table 14.1 and partly on other land, this rule only applies: (a) if at least 20% of the existing intensive farming *land*^ use is located on land within the listed *water management sub-zones**; and (b) to the portion of the existing intensive farming *land*^ use that is located within the listed *water management sub-zones**.		*discharge*^ of *contaminants*^ into air must comply with the *conditions*^ of Rule 14-7. (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 14-9. (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 14-11.	
14-2 Existing intensive farming *land*^ use activities not complying with Rule 14-1	The use of *land*^ pursuant to s9(2) RMA for any of the following intensive farming: (i) *dairy farming** (ii) *commercial vegetable growing** (iii) *cropping** (iv) *intensive sheep and beef farming** that was existing in *the Water Management Sub-zones** listed in and from the dates specified in Table 14.1, and any of the following *discharges*^ pursuant to ss15(1) or 15(2A) RMA associated with intensive	**Restricted Discretionary**		Discretion is restricted to: (a) preparation of and compliance with a *nutrient management plan** for the *land*^ (b) the extent of non-compliance with the *cumulative nitrogen leaching maximum** specified in Table 14.2 (c) measures to avoid, remedy or mitigate nutrient leaching, faecal contamination and sediment losses from the *land*^ (d) measures to exclude cattle from

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	farming, that do not comply with one or more of the *conditions*^, standards and terms of Rule 14-1: (a) the *discharge*^ of *fertiliser** onto or into *land*^ (b) the *discharge*^ of *contaminants*^ onto or into *land*^ from (i) the preparation, storage, use or transportation of stock feed on *production land*^ (ii) the use of a *feedpad** (c) the *discharge*^ of *grade Aa biosolids*^ or *compost** onto or into *production land*^ (d) the *discharge*^ of *poultry farm litter** onto or into *production land*^ (e) the *discharge*^ of farm *animal effluent** onto or into *production land*^ (or upon expiry or surrender of any existing consent for that *discharge*^) 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 pursuant to ss15(1) or 15(2A) RMA.			*wetlands*^ and *lakes*^ that are a *rare habitat** or *threatened habitat**, and *rivers*^ that are permanently flowing or have an *active bed** width greater than 1 m (e) the bridging or culverting of *rivers*^ that are permanently flowing or have an *active bed** width greater than 1 m that are crossed by cattle (f) the matters referred to in the *conditions*^ of Rules 14-5, 14-6, 14-7, and 14-9 (g) the matters referred to in the *conditions*^ of Rule 14-11 and the matters of control in Rule 14-11 (h) avoiding, remedying or mitigating the effects of odour, dust, *fertiliser** drift or effluent drift (j) provision of information including the annual *nutrient management plan** (k) duration of consent (l) review of consent *conditions*^ (m) compliance monitoring.
14-3 New intensive farming *land*^ use activities	The use of *land*^ pursuant to s9(2) RMA for any conversion to any of the following intensive farming:	**Controlled**	(a) A *nutrient management plan** must be prepared for the *land*^ and provided annually to the Regional Council.	Control is reserved over: (a) the implementation of the *nutrient management plan**

Discharges to Land and Water

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	(i) *dairy farming** (ii) *commercial vegetable growing** (iii) *cropping** (iv) *intensive sheep and beef farming** that occurs from the date this rule has legal effect[4] anywhere within the Region and any of the following *discharges^* pursuant to ss15(1) or 15(2A) RMA associated with that intensive farming: (a) the *discharge^* of *fertiliser** onto or into *land^* (b) the *discharge^* of *contaminants^* onto or into *land^* from (i) the preparation, storage, use or transportation of stock feed on *production land^* (ii) the use of a *feedpad** (c) the *discharge^* of *grade Aa biosolids^*, or *compost** onto or into *production land^* (d) the *discharge^* of *poultry farm litter** onto or into *production land^* (e) 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		(b) The activity must be undertaken in accordance with the *nutrient management plan** prepared under (a). (c) The *nutrient management plan** prepared under (a) must demonstrate that the nitrogen leaching loss from the activity will not exceed the *cumulative nitrogen leaching maximum** specified in Table 14.2. (d) Cattle must be excluded from: (i) *wetlands^* and *lakes^* that are a *rare habitat** or *threatened habitat**, *and* (ii) the *beds^* of *rivers^* that are permanently flowing or have an *active bed** width greater than 1 m. (e) *Rivers^* that are permanently flowing or have an *active bed** width greater than 1 m, that are crossed by cattle, must be bridged or culverted and the cattle must cross via that bridge or culvert, and run-off originating from the carriageway of the bridge or culvert must be *discharged^* onto or into *land^*. (f) The *discharge^* of *fertiliser** onto or into *land^* and any ancillary *discharge^* of *contaminants^* into air must comply with the *conditions^* of Rule 14-5. (g) 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 14-6. (h) The *discharge^* of *grade Aa biosolids** or *compost** onto or into *production land^* and any ancillary *discharge^* of *contaminants^* into air must comply with	(b) compliance with the *cumulative nitrogen leaching maximum** specified in Table 14.2 (c) the matters of control in Rule 14-11 (d) avoiding, remedying or mitigating the effects of odour, dust, *fertiliser** drift or effluent drift (e) provision of information including the *nutrient management plan** (f) duration of consent (g) review of consent *conditions^* (h) compliance monitoring. *Resource consent^* applications under this *rule^* will not be notified and written approval of affected persons will not be required (notice of applications need not be *served^* on affected persons).

[4] The rule has legal effect in the case of *dairy farming** from 24 August 2010 and for *commercial vegetable growing**, *cropping** and *intensive sheep and beef** it has legal effect from 9 May 2013.

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	and any ancillary *discharge*^ of *contaminants*^ into air pursuant to ss15(1) or 15(2A) RMA.		the *conditions*^ of Rule 14-7. (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 14-9. (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 14-11.	
14-4 New intensive farming *land*^ use activities not complying with Rule 14-3	The use of *land*^ pursuant to s9(2) RMA for any of the following intensive farming (i) *dairy farming** (ii) *commercial vegetable growing** (iii) *cropping** (iv) *intensive sheep and beef farming** that occurs from the date this rule has legal effect[5] anywhere within the Region, and any of the following *discharges*^ pursuant to ss15(1) or 15(2A) RMA associated with intensive farming, that do not comply with one or more of the *conditions*^, standards and terms of Rule 14-3: (a) the *discharge*^ of *fertiliser** onto or into *land*^	**Restricted Discretionary**		Discretion is restricted to: (a) preparation of and compliance with a *nutrient management plan** for the *land*^ (b) the extent of non-compliance with the *cumulative nitrogen leaching maximum**specified in Table 14.2 (c) measures to avoid, remedy or mitigate nutrient leaching, faecal contamination and sediment losses from the *land*^ (d) measures to exclude cattle from *wetlands*^ and *lakes*^ that are a *rare habitat** or *threatened habitat**, and *rivers*^ that are permanently flowing or have an *active bed** width greater than 1 m

[5] The rule has legal effect in the case of *dairy farming** from 24 August 2010 and for *commercial vegetable growing**, *cropping** and *intensive sheep and beef** it has legal effect from 9 May 2013.

Rule	Activity	Classification	Conditions/Standards/Terms	Control/Discretion Non-Notification
	(b) the *discharge*^ of *contaminants*^ onto or into *land*^ from (i) the preparation, storage, use or transportation of stock feed on *production land*^ (ii) the use of a *feedpad** (c) the *discharge*^ of *grade Aa biosolids*^ or *compost** onto or into *production land*^ (d) the *discharge*^ of *poultry farm litter** onto or into *production land*^ (e) 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 pursuant to ss15(1) or 15(2A) RMA.			(e) the bridging or culverting of *rivers*^ that are permanently flowing or have an *active bed** width greater than 1 m that are crossed by cattle (f) the matters referred to in the *conditions*^ of Rules 14-5, 14-6, 14-7, and 14-9 (g) the matters referred to in the *conditions*^ of Rule 14-11 and the matters of control in Rule 14-11 (h) avoiding, remedying or mitigating the effects of odour, dust, *fertiliser** drift or effluent drift (i) provision of information including the annual *nutrient management plan** (j) duration of consent (k) review of consent *conditions*^ (l) compliance monitoring.
14-5 ***Fertiliser****	The *discharge*^ of *fertiliser** onto or into *land*^ pursuant to ss15(1) or 15(2A) RMA and any ancillary *discharge*^ of *contaminants*^ into air pursuant to ss15(1) or 15(2A) RMA, except where the *discharge*^ is undertaken in association with a use of *land*^ controlled by Rules 14-1 to 14-4.	**Permitted**	(a) There must be no direct *discharge*^ of *fertiliser** into any surface *water body*^ or its *bed*^ or *artificial watercourse** other than as provided for under (b). (b) All reasonable measures must be taken to prevent: (i) any *discharge*^ of *fertiliser** within the *bed*^ of a *river*^ that is permanently flowing or has an *active bed** width greater than 2 m, or any *lake*^ or *wetland*^ that has an area of 1 ha or more (ii) any *discharge*^ into any *rare habitat**, *threatened habitat** or *at-risk habitat**, except for the purpose	

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26 July 2017

Phil Teal
Chief Executive
Wellington Fish and Game Council
P O BOX 1325
PALMERSTON NORTH

File ref:OMS10 23
MJM:RH

VIA EMAIL ONLY
pteal@fishandgame.org.nz

Dear Phil

IMPLICATIONS OF THE ENVIRONMENT COURT DECLARATIONS

I wrote to you on 8 June 2017 with a detailed reply to your earlier correspondence. Having not heard further from you, I reiterate my offer to meet with you to discuss implementation of the intensive land use policies and rules in the One Plan.

As you know Council has been working on a revised set of guidance material for applicants following the Environment Court declarations. In doing so Horizons has sought professional legal and planning advice alongside the work of council staff. We have also considered the planning advice you provided to us. The guidance documents will be finalised in the next few weeks and I will be taking them in draft to Council's Strategy and Policy in August.

Council staff have also been considering the ability of applicants to provide an adequate application, to obtain and to exercise a consent for intensive land use. This includes understanding the implications of the declarations and the rules and policies for farmers and our communities. The outcomes of work completed to date will be reported to Council's Strategy and Policy Committee in August. Once this committee meeting has occurred I suggest it would be valuable for our organisations to engage further on the implications of this work. Clearly there is a significant level of community concern and uncertainty so I suggest that if you do wish to discuss this work it should be before the end of August.

I reiterate my offer to continue to engage with the Environmental Defence Society and Fish & Game.

Yours sincerely

Michael McCartney
CHIEF EXECUTIVE

Copy to:
Gary Taylor QSO
Environmental Defence Society Inc
(via email only - gary@eds.org.nz)

Annex B

Planning Opinion on consenting pathways for intensive farming: Horizons One Plan

Enfocus

Annex C

Introduction

This note responds to a request from Andrew Bashford (Horizons Regional Council) for a planning opinion, as received by email dated 22 June 2017 (attached as Appendix 1).

Horizons' Analysis

First, I agree with the Horizons' consenting team analysis that there are five consenting pathways for intensive farming activities as indicated in your wiring diagram. I also understand that Pathway 5 will likely be where the "log jam" of applications occurs and hence there is a need to very clearly understand of the nature and extent of the pathway that exists. That in turn depends, to a large extent, on an understanding of the applicable policy framework and the appropriate approach to assessment against that policy framework.

Is the Council able to grant consent to those applications that follow Pathway 5?

I believe the answer to the above question may be different depending on whether the application is for a new or existing intensive farm. Accordingly, I deal with each situation in turn.

Existing intensive farms

The first provisions to consider in an RDA application will be the matters of discretion. Matter of discretion 14-2 (b) is *"the extent of non-compliance with the cumulative nitrogen leaching maximum* specified in Table 14.2"*. That very clearly indicates an expectation that consent may be granted for farms to exceed the Table 14.2 leaching rates.

The difficulty (as you know) is that the policy that would be the natural first port of call to guide how that available discretion should be exercised is Policy 14-6. That policy appears to limit the ability to grant an exception to two specific situations (those exceptions form Pathways 3 and 4 of your analysis).

However, any "standard" planning interpretation would conclude that if the Plan had intended that the *only* exceptions that could be granted were those in Policy 14-6(b) then those exceptions would be included as part of the rule framework (i.e. those activities meeting the specific exceptions criteria would be RDA and other activities would have some other consent status). That is not the case. Nor is it the case that the Table 14.2 rates are *standards or conditions* that are immutable thresholds. They are not, being merely numbers referred to in a policy. Although the pathway is, in my opinion, poorly defined, the only conclusion that can be drawn from the analysis of One Plan's structure is that Pathway 5 does exist and can (at least theoretically) be used to grant consents. The issue is, what will

be the relevant factors to consider in determining whether that pathway is real or illusory? Here other policies must be considered.

Policy 14-5 (d) says an activity must:

> *"Not exceed the cumulative nitrogen leaching maximum values for each year contained in Table 14.2, unless the circumstances in Policy 14-6 apply"*

Importantly, I think, it does not limit the circumstances to those in Policy 14-6 (b) but refers more broadly to Policy 14-6 as a whole. That is important because Policy 14-6 (c) sets out that where an exception is made to the cumulative leaching maximum good management practices must be adopted and N losses that cannot be avoided are remedied or mitigated (including through environmental compensation).

Importantly again, reference to "where an exception is made" is not limited by any reference to "in accordance with Policy 14-6 (b)". Rather the reference is left open and unlimited. There is an obvious argument that if Policy 14-6 (b) was intended to limit Policy 14-6 (c) specific reference to that section would have been made in Policy 14-6 (c). It is not and on that basis, there is a reasonable argument that for existing intensive farms Pathway 5 exists and that in assessing any such application regard must be had to Policy 14-6 (c).

It is also instructive to note that in referring to Policy 13-2D (now 14-6) in *Horticulture New Zealand v Manawatu-Wanganui Regional Council [2013] NZHC 2492 [24 September 2013]* Justice Kós noted:

> *I do not need to say anything about this Policy, other than to record that the Council stated, expressly, that they consider the exception in (c) to be a separate exception from (b). I record that submission because it too was seen as important to the appellants.*

While stopping short of endorsing the interpretation of Policy 14-6 (c), the passage at least records what was clearly the Council's own understanding at that time (which was not contradicted by the High Court). The High Court's noting of this point appears to be aimed at highlighting that there was discretion to be exercised that would obviate the issues raised with OVERSEER (being the focus of the appeal).

In summary, although unsatisfactory in its clarity, I believe there is an avenue to consent existing intensive farms under Pathway 5 – although I concede that because of the uncertainty other parties would likely challenge that interpretation.

Objectives and Policies of Chapter 5

The remaining issue is what factors/policy tests should be applied in determining whether (and to what extent) an "exception" should be made in accordance with matter of discretion 14-2 (b) and Policy 14-6 (c). There I think we do need to accept the probability that the correct approach would be to consider relevant objectives and policies of Chapter 5.

These will include Objectives 5-1 and 5-2 and Policies 5-1- 5-5. I do not include in that Policy 5-8 (a) because:

1. Policy 5-8 (a) (i) is expressly referring to the content of regional plans; and

2. Policy 5.8 (a) (ii) is to be had regard to but is clearly tempered by the provisions that exist in Chapter 14 that allow for exceptions to be made (as I argue above exists)

Hence, an applicant will need to show, and Council will need to be convinced that:

- in accordance with Objective 5-1 and Policy 5-1 –Individually and cumulatively the nitrogen discharge safeguards life supporting capacity and recognises and provides for Schedule B Values.
- in accordance with Objective 5-2 water quality will be maintained where it supports Schedule B values and enhanced where it does not support Schedule B values; accelerated eutrophication and sedimentation of lakes is prevented or minimised; groundwater water is maintained or enhanced where already degraded.
- in accordance with Policy 5-2 - the water quality targets in Schedule E inform the management of surface water quality in the manner set out in Policies 5-3, 5-4 and 5-5.
- in accordance with Policy 5-4 – where existing water quality does not meet the targets of Schedule E it is enhanced to meet either the target or the Schedule B values the target is designed to safeguard

Obviously, Policy 5-3 and 5-5 are also relevant but are unlikely to apply to existing intensive farms because by definition they are in sub-zones that are targeted because they are known to be degraded[1].

As we have previously discussed, these tests are information-intensive and would require a sophisticated application/AEE and hence it would be difficult to apply them in practice. The key is how Council applies the test of ensuring Schedule E targets "are met". Clearly, Council would have to promote an interpretation of that phrase such that it allows for the targets to be met over time and not on the basis of each individual application.

New Intensive farms

The exceptions of Policy 14-6 (i.e. parts (b) and (c) of that policy) apply only to existing farms. The policy framework for new intensive farms is significantly tighter.

Policy 14-6 (a) states simply that council must *"ensure the nitrogen leaching from the land is managed in accordance with Policy 14-5".*

Policy 14-5 states that *"new intensive farming use regulated in accordance with (b)(i) must be regulated to ensure that the leaching of nitrogen from those land uses does not exceed the cumulative nitrogen leaching maximum values for each year contained in 14.2"* [my emphasis].

There are no exceptions or discretionary judgments provided for in the policies of Chapter 14 in respect of new farming activities.

It might be possible to argue that in applying matter of discretion 14-2 (b) (in particular, *"the extent of non-compliance with the cumulative nitrogen leaching maximum* specified in Table 14.2")* it is necessary and appropriate to go back to the policies of Chapter 5

[1] Although Policy 5-5 may applicable in some cases and may provide some greater degree of flexibility

(since there are no policies in Chapter 14 that guide how that discretion is to be exercised).

Policy 5-3 seems to provide some opportunity to consent a new intensive farm at leaching rates above Table 14.2. That would be the case where:

(a) the application is in an area where water quality targets are met; and
(b) there is "headroom" above current water quality meaning that a new farm could exceed the Table 14.2 leaching rates while still ensuring Schedule E targets are met.

Policy 5-8 (a) (iii), on the other hand, states that *"new intensive farming land use activities must be regulated throughout the region to achieve the nitrogen leaching maximums"*. That policy might be argued to provide the foundation for Rules 14-3 and 14-4 rather than something intended to apply to resource consents. But a counter argument might be that the more specific Policy 5-8 over-rides that more general Policy 5-3. In summary there appears to be opportunity to argue the point in certain circumstances (where water quality is very good) that a new farm exceeding Table 14.2 limits is consentable but that opportunity is certainly not beyond challenge.

Other than the (slim) possibility outlined above I do not see any realistic opportunity to consent new intensive farms in accordance with Pathway 5.

In summary I consider that the Council:

- is legally able to grant consent for an existing intensive farming activity under Pathway 5. However, whether it can do so in practice is much less certain. In reality, if the Council did routinely grant consents under Pathway 5 it would likely be challenged unless it could show that good progress was being made towards water quality targets notwithstanding the granting of consents.
- would have great difficulty granting a consent for an new intensive farming activity under Pathway 5 (although there may be some opportunity to consent such an activity if it occurred in an catchment where the water quality targets were comfortably met and would continue to be met if the application was granted).

What is the existing environment against which effects should be assessed?

You have asked what the "existing environment" would be when assessing effect of intensive farming activities.

I do think this issue can be over complicated. While it is important, and the proper legal principles need to be applied, to the extent there is not clear guidance from case law (which I agree there is not in this case) a common sense/pragmatic approach should be applied.

In that sense, I broadly agree with your analysis that the existing environment will be the ground and surface water (to the extent that can be known, modelled or assumed) taking into account:

- Permitted activities in the catchment/groundwater zone;

- Any consented activities in the catchment (including point source discharges, dairy shed effluent discharges and any other consented intensive farms and their discharges in the catchment/groundwater zone;
- Any residual contaminants in the environment from when intensive farms were permitted activities ("load to come") in the catchment/ groundwater zone; and
- Natural/ambient contaminant load in the catchment/ groundwater zone.

While there may be no clear legal foundation, I would also consider that the existing environment also include the effects of current intensive farming activities at least to the extent that they comply with Table 14.2. That is on the basis that the activities exist and may continue to exist at Table 14.2 discharge rates as controlled activities and are hence not "fanciful activities".

Hence, I would add to the above bulleted list "existing intensive farming at Table 14.2 nitrogen leaching levels".

I also note (as you have) that Policies 5-3 to 5-5 refer to "existing water quality". I cannot see any logical reason why that phrase should not be interpreted at face value. The policy is very clearly referring to an improvement *from the status quo* (given activities as they exist whether permitted or not) and hence for the purpose of applying those policies I believe the correct approach is to assess (to the extent it is possible to do so) the difference between water as monitored in stream by the Council (or, more practically, as converted to a load) and that modelled to occur with the activity undertaken at the intensity (and with the practices and improvements) applied for as detailed in the application.

Consenting on a catchment wide basis

You ask whether there is potential to carry out consenting on a catchment wide basis (i.e. consenting all intensive farms within a catchment at the same time) in order to provide some equitable method to deal with cumulative effects.

I understand the concern and agree there is a legitimate issue to address. However, unless I misunderstand what you are proposing, I see little potential to run a catchment consenting process as you have outlined.

My understanding is that a consent authority is obliged to consent applications on a first-in first served basis where there is a competition for fixed quantum of resource available. (You will no doubt be aware of the significant extent of caselaw on that point - see string of Synlait/Central Plains Water cases out of Canterbury[2]).

If you are proposing that an available "pie" be defined and divvied up fairly amongst existing users then the same logic may apply.

Certainly existing case law was developed in relation to water *take* applications not discharge/land use applications. Nevertheless, I think there is a strong likelihood that the same situation would apply here. I would think that an applicant that applies early would be aggrieved if their consent was pared back through a catchment process designed to accommodate applications received later in time. The plan certainly makes no provision for that "equalisation of burden".

[2] For example, CENTRAL PLAINS WATER TRUST And Anor V SYNLAIT LIMITED And Anor CA CA544/2008 [18 December 2009]

That is not to say that early applicants necessarily get "all they want". They should have to justify the nitrogen leaching sought just as an applicant for a water take has to justify their need and their efficiency of use.

There is either a fixed quantum of resource to "allocate" or there is not. If there is not then each application needs to be assessed on its merits and the fact of of the case. If there is a fixed quantum then I would think that the first in first served principle applies as discussed above.

Of course, as noted, there is no case law specifically on land uses/discharges vying for a fixed quantum/load and my opinion is only that – an opinion. I should also add that it might be possible to run a catchment process as you outline if that were specifically provided for in the Plan (I understand that case law has not ruled out that possibility). Waikato Regional Council proposed such a scheme for water allocation in their Variation 6 but abandoned it during the Environment Court appeal (largely because it feared that it would run foul of *Resource Management (Discount on Administrative Charges) Regulations 2010.*

That said, I believe Tasman District may have taken such an approach to water allocation in the past (using a common catchment expiry approach) but that would require verification.

It is an interesting point and I would certainly be interested in others' opinion on the matter.

Appendix 1

Hi Gerard,

In addition to the work you are already doing for the Horizons' Policy Team, we have some issues in Consents that we would like your opinion on as follows:

At this stage we consider that there are five consenting pathways available for existing intensive farming land uses as set out in the following diagram.

Are you able to provide a 'planning opinion' on the following matters?

A Is the Council able to grant consent to those applications that follow 'Pathway 5' as set out in the above diagram (i.e. those applications that do not, and will not, meet the cumulative nitrogen leaching maximums (CNLMs) set out in Table 14.2 and for which no policy exceptions apply)?

B What is the "existing environment" against which we must assess the actual and potential effects on the environment?

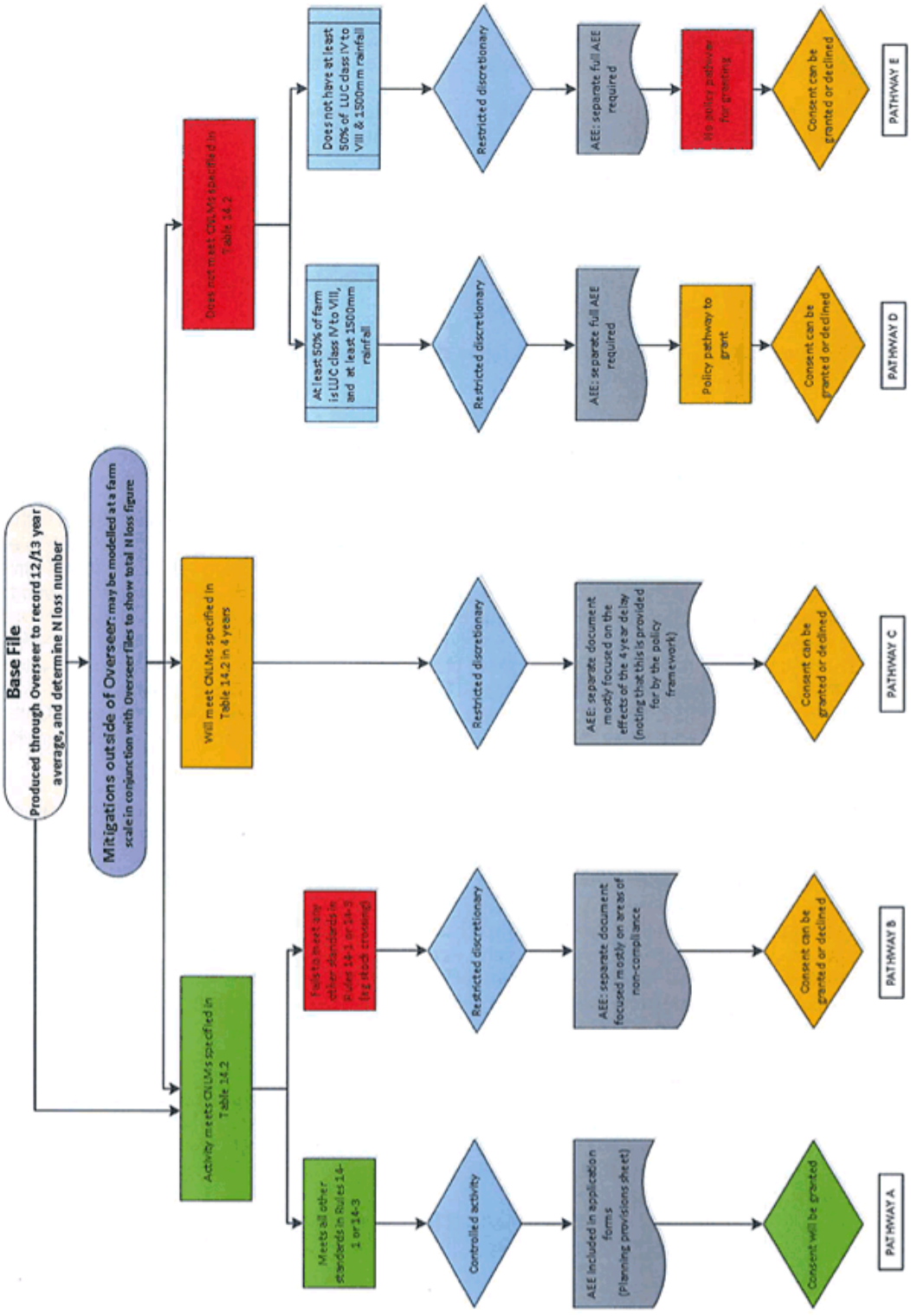
C The potential to carry out consenting on a catchment wide basis (i.e. consenting all intensive farms within a catchment at the same time) in order to provide some equitable method to deal with cumulative effects.

With regard to A above, it is likely that a high number of consent applications will fall within this pathway, and whilst we appreciate that we only need to have regard to the objectives and policies of the One Plan, Policies 14-5 and 14-6 are very directive in that intensive farming must meet the CNLMs. If it were an exception to the norm, there may be a case to depart from the policies; however, if this is occurring on a regular basis (as will likely be the case) then there appears to be little point in having the policies in the Plan at all. Another issue is that there could well be a fairly high level of uncertainty as to the scale of actual effects (particularly cumulative effects) on the environment from these activities, or at least uncertainty as to the level of contribution to those effects from each individual farm. Given such uncertainty, it does not seem prudent to be departing from the directive policy framework.

With regard to B above, most case law in respect of existing discharges has been built up around point source discharges and essentially dictates that such discharges do not form part of the existing environment when assessing the effect of that discharge on the environment. This makes sense and is easily managed using upstream and downstream data. I am not aware of case law that addresses the issue of when previously permitted activities (in this case intensive farming activities and their associated discharges) now require consent under a regional plan. Applying the same principles that apply to point source discharges would mean that we cannot consider the subject farm (or other unconsented farms and their discharges) to be part of the existing environment. The existing environment would, in my view, consist of:

a) Any permitted activities in the catchment;
b) Any consented activities in the catchment (including point source discharges, dairy shed effluent discharges and any other consented intensive farms and their discharges);
c) Any residual contaminants in the environment from when intensive farms were a permitted activity (noting that these would decrease over time at a rate that depends on attenuation rates and lag time);
d) The natural environment as it exists (streams/wetlands/forested areas etc); and
e) The built environment, insofar as such activities are permitted or consented.

Annex C


Base File
Produced through Overseer to record 12/13 year average, and determine N loss number
Mitigations outside of Overseer: may be modelled at a farm scale in conjunction with Overseer files to show total N loss figure
Activity meets ONLMs specified in Table 14.2
Will meet ONLMs specified in Table 14.2 in 4 years
Does not meet ONLMs specified in Table 14.2
Meets all other standards in Rules 14-1 or 14-3
Fails to meet any other standards in Rules 14-1 or 14-3 (eg stock crossing)
At least 50% of farm is LUC class IV to VIII, and at least 1500mm rainfall
Does not have at least 50% of LUC class IV to VIII & 1500mm rainfall
Controlled activity
Restricted discretionary
Restricted discretionary
Restricted discretionary
Restricted discretionary
AEE included in application forms (Planning provisions sheet)
AEE: separate document focused mostly on areas of non-compliance
AEE: separate document mostly focused on the effects of the 4 year delay (noting that this is provided for by the policy framework)
AEE: separate full AEE required
AEE: separate full AEE required
Consent will be granted
Consent can be granted or declined
Consent can be granted or declined
Consent can be granted or declined
Policy pathway to grant
No policy pathway for granting
Consent can be granted or declined
PATHWAY A
PATHWAY B
PATHWAY C
PATHWAY D
PATHWAY E

Excluding the existing farming practice from the existing environment raises an issue as to what takes its place? The land still exists and is physically used for that purpose and a number of activities are often already consented (e.g. effluent disposal/irrigation). We could assume a baseline aligning with the Table 14.2 CNLMs as the existing environment (which aligns with our discretion to examine the extent of non-compliance with the CNLMs), or we could consider a permitted activity land use that could be typical for the area (i.e. sheep and beef farming). However, such a land use would need to be modelled in Overseer for each farm.

It is also noted that Policies 5-3 to 5-5 (Policy 5-4 in particular) from the RPS appear to have been written under the premise that the intensive farming activities are actually taking place. To assume that they are not, in a resource consent process, would appear to make it difficult to enhance water quality if the activities which potentially degrade it do not exist. Perhaps, I am overthinking this issue so your opinion on this matter would be appreciated.

With regard to C above, as you will be aware one of the issues with cumulative effects is that the first few applications usually have very little effect, with a tipping point reached after which consents will be notified and have a much more difficult time to obtain a consent. For intensive farming we could have a situation where some of the highest nutrient leaching farms apply first, and some of the lower nutrient leaching farms (with better practices) apply later on. Assuming we can grant consents that do not meet the CNLMs this will likely result in a situation where the worse performers have a relatively easy time obtaining a consent and better performers a more difficult process or face the prospect of potential decline. One method to overcome this issue may be to consent the entire catchment through a single hearing process where the cumulative effects can be addressed at the same time. We have limited experience or knowledge in the implementation of such a process, particularly where we do not have a fixed allocable volume of resource (in this instance, nitrogen) to allocate. Any advice you can provide on how such a process might look and work would be appreciated.

Please note that we have also requested that Rob van Voorthuysen provide an opinion on the above questions. We are happy for you to discuss the above with Rob and with Paul Beverley/Thad Ryan ; however we are ideally looking for your independent opinion on these matters (particularly A and B). if you have any questions regarding the above, please feel free to give me a call.

Regards,
Andrew

ANDREW BASHFORD I Team Leader: Consents
DDI 06 952 2976 I M 021 227 7995

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Annex C

van Voorthuysen
Environmental Limited

MEMORANDUM

To: Andrew Bashford

From: Rob van Voorthuysen

Date: 29 June 2017

Topic: **ONE PLAN –INTENSIVE FARMING LAND USE ACTIVITIES**

1 Policy Framework

Council has asked:

> *Is the Council able to grant consent to those applications that follow 'Pathway 5' as set out in the above diagram (i.e. those applications that do not, and will not, meet the cumulative nitrogen leaching maximums (CNLMs) set out in Table 14.2 and for which no policy exceptions apply)?*

The initial policy framework relevant to the above question is contained in Chapter 14 *Discharges to Land and Water* of the One Plan.

Given the Environment Court's declaration[1] decision, I note that it will be necessary to refer to the NPSFM as well, however I have not undertaken that exercise here as the One Plan policy provisions are largely consistent with the NPSFM objectives and policies.

The most relevant One Plan policies that would lead a decision-maker to impose the Table 14.2 LUC based CNLMs are RPS Policies 5-8(a)(ii) and 5-8(a)(iii) and regional plan Policies 14-5(d) and 14-5(e). Those provisions are highly directive as they use the word "must". They state respectively:

(ii) Existing intensive farming land use activities must be regulated in targeted Water Management Sub-zones to achieve the nitrogen leaching maximums specified in (i).

(iii) New intensive farming land use activities must be regulated throughout the Region to achieve the nitrogen leaching maximums specified in (i).

(d) Existing intensive farming land uses regulated in accordance with [Policy 14-5](b)(i) must be managed to ensure that the leaching of nitrogen from those land uses does not exceed the cumulative nitrogen leaching maximum values for each year contained in Table 14.2, unless the circumstances in Policy 14-6 apply.

(e) New intensive farming land uses regulated in accordance with [Policy 14-5](b)(ii) must be managed to ensure that the leaching of nitrogen from those land uses does not exceed the cumulative nitrogen leaching maximum values for each year contained in Table 14.2.

[1] Decision [2017] NZEnvC ENV-2016-WLG-000038 paragraph 83.

The 'policy exceptions' referred to in Policy 14-5(d) are set out in Policy 14-6(b). That latter policy allows decision-makers to make an exception to the Policy 14-6(a) requirement to ensure nitrogen leaching from the land is managed in accordance with Policy 14-5 for existing intensive farming land uses[2] if (paraphrasing Policy 14-6(b)):

a) the existing intensive farming land use occurs on land that has 50% or higher of LUC Classes IV to VIII and has an average annual rainfall of 1500 mm or greater; or

b) where the existing intensive farming land use cannot meet [Table 14.2] year 1 cumulative nitrogen leaching maximums in year 1 but they instead meet them within 4 years.

Interestingly, the Policy 14-6(b) 'exceptions' do not apply to new intensive farming land uses regulated by Rules 14-3 and 14-4.
Table 14.1 sets out the dates when Rule 14-1 had legal effect, ranging from 1 July 2014 to 1 July 2016. Table 14.2 has five yearly time steps at which various CNLMs apply. Footnote 3 to Table 14.2 sets out when the Plan had legal effect for the various types of intensive land use activities.[3] The result of these provisions is that in all catchments the Table 14.2 Year 1 CNLMs currently apply, but in some catchments[4] the Table 14.2 Year 5 CNLMs will apply as early as 1 July 2019.

This means that the exception in Policy 14-6(b)(ii) only has a remaining "shelf life" of two years in some catchments, and in all catchments it will be redundant on 1 July 2021 as at those dates the Year 1 LUC based CNLMs will no longer apply. The exception in Policy 14-6(b)(i) will continue to apply for existing intensive farming land use activities, but not for new ones.

I have assumed as a starting point for the analysis that an existing intensive farming land use does not currently meet the Table 14.2 Year 1 LUC based CNLMs and so it does not meet the conditions of Rule 14-1 and it falls to be considered under Rule 14-2.

I note that, depending on the duration of consent sought, an applicant would also need to demonstrate future compliance with the Year 5, 10 or 20 CNLMs, presumably through the furnishing of modified[5] Overseer files showing compliance with the relevant CNLMs.

The same analysis would hold for new intensive farming land uses and Rules 14-3 and 14-4.

I consider that for the purposes of the analysis the question to be asked and answered is:

> *Are there any provisions in the One Plan that would enable a decision-maker to consider granting consent for an existing intensive farming land use activity that leached nitrogen at a level exceeding the relevant Table 14.2 CNLMs, if the exception in Policy 14-6(b)(i) does not apply?*

Existing intensive farming land use activities which do not comply with Rule 14-1 require consent as a restricted discretionary activity. When making a decision on such an application, the Council must consider only those matters over which it has restricted the exercise of its discretion.[6] It should also

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[2] Intensive farming land uses are dairy farming, commercial vegetable growing, cropping and intensive sheep and beef (Policy 14-5(a)).
[3] 24 August 2010 for dairy farming and 9 May 2013 for commercial vegetable growing, cropping and intensive sheep and beef.
[4] Mangapapa, Waikawa and Other south-west catchments (Papaitonga).
[5] Modified from current farming practice.
[6] Section 104C RMA

consider relevant objectives and policies which inform the matters over which discretion is restricted.
I consider that the relevant One Plan provisions are:

- Objective 14-1 as far as it relates to land uses affecting groundwater and surface water;
- Chapter 5 objectives and policies (cross-referred to in Objective 14-1(b)) these being:
  - Objective 5-1;
  - Objective 5-2;
  - Policy 5-1 and Table 5.2;
  - Policy 5-3;
  - Policy 5-4;
  - Policy 5-5;
  - Policy 5-6(a);
  - Policy 5-7(c);
  - Policy 5-8(a)(ii);
  - Policy 5-8(a)(iii);
- Policy 14-2(c);
- Policy 14-2(d);
- Policy 14-2(e);
- The objectives and policies of Chapters 2, 3, 6, 9 and 12 to the extent that they are relevant to the discharge (as set out in policy 14-2(f)), these being:
  - Objective 2-1(a);
  - Policy 2-2(a);
  - Policy 6-2;
  - Policy 9-2;
  - Objective 12-1(a);
- Policy 14-5(d);
- Policy 14-5(e);
- Policy 14-9(b);
- Policy 14-9(c)

I acknowledge that the above list of provisions is more extensive than that agreed by the planners in the Environment Court declaration proceedings, however in my opinion that more extensive list is appropriate.

Rules 14-1 to 14-4 are section 9(2) land use rules and this raises the question of whether Policy 14-1, Objectives 5-1 and 5-2 and Policies 5-1, 5-3, 5-4, 5-5 and 5-6 are relevant because Rule 14-1 manages land use as opposed to managing water quality directly. However, I have considered those provisions because management of the land is being undertaken solely for the purpose of managing effects on water quality. The cause of the effects on water quality is the diffuse discharge of contaminants to land. For that same reason, I have assumed Policy 14-2 to be relevant.[7]

I have examined the above listed One Plan provisions. In my view, the ones that might enable a decision-maker to consider allowing an existing intensive farming land use activity to leach nitrogen in excess of the Table 14.2 CNLMs are:

- Objective 14-1(c) if the intensive farming land use activity remedied or mitigated its adverse effects on surface water or groundwater. However, in reality that would be very difficult to do as it would be almost impossible to determine the effects of a single intensive farming land use

[7] I note that the planners in the EC declaration agreed that Policies 14-1, 14-2, 14-5, 14-6 and 14-9 were relevant. Decision [2017] NZEnvC ENV-2016-WLG-000038, paragraph 83.

activity on water quality and to then remedy or mitigate those effects in the receiving water body. I have therefore discounted this policy avenue.

- Objectives 5-2(a)(i) and 5-2(b) if the nitrogen loss from the intensive farming land use activity could be demonstrated to be at a level that maintains existing water quality and, in the case of surface water, that existing water quality is at a level sufficient to support the relevant Schedule B Values. That could only be the case if the level of nitrogen loss did not increase beyond historical levels and there was no lag effect (namely the nitrogen lost from the farm was already fully manifesting in the receiving water body). Proving there was no lag effect would be problematic but possible.
- Policy 5-1 if the nitrogen loss from the intensive farming land use activity could be demonstrated to be at a level that safeguards the life supporting capacity of the receiving surface water (the relevant river) and provides for the relevant Schedule B Values. In the unlikely event that those outcomes are being achieved the policy would only support granting consent if the level of nitrogen loss did not increase beyond historical levels and there was no lag effect.
- Policy 5-3(a) if the nitrogen loss from the intensive farming land use activity could be demonstrated to be at a level that enables relevant Schedule E water quality targets to continue to be met. The same caveats as apply to Policy 5-1 would apply here.
- Policy 5-5(a)(i) if the nitrogen loss from the intensive farming land use activity could be demonstrated to be at a level that maintains existing water quality. The same caveats as apply to Policy 5-1 would apply here.
- Policy 5-6(a) if the nitrogen loss from the intensive farming land use activity could be demonstrated to be at a level that maintains existing groundwater quality. The same caveats as apply to Policy 5-1 would apply here.
- Policy 14-2(d)(i). The discussion above indicates that it is difficult to establish discharge parameters that would give effect to the management approaches for water quality and discharges set out in Chapter 5. On that basis, the adoption of the best practicable option might be appropriate.
- Policy 14-2(d)(ii) because for an individual farm the potential adverse effects on water quality are likely to be minor, and the costs associated with adopting the best practicable option are likely to be small in comparison to the costs of investigating the likely effects of the farm's nitrogen leaching on land and water.
- Objective 12-1(a) because imposing the Table 14.2 LUC based CNLMs is likely to have either unknown or less than minor positive effects on water quality and so requiring them to be met could impose an unnecessary cost on the farmer (i.e. the resource user).

So, despite the directive nature of RPS Policies 5-8(a)(ii) and (iii) and regional plan Policies 14-5(d) and 14-5(e) I consider that a decision-maker could consider granting an application lodged under Rule 14-2 by an individual farm to exceed the Table 14.2 CNLMs in a limited situation where:

a) Council acknowledged that there is no link between the Table 14.2 LUC based CNLMs and the Schedule B values and Schedule E water quality targets[8] and so imposing the CNLMs could impose unnecessary costs on the applicant;[9] and

[8] Namely requiring the Table 14.2 CNLMs to be met will not ensure that Schedule B values are provided for and Schedule E water quality targets are met.
[9] Objective 12-1(a).

b) Throughout the duration of any consent granted the proposed loss of nitrogen from the intensive farming land use activity did not increase above historical levels[10] and there was no lag effect (or load to come) from the historical land use; and

c) The relevant surface water body that eventually receives the nitrogen leached from the intensive farming land use activity has existing water quality that both safeguards its life supporting capacity and provides for the relevant Schedule B Values;[11] or

d) The relevant water body that eventually receives the nitrogen leached from the intensive farming land use activity currently meets the Schedule E water quality targets;[12] and

e) Consent conditions are imposed to require the best practicable option to be implemented on-farm to manage the leaching of nitrogen.[13] The best practicable option could be equated to requiring good or best nutrient management practices to be adopted.

I have underlined the words individual farm above because for a single farm it is likely that the potential adverse effects of exceeding the Table 14.2 LUC based CNLMs will be minor and the costs of investigating the effects of a single farm's nitrogen losses on land and water[14] could be higher than the cost of implementing best or good management practices on that farm. That might not be the case if all consent applications within a catchment were processed simultaneously.

2 Existing Environment

Council has asked:

> *What is the "existing environment" against which we must assess the actual and potential effects on the environment?*

The nature of the 'existing environment' is largely a legal matter, however my planning opinion on this is set out below.

The relevant context is that Rules 14-1 to 14-4 regulating 'intensive farming' are section 9(2) land use rules. While the rules also deal with several discrete discharges (fertilisers, biosolids, farm dairy effluent, etc) associated with intensive farming, those discharges are authorised by separate discharge rules.[15] The effect of cross-referring to the discrete discharges in Rules 14-1 to 14-4 merely serves to make the consent category of those discrete discharges either controlled or restricted discretionary instead of permitted.

Table 14-1 sets out dates when Rule 14-1 has legal effect[16] in various catchments and water management sub-zones. All of those dates have now passed with the most recent date (1 July 2016) having occurred eleven months ago.

Existing use rights for land use activities regulated by regional rules are set out in section 20A of the RMA. Prior to Rule 14-1 having legal effect the intensive farming land use activities could have been

[10] The relevant historical time period would have to be defined. Presumably it would have to exceed the lag effect time period.
[11] Policy 5-1.
[12] Policy 5-3(a).
[13] Policies 14-2(d)(i) and (ii).
[14] Policy 14-2(d)(ii)
[15] Rule 14-5 for fertiliser, Rule 14-6 for stock feed and feed pads, Rule 14-7 for biosolids and compost, Rule 14-9 for poultry litter and Rule 14-11 for farm animal effluent.
[16] Or become operative in other words.

lawfully undertaken without a resource consent.[17] Assuming that they did not alter their character, scale or intensity of effects, those intensive farming activities could continue if consent was sought within six months of the rule becoming operative.

Rule 14-1 is a controlled activity and compliant applications lodged under it must be granted. A compliant application is one that meets the conditions of Rule 14-1. Condition (a) mandates the production of a nutrient management plan.[18] Condition (c) then states:

> The *nutrient management plan** prepared under (a) must demonstrate that the nitrogen leaching loss from the activity will not exceed the *cumulative nitrogen leaching maximum** specified in Table 14.2.

Consequently, in order to be a controlled activity, the intensive farming activity must not exceed the CNLMs specified in Table 14.2. The fact that this requirement is achieved via a mandatory nutrient management plan does not in my view derogate from the absolute nature of the requirement. Table 14.2 has time periods by which the CNLMs must be met.

Annex D

So, the relevant current existing environment for intensive farming land use activities comprises:

- Land uses not regulated by Rule 14-1;
- Land uses that do not exceed the Table 14.2 Year 1 CNLMs,[19] including compliant applications made under Rule 14-1 but not yet decided; and
- Land uses that have already gained consent under Rules 14-1, 14-2, 14-3 or 14-4.

However, this 'land use' existing environment is not particularly useful for decision-makers as the One Plan policy framework is directed towards managing effects on water quality. Ideally then one would determine the effects on 'natural' water quality arising from the relevant existing environment land uses. That would translate to respectively:

- the effects of non-intensive farming activity land uses on water quality, including urban land uses;
- the effects of intensive farming activity land uses on water quality that have sought consent under Rule 14-1 in compliance with section 20A(2) of the RMA and which do not exceed the Year 1 Table 14.2 CNLMs; and
- the effects of intensive farming activity land uses on water quality that have already gained consent under Rules 14-1, 14-2, 14-3 or 14-4.

However, actual water quality can only be determined by water quality monitoring. Water quality is affected by land use activities, point source discharges and diffuse discharges, both authorised (i.e. permitted or consented) or unauthorised.

This raises an argument that in theoretical terms, and disregarding the fact that Rules 14-1 to 14-4 are section 9(2) land use rules, the relevant 'existing environment' is the monitored water quality status minus the effects of any unauthorised land use activities and unauthorized discharges. As noted at the outset of this section, this is more of a legal question than a planning one in my view. However, in reality it would be difficult to quantify the effects of the unauthorised activities because presumably Council would not have any knowledge of them.

[17] RMA section 20A(2)(ii).
[18] Condition (a).
[19] Note that in July 2019 the Year 5 CNMLs will apply in some catchments.

Assuming for now that it is correct to limit the analysis to land use activities, it may be possible to model the effects of the relevant existing environment land uses as distinct from other land uses and discharges. If that can be achieved it would provide an estimate of the relevant existing environment in terms of water quality. However, that estimate would vary in spatial and temporal terms and so the practicality and utility of such a modelling exercise would be limited.

My analysis leads me to conclude that an assessment of applications against an 'existing environment' is problematic. It may be more useful to try and determine the effects on the ultimate receiving environment (i.e. groundwater and surface water quality) of any proposed exceedence of the Table 14.2 CNLMs. That would require catchment modelling to translate Overseer (or some other model) predicted farm scale nutrient leaching losses into predicted effects on receiving water quality (groundwater and thereafter surface water). Further modelling would then be required to translate those predicted water quality effects (nutrient concentrations) into predicted effects on the relevant Schedule B surface water management values and objectives and the Schedule E water quality targets.

It is very difficult to envisage how an individual farmer could competently undertake such an analysis.

3 Catchment Wide Consenting

Council has asked for advice on:

> *The potential to carry out consenting on a catchment wide basis (i.e. consenting all intensive farms within a catchment at the same time) in order to provide some equitable method to deal with cumulative effects*

As noted above, it is very difficult to envisage how an individual farmer could competently undertake the type of analysis required to determine the relevant existing environment and the effects of their proposed intensive farming activity land use on that environment.

In an ideal world it would be preferable for Council to determine, on a catchment by catchment basis using the catchments set out in Table 14.1 of the One Plan:

- Existing water quality;
- The water quality necessary to safeguard the life supporting capacity of water and provide for the values and management objectives in Schedule B and meet the Schedule E water quality targets;[20]
- The scale of water quality improvement (presumably concentrations of nitrogen and phosphorus and arguably also sediment and faecal bacteria) necessary to achieve the above outcomes if the life supporting capacity of water is not being safeguarded, or the values and management objectives in Schedule B are not being provided for, or the Schedule E water quality targets are not being met;
- The scale of water quality improvements required (nitrogen and phosphorus concentrations[21]) would then be translated into catchment load reductions. The catchment load reductions could then be apportioned amongst the intensive farming activity land uses within the catchment, thereby determining allowable on-farm leaching rates.

[20] Objective 14-1(a) of the One Plan.
[21] It would be very difficult if not impossible to translated sediment and faecal bacteria load reductions across land use activities, as I am not aware of any proven way of accurately modelling those losses at a farm scale.

It is telling that the suggested approach does not relate directly to the Table 14.2 LUC based CNLMs. The reason for that is the CNLMs have no direct relationship with desired catchment water quality. Instead they are based on one assessment of the 'natural capital' of the land, namely what levels of nitrogen a 'sustainable' pastoral sheep grazing regime is likely leach. The actual on-farm leaching rates necessary to achieve Objective 14-1(a) and the other One Plan water quality outcomes may be more or less than the Table 14.2 LUC based CNLMs.

Returning to the question posed by Council, the above discussion suggests that it is highly desirable for Council to carry out consenting under Rules 14-1 to 14-4 on a catchment-wide basis. However, that could only be achieved with the co-operation of all intensive farming activity land uses within each catchment. The reason for that is that case law[22] has determined that applications for consent must be processed to completion in the sequential order that the Council receives them.[23]

Given that the dates set out in Table 14.1 all passed more than six months ago it is assumed that all existing intensive farming activity land uses within the region requiring consent have now lodged consent applications. Council could therefore approach all of the applicants on a catchment by catchment basis and seek their written approval to either suspend[24] the processing of their applications, or to agree to the Council commissioning a cumulative effects assessment report,[25] so that all applications can be processed together. That would allow a cumulative effects assessment to be undertaken by the Council, along the lines outlined above.

Factors to consider as part of any catchment wide process would include:

- Dealing with individual intensive farming activity land uses that have already gained consent, as these could not have their consented nitrogen leaching rates changed unless they are able to be reviewed by Council under section 128 of the RMA;
- Dealing with applicants who do not agree to having their applications delayed. It may be necessary to request[26] these applicants to assess the effects on their activity on the life supporting capacity of water and the values management objectives in Schedule B and the water quality targets in Schedule E and then offer to have Council do that on their behalf once the applicants realise the difficulty of that task;
- Apportioning consent processing costs (including any catchment modelling) amongst the applicants. This could be by way of equal shares or some apportionment of costs based on relative farm area or farm leaching rates;
- Dealing with any appeals of the farm scale nitrogen leaching rates assigned to individual intensive farming activity land uses. Any wide spread amendment of the assigned leaching rates as part of an appeal process could affect the catchment wide achievement of Objective 14-1(a).

It is beyond the scope of this planning advice to definitively recommend how these factors should be addressed.

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[22] Fleetwing Farms Ltd v Marlborough District Council [1997] 3 NZLR 257 and Central Plains Water Trust v Synlait Ltd [2010] 2 NZLR 363.
[23] Provided the applications are complete and are not rejected under section 88 of the RMA.
[24] Section 91A of the RMA
[25] The Report would be commissioned under section 92(2) of the RMA and once the applicant agreed under section 92B, sections 88C(3) and (4) apply.
[26] Under section 92(1) of the RMA.

So, to conclude, the answer to the third question posed by Council is 'yes'. There is both potential and merit in consenting all intensive farms within a catchment at the same time, but doing so would not be a straight forward process.

Annex D

INTENSIVE FARMING RESOURCE CONSENT APPLICATIONS - OVERVIEW DOCUMENT

INTRODUCTION

This guidance information pack has been developed to assist applicants and their advisors in making resource consent applications for intensive farming under the Horizons One Plan. There are several parts to this guidance information.

Part 1: This overview document

Part 2: The application forms

Part 3: Guidance for the preparation of restricted discretionary consent applications and what to include in an assessment of effects

Part 4: Template for the preparation of a Nutrient Management Plan

Part 5: Potential nutrient loss mitigation options (not modelled in Overseer)

Part 6: Background catchment information

Part 7: Statutory provisions

OVERVIEW

The One Plan sets cumulative nitrogen leaching maximums (CNLMs) in Table 14.2 based on land use capability (LUC) classes, and has a directive policy framework that directs applicants to meet those CNLMs on their farms. Exceptions to meeting the CNLMs are provided for in some limited circumstances. Modelling of the existing farm system's nitrogen losses (usually in Overseer) is recommended as a first step to determine whether the farm currently meets the CNLMs. If the farm does not meet the CNLMs, various mitigations to reduce nitrogen loss should be modelled to attain compliance with the CNLMs and a controlled activity consenting pathway. An inability to meet the CNLMs will mean that a more difficult consenting pathway and more detailed information will be required.

APPLICATION FORMS

Part 2 of this information pack contains three individual forms consisting of a cover sheet, an activity information form and an activity assessment form.

The forms should be utilised in the following manner:

- All applicants will be required to complete Form A (Cover Sheet) and Form B (Activity Information Form).
- Applicants for controlled activities can use Form C (Activity Assessment Form) as a template for their application.
- All Restricted Discretionary activities (RDAs) should refer to the guidance material in Part 3 of this information pack and will need to prepare an assessment of environmental effects that address the matters outlined in the document.

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Annex E

APPLICATION GUIDANCE

Part 3 of this information pack contains a guidance document titled "A guide to preparing resource consent applications for intensive farming activities in the Horizons Region". This document provides guidance to applicants seeking consent for restricted discretionary activities whose intensive land use farming activity does not currently meet the Year 1 CNLMs.

GUIDANCE NOTES FOR THE PREPARATION OF A NUTRIENT MANAGEMENT PLAN

Part 4 contains a suggested template for a Nutrient Management Plan. This template is designed to provide the information required in a NMP, but also to minimise repetition from the information required in the application forms for a resource consent.

POTENTIAL NUTRIENT LOSS MITIGATIONS OPTIONS (OUTSIDE OF OVERSEER)

Part 5 contains a document titled "Mitigation measures outside of Overseer", which is a review of New Zealand literature on nutrient loss mitigations that are not well represented in Overseer or don't feature at all. The research cited in the report indicates that these mitigations can assist in the reduction of nitrogen, phosphorous, sediment and E. coli losses to ground and surface water. Some of these mitigations may be able to be used to further reduce N-losses from that modelled in Overseer on some farms. This will enable applicants that use these mitigations to reduce their N-losses closer to the cumulative nitrogen leaching maximums expressed in Table 14.2 of the One Plan.

The main mitigations described in this report include wetlands, riparian management, fertiliser management, effluent management, crop management, alternative forages and pasture species.

If any of these mitigation are to be used as part of an application the chosen mitigation(s) would need to be modelled at the farm scale.

Applicants who wish to employ mitigations measures listed in Part 5 must demonstrate the effectiveness of these measures, if implemented on their farm.

Catchment Information

Part 6 contains catchment information prepared by Horizons' Science and Innovation Team. This material outlines the information held by Horizons in relation to specific Water Management Zones. The catchment summaries provide information on the current state of water quality and other information (where available) that can be used to inform the development of an AEE.

Statutory Provisions

Part 7 of the guidance material contains relevant extracts from the RMA, NPSFM, NESDW and One Plan.

- Section 88
- 4th schedule
- S105
- S107
- Part 2
- One Plan chapter 5 and 14 provisions
- NPSFM Objective A1 and A2
- NESSHDW provisions

2016/644

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one plan mo te iti mo te rahi

Annex F

MANAGING OUR ENVIRONMENT

RESOURCE CONSENT

PART A: APPLICATION FORM COVER SHEET

This form needs to be completed with all consent applications submitted to Horizons Regional Council. If sending multiple applications this cover form only needs to be completed once.

Consent holder name: .....

Please note: Resource Consents in the name of a Trust, Estate or Partnership require a contact list of all trustees/partners to be attached to any application. Consents can also be issued to a person(s) or to a company.

Contact person: (if different from above) .....

Phone no: ..... Fax no: .....

Mobile no: ..... Best contact time: .....

Email address: .....

Postal address: .....

Post code: .....

Please tick each of the following consents you are applying for and attach the respective application forms to the back of this form:

- ◯ **Drilling of Well**
  Lodgment fee $320 incl GST
- ◯ **Land Disturbance / Vegetation Clearance**
  Lodgment fee $885.50 incl GST
- ◯ **Surface Water Take**
  Stock Water: lodgment fee $977.50 incl GST
  Irrigation: lodgment fee $1,207.50 incl GST
  Other: lodgment fee $885.50 incl GST
- ◯ **Ground Water Take**
  Stock Water: lodgment fee $908.50 incl GST
  Irrigation: lodgment fee $1,863 incl GST
  Other: lodgment fee $885.50 incl GST
- ◯ **Dairyshed Discharge**
  Lodgment fee $1,012 incl GST
- ◯ **Land use for intensive farming and associated discharges**
  Lodgment fee $885.50 incl GST
- ◯ **Addition of Land Parcels to Dairyshed Effluent Discharge Area**
  No charge
- ◯ **Works in a Waterbody**
  Lodgment fee $885.50 incl GST
- ◯ **Gravel Extraction**
  Lodgment fee within allocation $1,667.50 incl GST
- ◯ **Discharge to Air**
  Lodgment fee $885.50 incl GST
- ◯ **Discharge to Land**
  Lodgment fee $885.50 incl GST
- ◯ **Change of Consent Conditions**
  Lodgment fee $885.50 incl GST
- ◯ **$885.50 incl GST**

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Annex F

Ring Horizons Regional Council's Consents Team on freephone 0508 800 800 if you require any assistance

Location/ property address of the proposed activity .....

.....

Legal description of all land titles (this can be found on your rates demand): .....

.....

Valuation numbers for all land titles (this can be found on your rates demand): .....

.....

Map reference (if known): .....

Ring Horizons Regional Council's Consents Team on freephone 0508 800 800 if you require a map

Do you own the property where this activity will take place? ◯ Yes ◯ No

If no, please state owner of property? .....

Contact details of property owner: .....

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

Contact person at Horizons Regional Council

If you have already dealt with a member of the consents team please advise their name? .....

Signature of applicant: (or person authorised to sign on behalf of the Applicant) .....

Address for service of applicant if different from above: .....

.....

Phone no: .....

Mobile no: .....

Contact person: .....

Have you attached the following:

◯ **Activity application forms as ticked above**

◯ **Assessment of Environmental Effects**

◯ **Map showing location and all required points of reference as requested on the activity application form**

◯ **Lodgment fee**

Please note: If you do not provide enough information your application may not be accepted. All further correspondence will be sent electronically unless otherwise specified.

◯ **I would like to receive all correspondence as hardcopy.** ◯ **I would like to receive all correspondence electronically.**

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.

2016/644

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APPLICATION FOR

RESOURCE CONSENT: INTENSIVE FARMING

FORM B: ACTIVITY INFORMATION FORM

Once you have determined your activity status (controlled or restricted discretionary) please fill in Form B below:
(Note that Form C, the Activity Assessment Form may assist in determining the activity status for your proposal)

Applicant Name: .....

Land Use Activity: ◯ **Dairy** ◯ **Horticulture** ◯ **Cropping** ◯ **Irrigated sheep and beef**

Activity Type: ◯ **Existing** ◯ **New (full conversion)** ◯ **New (partial conversion)**

Associated Discharges:

- ◯ **Fertiliser**
- ◯ **Contaminants from the use of a feedpad and/or feed storage and/or transportation**
- ◯ **Grade Aa biosolids or compost**
- ◯ **Poultry litter**
- ◯ **Farm animal effluent**
  - ◯ **Dairy shed and/or feedpad effluent**
  - ◯ **Piggery effluent**
  - ◯ **Sludge from farm effluent ponds**
  - ◯ **Poultry farm effluent**
- ◯ **Spray irrigation or sludge trucks used to discharges biosolids, poultry litter or farm dairy effluent** (contaminants therefore discharged to air)

Activity Status: ◯ **Controlled activity** ◯ **Restricted discretionary activity** (Form C may assist first to determine activity status)

Farm Name: ..... Supply number (if applicable): .....

Consent Term Sought (maximum of 35 years) .....

Related Permitted Activities

A. List any activities that are part of your proposal and are permitted (allowed without resource consent) under the One Plan.

B. Provide information that shows how each permitted activity will comply with the conditions of each relevant permitted activity rule. Please attach separate sheets if necessary

Other Activities

Describe any other discharge to land or water, water abstraction, river bed disturbance, vegetation clearance or discharge to air activities related to your proposal that you think Horizons Regional Council may need to be aware of.

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Annex G

Annex G

Existing Resource Consents

Please give details of any existing consents you hold relating to this application, and whether they match your current farm system (e.g. discharge consent for dairy farm, are your cow numbers and irrigation areas the same?)

Other Resource Consents

Describe any other resource consents that are required in relation to your intensive farming operation. Examples may include consents required for the installation of bridges or culverts, water takes, or earthworks for sediment control structures or cultivation etc.
(Use separate sheets if necessary)

Checklist Please ensure the following is included in your application:

- ◯ Cover Sheet Form
- ◯ Activity Assessment Form
- ◯ Application Report including an Assessment of Environmental Effects* (for restricted discretionary activities)
- ◯ Nutrient Management Plan (including overseer working files and base files) including maps for:
  - ◯ Farm locality
  - ◯ LUC classes for the farm
  - ◯ Natural features (contours/rivers/streams/wetlands/lagoons/ indigenous vegetation)
  - ◯ Physical Infrastructure (buildings/races/fences/farm drains/ bridges/culverts/ underpasses/irrigation)
  - ◯ Discharge areas for FDE, poultry litter, biosolids
- ◯ Dairy Effluent Storage Calculator (DESC) working file (for dairy only)
- ◯ Lodgement Fee

*for Restricted Discretionary Activities – please refer to the Horizons guidance document titled "A guide to preparing resource consent applications and assessments of environmental effects for intensive farming activities in the Horizons Region"

Applicant Declaration

I.....confirm the information contained within this application and supporting information is true and correct at the time of submission.

Signature of Applicant: ..... **Date:**.....
(or person authorised to sign on behalf or applicant)

Fees and Charges A lodgement fee of $885.50 (incl. GST) is required with your application. Failure to send the fee may result in rejection of your application. Please note: Additional charges may apply for any actual planning, technical and administration staff time incurred during the processing of your application. If you would like to pay your lodgement fee via internet banking please make payment to: 02-0630-0024883-003, please insert CONSENT HOLDER NAME in reference and CONSENTS in code.

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

Official Information Act Disclaimer Horizons Regional Council takes your privacy seriously. Any information you provide with this application including documentation provided in support of your application is official information. It will be used to process your resource consent application and, together with other official information, assist in the management of the regions natural and physical resources. This information will be held and administered by Horizons Regional Council in accordance with the Local Government Official Information and Meetings Act 1987 and the Privacy Act 1993. Your information may be disclosed in accordance with the terms of these Acts. It is therefore important you advise the council if your application includes trade secrets and/or commercially sensitive material. You have the following rights with regard to the information held about you:

- To access your personal information.
- To request incorrect information to be amended.
- To expect the information to be safely stored and used by or disclosed to authorised users only.
- To expect your personal information to be accurate and consistent in accordance with sound practices of record keeping and information systems management

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APPLICATION FOR RESOURCE CONSENT:

INTENSIVE FARMING

FORM C: ACTIVITY ASSESSMENT FORM

Applicant Name: .....

1. Rules Assessment

To determine if your application will be assessed as a controlled activity for which consent must be granted (Rule 14-1) or a restricted discretionary activity (Rule 14-2) for which consent may or may not be granted we need to see if your farming activity meets all of the conditions of Rule 14-1, including the other rules it cross-refers to. So please, work through the following table.

Rule 14.1 Conditions/Standards/Terms	Yes/ No/ N/A	Explanation of how standard is met
a) Has a nutrient management plan for the proposed activity (Existing or New Intensive Land Use) been prepared and provided to the Regional Council?		
b) Will the activity be undertaken in accordance with the nutrient management plan submitted with this application?		
c) Does the nutrient management plan demonstrate that the nitrogen leaching loss from the proposed activity will not exceed the cumulative nitrogen leaching maximum* specified in Table 14.2 (see below for Table 14.2 and your catchment, please fill in the blanks from your NMP)		

Please fill in the appropriate version of the table below, comparing the N loss limits in Table 14.2 of the One Plan with what has been modeled for your property.

Table 14.2 Cumulative nitrogen leaching maximum* by Land Use Capability Class*

Period (from the year that the rule has legal effect)	LUC* I	LUC* II	LUC* III	LUC* IV	LUC* V	LUC* VI	LUC* VII	LUC* VIII
Year 1	30	27	24	18	16	15	8	2
Year 5	27	25	21	16	13	10	6	2
Year 10	26	22	19	14	13	10	6	2
Year 20	25	21	18	13	12	10	6	2

Mangapapa/Waikawa/Other south-west catchments (Papaitonga)	Base	Yr 1	Yr 5 (2019)	Yr 10 (2024)	Yr 20 (2034)
Permissible N loss limits (Table 14.2)	-				
Farm Trajectory					

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Annex H

Mangatainoka/Other Coastal lakes/Coastal Rangitikei/Lake Horowhenua	Base	Yr 1	Yr 5 (2020)	Yr 10 (2025)	Yr 20 (2035)
Permissible N loss limits (Table 14.2)	-				
Farm Trajectory					

Upper Manawatu above Hopelands/Manawatu above gorge	Base	Yr 1	Yr 5 (2021)	Yr 10 (2026)	Yr 20 (2036)
Permissible N loss limits (Table 14.2)	-				
Farm Trajectory					

Rule 14.1 Conditions/Standards/Terms	Yes/ No/ N/A	Explanation of how standard is met
d) Are cattle excluded from all: i. wetlands and lakes that are defined as rare or threatened habitat?, and/or ii. the beds of rivers that are permanently flowing or have an active bed* width greater than 1 m?		
e) Are all rivers that are crossed by cattle and are permanently flowing or have an active bed width greater than 1 m; i. Bridged or culverted so that the cattle must cross via that bridge or culvert? and; ii. Is all run-off originating from the bridge or culvert diverted away from the waterway and discharged onto or into land?		
f) Will the application of fertiliser onto or into land and any additional discharge of contaminants into air (fertiliser drift) comply with the conditions of Rule 14-5 (below)?		
• **Will there be any direct discharge of fertiliser to a surface water body or artificial watercourse?**		
• **Will there be any direct discharge of fertiliser into any rare, threatened or at-risk habitat? E.g. wetland**		
• **Will fertiliser be applied in accordance with the Code of Practice for Nutrient Management (New Zealand Fertiliser Manufacturers' Research Association, 2007)?**		
• **Will the planning and application of fertiliser be carried out in accordance with the nutrient budget supplied with this application?**		
• **Will fertiliser be applied in a manner that is likely to cause offensive or objectionable odour or fertiliser drift beyond the property boundary?**		

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Rule 14.1 Conditions/Standards/Terms	Yes/ No/ N/A	Explanation of how standard is met
g) Will the discharge of contaminants onto or into land from: i. the preparation, storage, use or transportation of stock feed, or ii. the use of a feedpad; and; iii. any ancillary discharge of contaminants into air (odour and/or dust); Comply with the conditions of Rule 14-6(below):		
• Are all silage (excluding maize silage) storage pits that have an area greater than 500 m^2 sealed to restrict seepage of contaminants (maximum permeability 1x10-9 metres per second)?		
• Are all feed pads sealed to restrict seepage of contaminants (maximum permeability 1x10-9 metres per second)?		
• Are all areas used for storing stock feed, or areas for feeding stock, located and managed to ensure that at all times when these areas are used runoff into surface water or artificial watercourses (e.g. farm drains) is prevented and run-off from the surrounding catchment is prevented from entering these areas?		
• Will all areas used for storing stock feed or feeding stock comply with the following separation distances: i. 50 m from any rare, threatened, or at-risk habitat type ii. 20 m from any bore , water body, artificial watercourses, and the coastal marine area and iii. 50 m from any historic heritage identified in any district plan or regional plan.		

Annex H

Rule 14.1 Conditions/Standards/Terms	Yes/ No/ N/A	Explanation of how standard is met
h) Will the discharge of the following material: i. Grade Aa biosolids* or; ii. Compost; and; iii. any additional discharge of contaminants into air Comply with the conditions of Rule 14-7 (below)?		
• Is there any direct discharge or run-off into any surface water body or its bed or artificial watercourse?		
• If you are spreading compost to land, does it not contain any human or animal pathogens, or any hazardous substances?		
• For grade Aa biosolids does the discharge comply with the requirements for grade Aa biosolids as included with Chapters 4 and 17 of Volume 1 and Chapters 8 (including monitoring requirements) and 9 of Volume 2 of the Guidelines for the Safe Application of Biosolids to Land in New Zealand?		
• Does the discharge comply with the following separation distances: i. 50 m from rare, threatened habitats or at-risk habitats ii. 20 m from bores, surface water bodies, artificial watercourses and the line mean high water springs iii. 50 m from any historic heritage identified in any district plan or regional plan?		
• Will the activity be accounted for in the NMP and will it be in accordance with the NMP?		
• Will the discharge result in any offensive or objectionable odour beyond the property boundary?		

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Rule 14.1 Conditions/Standards/Terms	Yes/ No/ N/A	Explanation of how standard is met
i) Will the discharge of poultry farm litter onto or into production land and any ancillary discharge of contaminants into air comply with the conditions of Rule 14-9 (below)?		
• Is the rate of discharge no greater than 150 kgN/ha/yr in any 12 month period?		
• Will the discharge does not exceed 60 kgN/ha in any 24 hour period?		
• Is there any direct discharge or run-off into any surface water body or its bed or artificial watercourse?		
• Does the discharge comply with the following separation distances? i. 150 m from any residential buildings, public places and amenity areas where people congregate, and education facilities ii. 50 m from property boundaries iii. 50 m from rare habitats, threatened habitats and at-risk habitats iv. 20 m from bores, surface water bodies, artificial watercourses, and the line of mean high water springs v. 50 m from nay historic heritage identified in any district plan or regional any plan		
• Does the discharge and associated temporary stockpiling result in any offensive or objectionable odour or any dust beyond the property boundary?		
• Are areas used for stockpiling located and managed in a manner that ensures at all times when such areas are in use that: i. Run-off from the area into water or an artificial watercourse is prevented ii. run-off from the surrounding catchment is prevented from entering the area?		

Annex H

Rule 14.1 Conditions/Standards/Terms	Yes/ No/ N/A	Explanation of how standard is met
j) Will 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 v. and any ancillary discharge of contaminants into air Comply with the conditions, standards and terms of Rule 14-11 (below)?:		
• **Will there be any direct discharge of effluent into a surface water body or artificial watercourse?**		
• **Are all effluent storage and treatment facilities sealed to proposed seepage of effluent (maximum permeability 1x10-9 metres per second)?**		
• **Will the discharge comply with the following separation distances** i. **for discharges of piggery effluent, 150m from any residential buildings, public places and amenity areas where people congregate and education facilities?** ii. **for other discharges, 20 m from any residential building, public places and amenity areas?** iii. **for all discharges 50m from rare habitats, threatened habitats, and at risk habitats?** iv. **for all discharges 20m from bores, surface water bodies, artiificial watercourses, and the coastal marine area?** v. **for all discharges, 50m from any historic heritage identified in any district or regional plan?**		
• **Will the area where the effluent is disposed of/spread be separated from any archaeological site or historic heritage site, waahi tapu or koiwi remains identified in a district plan by at least 50 metres?**		

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• Will there be any ponding on the soil surface for more than five hours following application?		
• Will any storm water be discharged into the effluent treatment and storage facilities? If so, does the DESC take the stormwater volume into account?		
• Is the discharge accounted for in the NMP and will it be carried out in accordance with the NMP?		
• Will there be any offensive or objectionable odour, dust, or effluent drift beyond the property boundary?		

If you have meet all of the above conditions/standards/terms your application is **controlled activity**, you can proceed to fill out this form to cover your application, including an appropriate Assessment of Environmental Effects.

If you have not met any of the conditions/standards/terms above your application is a **restricted discretionary** activity, a full Assessment of Environmental Effects, prepared by a suitably qualified person must accompany your application, appropriate to the scale of the non-compliance with the rules above. (See Part 3 Guide to Preparing an AEE)

Annex H

For **controlled activity** applications, please fill out this form, adding additional sheets as necessary. You must ensure your application includes all information required by Schedule 4 of the Resource Management Act 1991. (See Part 7 of the information pack).

2. Description of Activity

Describe your activity including the farm system, discharges, inputs and outputs of nutrients, and any nutrient loss mitigations. (a general overview of your application, with details to be provided in your Nutrient Management Plan)

3. Description of Site

Describe the farm site and surrounding environment identifying any natural and physical features, including waterbodies and farm infrastructure. Note that maps of suitable scale and accuracy, identifying key features must accompany your application.

4. Assessment of Effects on the Environment

Describe the actual and potential effects of your intensive farming activity on the environment. This assessment needs to address effects on any neighbours from things such as effluent drift or odours, and any potential effects (including cumulative effects) on groundwater and surface water quality from nutrients, sediment and bacteria and be carried out within the context of the One Plan.

5. Mitigation Measures

Describe any measures undertaken, or proposed, in order to mitigate or avoid the loss of sediment and nutrients on the environment. Examples might include:

- wetlands at the base of critical source areas,
- riparian fencing
- Crop type and areas
- Timing of fertiliser applications

(High level overview, with further details in the Nutrient Management Plan)

Annex H

6. The National Environmental Standard for Sources of Human Drinking Water

- The National Environmental Standard for Sources of Human Drinking Water (You will need to determine whether there are any public water supplies that could be affected by your farming activities. Discussion with the water supply operator may be beneficial in determining whether the supply could be affected and what measures can be taken to ensure the quality of the water supply is maintained.)

7. Relevant Statutory Provisions

Assess your proposal against any relevant provisions of the following documents:

- Horizons One Plan (in particular Policies 14-5, 14-6 and 14-9) (See Statutory Provisions guidance document)

Is there any other information to add to your application? Please attach to this form.

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2016/644

Nutrient Management Plan

Applicant: A Farmer
123 A Road
xxxx
Supply Number: xxxxx
Catchment: xxxxxxx

Prepared by:
Position:
Version No:
Date:

Annex I

Consultant Declaration

I declare that I have the necessary expertise to prepare this Nutrient Management Plan and associated Overseer modelling and any associated files and documents.

I confirm the following:

- I have attained a Certificate of Advanced Sustainable Nutrient Management from Massey University.
- Overseer modelling has been completed in accordance with the current Overseer Data Input Standards and Horizons Regional Variations.
- Any alterations to the base file information or Overseer file have been outlined in this document and noted on the Base File Check List.

Name:

Position:

Signed:

Date:

Nutrient Management Plan (NMP) Checklist:

Please ensure you include the following in Your NMP

☐Fully completed Nutrient Management Plan template (or other industry approved template)

☐ Coversheet (SMP)

☐ Base file checklist completed by Dairy NZ (if applicable)

☐ Overseer files (base year and target)

☐ Dairy Effluent Storage Calculator working file

☐ Copy of latest soil test for the property

Table of Contents

1. Farm Contaminant Losses

1.1. Nitrogen Losses

Comment on farm trajectory and ability to meet the LUC targets.

Table 1: Comparison in kg N/ha/yr of Planned Farm Leaching Trajectory and the One Plan Cumulative Nitrogen Leaching Maximums calculated using Table 2.2 in Appendix A.

	Base	Yr 1	Yr 5	Yr 10	Yr 20
Permissible N loss limits (Table 14.2)	-	XX	XX	XX	XX
Farm Trajectory	XX	XX	XX	XX	XX

Table 2: Base and target year N loss and % reduction

	Total kg N/yr	Kg N/ha/yr
Base Year (2012/13 season)	XX	XX
Target Year (2015/16 season)	XX	XX
N Loss % Reduction	XX	N/A

1.2. Phosphorous Losses

Table 3: Base and Target P loss

	Total kg P/yr	Kg P/ha/yr
Base Year	XX	XX
Target Year	XX	XX

This section should discuss the following:

- The status of phosphorous loss on farm;
- Identify high risk areas for phosphorous loss on the farm e.g. high Olsen P levels, high P fertiliser applications and P fertiliser applications during high drainage months; and
- Any disparities in individual blocks.

1.3. Sediment Losses

This section should include the following:

- Practices observed on the farm that may contribute to sediment losses;
- A discussion on status of sediment loss on farm;
- Identify any high risk areas e.g. cultivation, crop management, steep or erodible land

Annex I

2. Nutrient Management Strategies

2.1. Nitrogen

2.1.1. Potential Reduction in Contaminant Loss

The following nitrogen management options have been identified as being feasible on the farm. These options represent the "Potential Reduction" in nitrogen leaching which is able to be modelled in Overseer.

Table 4: Nitrogen management options that could feasibly be adopted to reduce nitrogen leaching

Management Strategy Description	N Reduction	
	kgN/ha	Total N (kg)
	XX	XX
	XX	XX
	XX	XX
	XX	XX
Predicted Reduction in N Loss if ALL Strategies Adopted	XX	XX

The mitigations in the above table need to show a reduction in N leaching. In the event that there is an increase in cow numbers and/or production which results in an increase in N leaching, this should be listed in this table as a negative N reduction and be discussed in detail at the beginning of the report under the 'Background' section.

2.1.2. Selected Nitrogen Management Strategies

The farmer has selected the following strategies from those contributing to the Potential Reductions to reduce N leaching over time. These are the **Targeted Reductions**.

Table 5: Nitrogen management strategies the farmer is committed to implementing to reduce nitrogen leaching

Selected Management Strategies	Comment / Proposed Timing

	kgN/ha	Total N (kg)
Predicted Reduction in N Loss from Adopting Selected Management Strategies	XX	XX

2.1.3. Rejected Nitrogen Management Strategies

Following discussion with the farm owner and basic farm system modelling to ensure that the farms' profitability and production volumes are not significantly affected against the wishes of the owner, the management strategies identified in the Potential Reductions that have been rejected are outlined in the table below with farmers' justification as to why the strategies are rejected.

Table 6: Potential nitrogen management strategies that have been rejected and will not be implemented

Rejected Management Strategies	*Justification*

2.1.4. Nitrogen Reduction Reconciliation

The following table reconciles the differences in **Potential** and **Targeted** N reduction strategies.

Table 7: Differences in potential and targeted reductions

	Potential Reduction	Targeted Reduction
Baseline N Loss (kgN/yr)	8000	
Predicted Loss (kgN/yr)	7000	7200
Reduction in Forecast N loss (kgN/yr)	1000	800
Percentage Reduction	12.5%	10%
Targeted Reduction as Proportion of Potential Reduction		10%

2.1.5. Other Nitrogen Good Management Practices

Delete section if not applicable

The previous section outlines any good management practices that have been implemented that will affect N leaching and that will be reflected in Overseer. Other practices identified that will be implemented to minimise N Leaching that are not represented in Overseer include:

Table 8: Other Good management practices implemented on farm

Management Practice	*Implementation Date*

2.2. Phosphorus

Please provide some additional discussion about phosphorus loss. High risk areas should be discussed. Any mitigations in place or proposed to reduce P losses should be included in the below table.

Table 9: Phosphorus management practices implemented on farm

Management Practice	*Implementation Date*

2.3. Sediment

Discuss any mitigations that have been implemented or are proposed to manage sediment loss. Identified high risk areas should be addressed.

Table 10: Sediment management practices implemented on farm

Management Practice	*Implementation Date*

2.4. Stock Crossings

Please fill out if there is a stock crossing point on farm where stock cross through water:

- Please provide a detailed description of the stock crossing, including, but not limited to:
  - Co-ordinates of crossing location
  - Photographs of location
  - Number of crossing per year and timing of crossing eg one return crossing per month from August-May – see table below
  - Number of cows crossing per crossing – see table below

Table 11: Description of stock crossings through waterways that are being requested to continue

Stock type	Age	Weight per cow (kg)	Number	Crossing – what month? – No. of crossings?	Total Crossings / year
e.g. Mixed age cows	-	450	300	Cross over in June and return in July	2 per year
e.g. R2 Heifers	12-22	230-400	80	- Cross in August on	4 per year

	months			arrival to runoff - One return crossing in November - Cross to leave property in July	
Etc.					

If you have any questions about this section contact Horizons Rural Advice Team.
OR
If stock do not cross through water anywhere on the milking platform, lease land or associated run offs – Please replace with "**N/A - No stock cross through water on farm**".

2.5. Acknowledgement of Other Good Management Practices

Note any current mitigations that have been implemented since the base year which contribute to reduced loss of nitrogen, phosphorus, sediment or faecal contamination that have not been covered previously. Please ensure the information contained in this section is accurate (including the dates that the mitigations were implemented).

3. Farm system and Overseer Model Assumptions

Provide details or assumptions made or delete this and enter: No assumptions outside the Overseer Data input standards and regional variations required by Horizons Regional Council were used in preparation of the nutrient budgets.
If any assumptions were made during the interpretation of information please outline:

a) *Any assumptions or averaging of farm practices that were made when entering information;*
b) *If Overseer Data Input standards have not been followed.*

Please detail the reasons for these assumptions and the impact this has had on the modelled information.

Annex I

4. List of Appendices

Appendix A:	Farm Details (Base file data)
Appendix B:	Overseer Block Map
Appendix C:	Soil Maps
Appendix D:	LUC Maps
Appendix E:	Effluent Block Extension maps
Appendix F:	Aerial map showing bridges, culverts, location/s where stock cross through water or waterway fencing that is yet to be installed.

APPENDIX A: BASE FILE FARM DATA

1. Farm description

The farm business is defined by the following legal description:

NOTE: These descriptions must match the maps in Appendix E.
NOTE: Outline any differences in property size or legal description between base and target year.

1.1. Legal Description

Table 1.1: Legal description

	Milking Platform	Support block
Physical Location		
Legal description		
Valuation numbers		
Area (rateable)		

1.2. Farm Area

Table 1.2: Total farm area involved in the farming operation to be consented

	Milking Platform	Support block
Grazeable Area		
Stock Excluded Area		
Non-Productive		
Total Area		
Ownership		

1.3. Other Physical Characteristics

Table 1.3: Other physical characteristics to

	Milking Platform	Support block
Latitude: Longitude		
Average rainfall:		
Distance from Coast:		

2. Land Resource Information

Table 2.1: Land Resource Description

Overseer blocks names	Primary LUC	Area (ha)	Main soil type (S-Map identifier)	Contour	Drainage*	Relative Pasture Yield	N-Loss to Water
Platform							
Stock Excluded							
Non Productive							
Subtotal - Platform							
Support block							
Stock Excluded							
Non Productive							
Subtotal – Support block							
TOTAL AREA							

*if mole or tile drainage is present in the block include the % in brackets in the drainage column i.e Poor (100% tiled)

Table 2.2: Permissible N-loss limits for the farm based on Table 14.2 of the One Plan and the land areas provided in Table 2.1

Land Use Capability* (LUC)	LUC Areas (ha)			Table 14.2 N Leaching Limits (kgN/ha)			
	Total	Platform	Run-off	Year 1	Year 5	Year 10	Year 20
I	0.0	0.0	0.0	30	27	26	25
II	0.0	0.0	0.0	27	25	22	21
III	0.0	0.0	0.0	24	21	19	18
IV	0.0	0.0	0.0	18	16	14	13
V	0.0	0.0	0.0	16	13	13	12
VI	0.0	0.0	0.0	15	10	10	10
VII	0.0	0.0	0.0	8	6	6	6
VIII	0.0	0.0	0.0	2	2	2	2
Farm Area (ha)	0	0	0				
FARM LEACHING TARGET (kgN/ha)				#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Total Nitrogen (kg)				#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

*NOTE: A description of LUC can be found in: Land Use Capability Survey Handbook, 3rd Edition. (Available at http://www.landcareresearch.co.nz/__data/assets/pdf_file/0017/50048/luc_handbook.pdf)

3. Farm System Description

The farm description outlined in the following section is the basis on which this consent is being sought. The base year is the 2012/13 season and the target year is the 2015/16 season.

3.1. Milking Platform

3.1.1. Stock numbers

Table 3.1 Stock numbers on farm

	2010/11	2011/12	2012/13	Baseline	Target
Peak cows milked					
Other stock:					

Enter any clarifying comment

3.1.2. Production

Table 3.2: Production to Factory

	2010/11	2011/12	2012/13	Baseline	Target
Total kgMS					
kgMS/ha					
KgMS/cow					

Season	Good/Avg/Poor	Good/Avg/Poor	Good/Avg/Poor		

Enter any clarifying comment, and also comment if a season other than the 2012/13 has been selected to generate the baseline and the reason for this e.g. drought

3.1.3. Nitrogen used

Table 3.3: Nitrogen used (Whole farm)

	2010/11	2011/12	2012/13	Baseline	Target
kgN/ha					

As reported in Overseer whole farm Nutrient Budget

3.1.4. Feeding

Table 3.4: Imported Supplements

	Feed Volume (TDM)				
Supplement Type	2010/11	2011/12	2012/13	Baseline	Target
Eg. Maize silage (TDM)					
TOTAL					
Kg/cow					

Enter any clarifying comment such as where the supplement is fed and to what stock.

Table 3.5: Supplement harvested on farm

	Feed Volume (TDM)				
	2010/11	2011/12	2012/13	Baseline	Target
xxxx (TDM)					
Block harvested from					
Destination					

Enter any clarifying comment – Note: only include if supplement is being transferred between milking platform and the runoff (and vice versa).

3.1.5. Winter Grazing

Table 3.6: Time spent off farm

	Total Days Grazed Off				
	2010/11	2011/12	2012/13	Baseline	Target
Total cows					
Date cows leave MP					

Page | 16

Date cows return to MP					
Total days off					

If total cows grazed off do not all leave or return at the same time please outline. Eg all leave on 20 May, 100 return on 20 July and 100 return on 10 August. Enter any other clarifying comment.

3.1.6. Cropping

Table 3.7: Cropping undertaken on farm

	2010/11	2011/12	2012/13	Baseline	Target
Crop:					
Block(s) crop rotates through					
Area (ha)					
Yield (TDM)					
Cultivation method					
Month sown					
Month harvested					
Harvest method					
Stock class					
Hours on crop					
Month re-sown					

3.2. Support block

If no support block is associated with this application the text and tables below in this section can be deleted and replaced with "Not applicable – no support block is associated with this application".

3.2.1. Stock Numbers

Table 3.8: Stock Numbers on support block

Stock Class	2010/11	2011/12	2012/13	Baseline	Target
e.g R1yr replacements					

Enter any clarifying comment.

3.2.2. Nitrogen used

Table 3.9: Nitrogen used on support block

	2010/11	2011/12	2012/13	Baseline	Target

kgN/ha					

Enter any clarifying comment.

3.2.3. Feeding

Table 3.10: Imported Supplement

	Feed Volume (TDM)				
Supplement Type	2010/11	2011/12	2012/13	Baseline	Target
Eg Maize silage (TDM)					
TOTAL					
Kg/cow					

Enter any clarifying comment.

Table 3.11: Supplement harvested on support block

	Feed Volume (TDM)				
	2010/11	2011/12	2012/13	Baseline	Target
xxxx (TDM)					
Block harvested from					
Destination					

Enter any clarifying comment – Note: only include if supplement is being transferred between milking platform and the runoff (and vice versa).

3.2.4. Cropping

Table 3.12: Cropping undertaken on support block

	2010/11	2011/12	2012/13	Baseline	Target
Crop:					
Block(s) crop rotates through					
Area (ha)					
Yield (TDM)					
Cultivation method					
Month sown					
Month harvested					
Harvest method					
Stock class					
Hours on crop					
Month re-sown					

4. Farm Structures

Table 4.1: Farm Structure Descriptions

Structure	Description
Farm Dairy	
Feedpad	
Silage bunkers	
Etc...	

5. Farm Animal Effluent

Includes effluent from dairy sheds, poultry farms and piggeries

5.1. Consent Conditions

Table 5.2: Existing Discharge Consent Conditions

Consent number	
Expiry date	
Maximum cow numbers	
Minimum area required to be irrigated per year*	
Maximum allowable effluent nitrogen (kgN/ha)	

*as determined by Overseer modelling

5.2. System Description

Describe system and enter details for effluent section below as it is today (not baseline year). If any changes have been made following the base year please comment on the changes.

5.3. Effluent Application

Describe system, *e.g.* The performance and flow of the irrigator was not measured, but it is assumed for Overseer to be applying12-24 mm and for the Dairy Effluent Storage Calculator (DESC) it is applied at 20mm.

Table 5.3: Description of current effluent application on farm

	Irrigator 1	Irrigator 2
Irrigator type		
Application depth		
Area irrigated		

Annex I

5.4. Storage

A Dairy Effluent Storage Calculator (DESC) does not need to be completed for farms that have a sump only system and are not proposing to install effluent storage as part of this application. Please include the following note with sump only:

A DESC has not been completed for this property but one will be required if the applicant chooses to install storage or when particular changes are made to the effluent system which trigger the need for a new Discharge Permit or when Discharge Permit XXXX expires on XXXX.

For all other systems a DESC will need to be completed and all sections completed. The DESC working file needs to be supplied with the application.

5.5. Rainfall

Table 5.4: Description of rainfall site and impact on modelling (Overseer and DESC)

Rainfall Site	Rainfall	Variance
DESC Site		
Overseer model		
Farmer estimate (if known or delete)		

The xxxx site was chosen as being the most representative.

5.6. Soil Risk Status

Table 5.5: Description of Soil Risk and impact on modelling (Overseer and DESC)

	Area (ha)	High risk Area (ha)	Low Risk Area (ha)
Soil area within the effluent block			
Effluent area required by Overseer to apply no more than 150 kg N/ha/year			
Artificial drainage			
Areas used in the DESC			
Surplus area			

Enter any clarifying comment

5.7. Storage Volume

The DESC has been used to calculate the current storage volumes and the storage volume required to allow deferred effluent irrigation to be practiced. The current storage capacity is insufficient/sufficient.

Table 5.6: Comparison of current and required effluent storage volume

	Storage Volume
Current Volume	m3
Required Volume	m3

Page | 20

NOTE: The required storage volume is based on the current effluent system set up, and is specific to this farm only. No consideration has been made in this calculation as to possible options to reduce total volume required.

5.8. Permeability

Describe the pond(s) and likely permeability.

5.9. Dairy Effluent Storage Calculation Summary Report

Add the summary report here.

6. Water Use

6.1. Stock and Farm Dairy Water Requirements

Water is sourced from XXX. Based on XX cows at 140 litres per day. The take is a permitted activity and is not metered or the take requires consent / or is consented under Water Permit xxxxx, allowing for a maximum daily usage of xxxm3/day and expiring on XXXX.

Describe water system at shed, e.g.
The cooler water is recycled into tanks for yard wash-down but there is no use of green water recycling. Water flows onto the yard from the bottom of the backing gates to assist in yard wash down. An assumption of xx l/cow has been made for water use for the plant cleaning, milk cooling and yard.

Table 6.1: Stock drinking water and shed washdown use estimates

	Source of Data	Total Litres / Day
Stock drinking water	Industry standard / Water meter etc	
Dairyshed	Industry standard / Water meter etc	
Feedpad		
TOTAL LITRES / DAY		

6.2. Water Irrigation

If no irrigation on farm delete the below text and tables and replace with "Not applicable - No irrigation currently on farm"

If irrigation is used on farm please detail the following:

- Water is sourced from XXX. The take is consented under consent number XXX
- The maximum daily volume for extraction is …m3/day (subject to conditions).
- Resource consent xxxxx expires on
- Describe irrigation system (e.g. type of system, area irrigated, reliability)
- Comment on telemetry records for mm/ha/year applied

6.2.1. Base Year Overseer Inputs

Table 6.2: Base Year Overseer Inputs:

Depth of Application	Fixed / Variable	Application Depth if Fixed	mm
Frequency of Irrigation	Fixed Return / Variable Return	Return period if Fixed	days
Decision criteria	%PAW[1] / mm deficit	Initial Trigger	% or mm
		Target	% or mm

6.2.2. Irrigation Scheduling Method

It is a requirement to implement a scheduling method. Describe the method used/to be used on the property to schedule irrigation.

Table 6.3 Target Year Overseer Inputs
Delete section if same as base

Depth of Application	Fixed / Variable	Application Depth if Fixed	mm
Frequency of Irrigation	Fixed Return / Variable Return	Return period if Fixed	days
Decision criteria	%PAW[2] / mm deficit	Initial Trigger	% or mm
		Target	% or mm

Add any clarifying comment and describe good practices implemented if not covered above eg Electro-magnetic soil mapping, soil moisture monitoring.

7. Fertiliser Applications

Table 7.1: Fertiliser applications undertaken on farm in Base Year (including crop blocks)

Block	Month	Product	Rate (kg/ha)	N	P	K	S

Note: the N reported as above is based on the total units of nitrogen applied to the block and divided by the total block area. The application rate reported refers to the rate applied on the effective (farmed) area of the block.

Table 7.2: Fertiliser applications undertaken on farm in Target Year (including crop blocks)

Block	Month	Product	Rate (kg/ha)	N	P	K	S

Page | 22

7.1. Soil Tests

The soil test values used in the Overseer file are actuals based on a soil test carried out [insert date]

Table 7.4: Soil test results used in Overseer

Block	Olsen P	QT K	QT Ca	QT Mg	QT Na	QT SO4	pH

Or

The soil test values used in the Overseer file are defaults from Overseer. Explain why defaults have been used. These should only be used if no soil test data is available.

8. Poultry/Piggery farm litter Applications

If no poultry/piggery litter are applied on farm - enter N/A – No poultry/piggery litter are applied on farm.

Table 8.1: Poultry and/or Piggery applications undertaken on farm

Block	Month	Product	Rate (kg/ha)	N	P	K	S

9. Bio-solids Applications

If no Bio-solids are applied on farm - enter N/A – No Bio-solids are applied on farm.

Note: An example of Grade Aa Bio-solids – Sludge from Waste Water Treatment Plants.

Table 9.1: Bio-solids applications undertaken on farm

Block	Month	Product	Rate (kg/ha)	N	P	K	S

10. Odour, dust, fertiliser, and effluent drift management

Please detail how the effects of odour, dust, fertiliser and effluent drift are managed and have been minimised on farm.

Example: not applying effluent or fertiliser during windy conditions, maintaining buffer distances etc.

11. Stock Exclusion

REQUIREMENTS	STATUS	NOTES

REQUIREMENTS	STATUS	NOTES
Is there a reticulated water supply available for all animals on the farm to avoid reliance on natural waterways?		
Are all stock physically prevented from entering waterways that are either permanently flowing or have an active bed width greater than one metre?		
Are all stock excluded from any wetlands and lakes that are defined as either a rare or threatened habitat?		
Are all points where stock cross waterways bridged or culverted to prevent effluent entering water?		
Are there any direct discharges of animal effluent to waterways from other activities?		

11.1. Existing Stock Crossing (through water)

Are there any existing stock crossings through waterways on farm excluding bridged/ culverted crossings? If so please fill out the Table below to describe current stock crossings, mark the location of these crossings in Appendix I and refer to Section 3.4 of the report

Table 11.2: Description of current stock crossings through waterways on farm

Stock type	Age	Weight per cow (kg)	Number	Crossing – what Month? – No. of crossings?	Total Crossings / year
e.g. Mixed age cows	-	450	300	Cross over in June and return in July	2 per year
e.g. R2 Heifers	12-22 months	230-400	80	- Cross in August on arrival to runoff - One return crossing in November - Cross to leave property in July	4 per year
Etc.					

[Delete if no stock crossings exist on farm and replace with – N/A – no stock crossings on farm]

11.2. Existing bridges and culverts

Are there any existing bridged or culverted crossings? If present, mark these on map in Appendix I. Outline any measures that have been put in place to manage the run-off originating from the carriageway of the bridge or culvert e.g. bunding to prevent the direct discharge of effluent over the edge of any structures or design of races leading to and from crossing.

11.3. Fencing

Please detail in the following table the length of waterways that have been fenced/are to be fenced to exclude stock. If a portion is left to be fenced, please give a timeframe of when this fencing is to be completed and include a farm aerial map showing the fencing yet to be completed in Appendix I.

Table 11.3: Fencing audit

	Waterways
Length of Waterways	
Length Fenced	
Percentage Fenced	

12. APPENDIX B: OVERSEER BLOCK MAP

Base and Target Maps required if any changes to blocks occur.

13. APPENDIX C: SOIL MAPS

14. APPENDIX D: LUC MAPS

15. APPENDIX E: AERIAL MAP SHOWING LEGAL DESCRIPTIONS

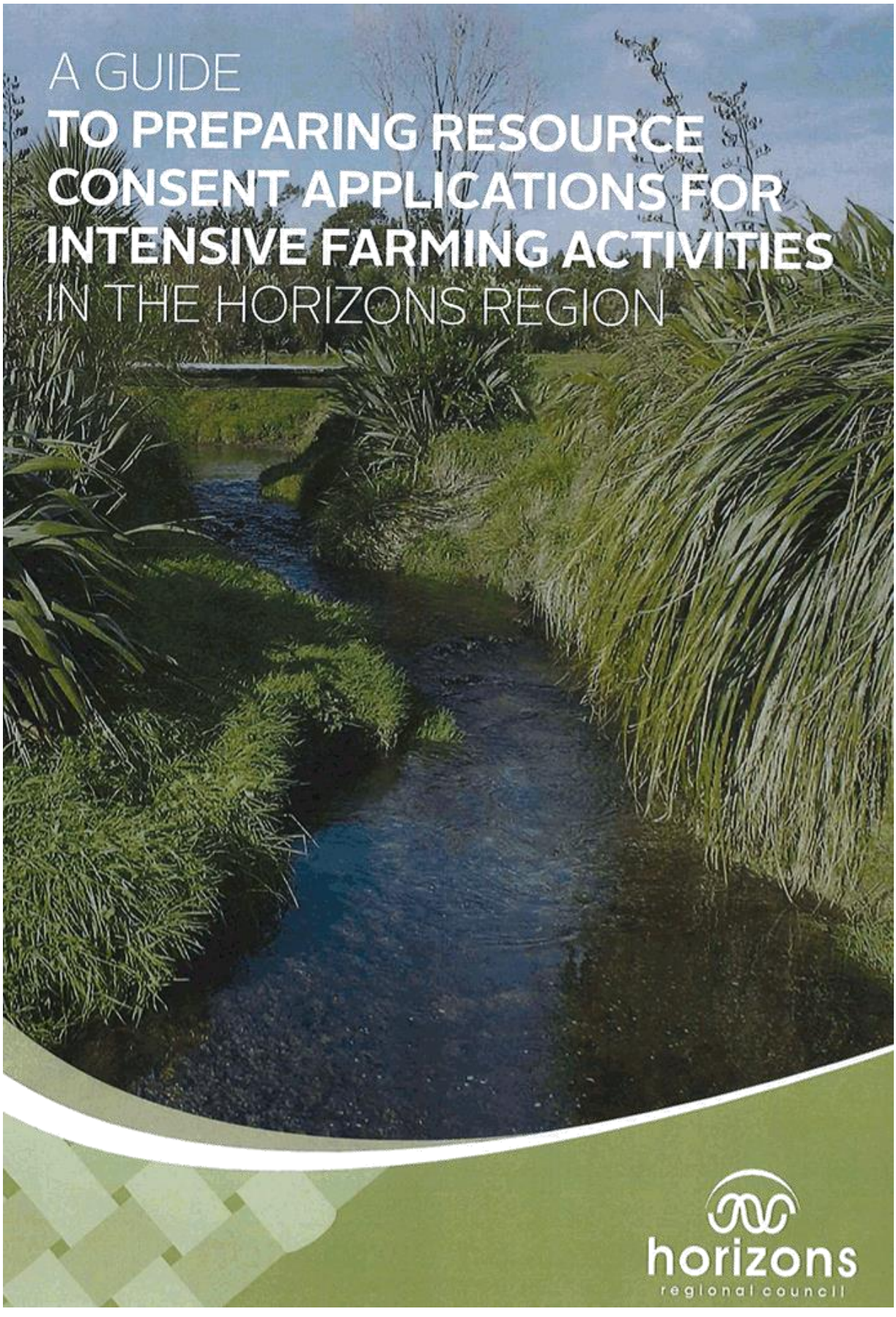
16. APPENDIX H: EFFLUENT BLOCK MAPS

Please only fill out if extending effluent area. Put N/A if not applicable.

Please mark clearly the land that has been added for the effluent area (from the existing).
NB: If the applicant is extending the effluent area, the Discharge Permit will need to be checked to see if this covers the extended effluent area.
If not addition of land parcels will need to be applied for, which is free of charge.

17. APPENDIX I: AERIAL MAP SHOWING BRIDGES, CULVERTS, LOCATION/S WHERE STOCK CROSS THROUGH WATER OR WATERWAY FENCING THAT IS YET TO BE INSTALLED.

Annex I


A GUIDE
TO PREPARING RESOURCE CONSENT APPLICATIONS FOR INTENSIVE FARMING ACTIVITIES
IN THE HORIZONS REGION
horizons
regional council

Annex J

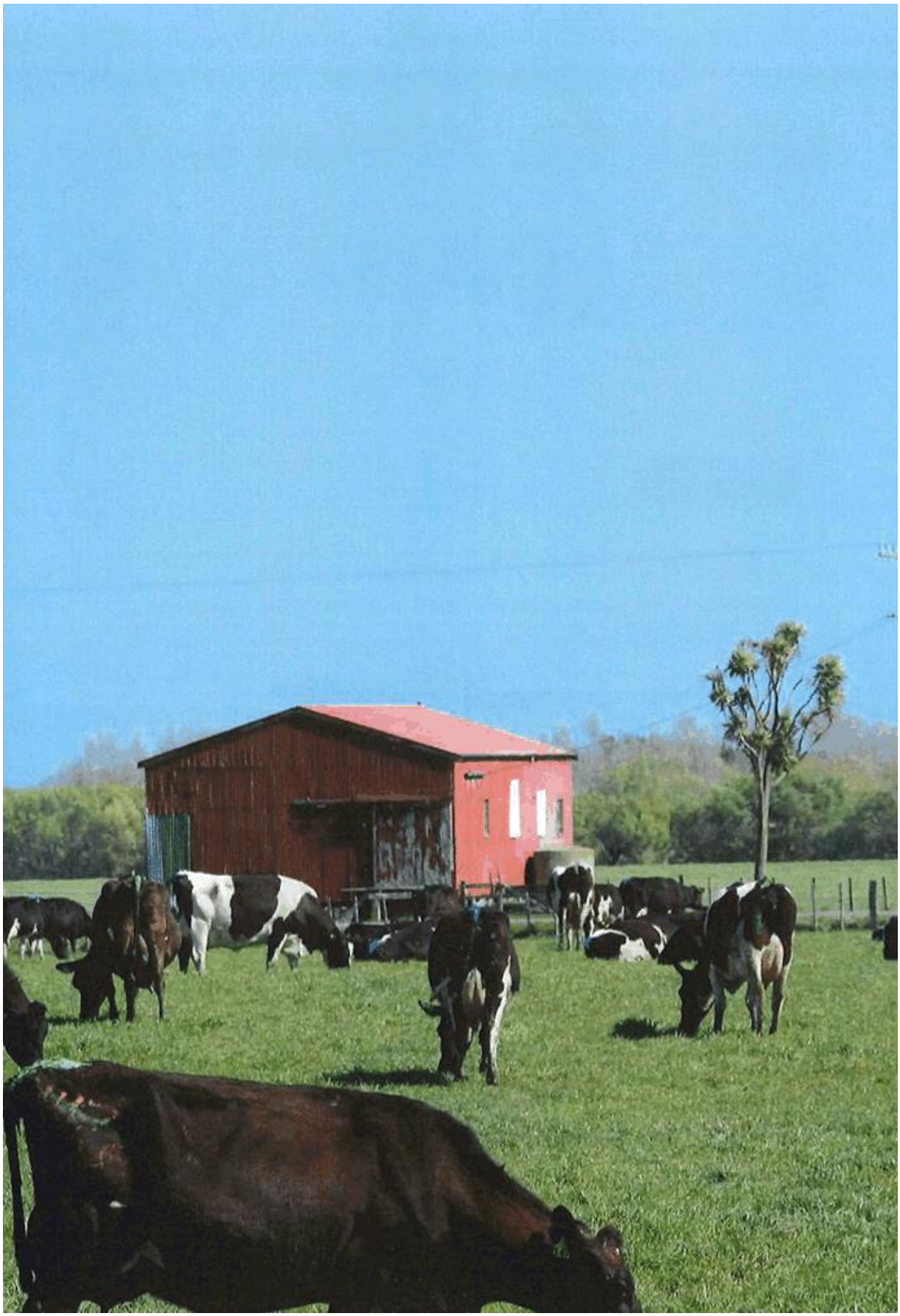
Annex J

OVERVIEW

This implementation guide has been developed to assist applicants and their technical advisors in the preparation of resource consent applications for intensive farming activities under the Horizons One Plan.

The guidance within this document outlines the key components of an application report and assessment of environmental effects (AEE) for restricted discretionary activity consent applications, particularly those for those proposals that will not meet the cumulative nitrogen leaching maximums specified in Table 14.2 of the One Plan.

This guide should be read in conjunction with section 88 and the 4th schedule of the Resource Management Act, which specify the legal requirements for resource consent applications and AEEs.



CONTENTS

1. INTRODUCTION

This guidance document has been developed to assist applicants and their advisors in the preparation of restricted discretionary resource consent applications for intensive farming activities under Rules 14-2 and 14-4 of the Horizons One Plan. The guide outlines the key components of an application report and assessment of environmental effects (AEE), particularly for those proposals that will not meet the cumulative nitrogen leaching maximums (CNLMs) specified in Table 14.2 of the One Plan.

In general, resource consent applications include the applications forms, an application report (usually prepared by a planner) that provides descriptions of the activity, the site, the effects, and assesses the activity against the relevant provisions of applicable plans and statutory documents. The application report will often draw on information contained within technical reports and documents that provide background information and assess specific effects on the environment. Examples for intensive farming consents might be reports identifying groundwater flow and nutrient attenuation rates or a report addressing effects on surface water quality and aquatic life. Other attachments for intensive farming consents will include a nutrient management plan and the associated overseer files. In addition to the above, there should be maps and plans that provide spatial information such as LUC classes, soil types, artificial drainage, natural and built features, and discharge areas.

2. HORIZONS ROLE IN THE RESOURCE CONSENT PROCESS

Section 30 of the RMA sets out the statutory responsibilities of regional councils. These include controlling the use of land for soil conservation purposes, maintenance and enhancement of water quality and ecosystems, and controlling discharges of contaminants.

Intensive land use activities (defined under the One Plan) have the ability to affect surface water and groundwater quality. The One Plan outlines how Horizons Regional Council will manage the effects of intensive farming land use activities throughout the Region. The Region has been divided into Water Management Zones and Water Management Sub-Zones. Under the One Plan, intensive farming land use activities affecting groundwater and surface water quality must be regulated if the activity is within a targeted Water Management Sub-Zone or they are a new intensive farming land use anywhere in the Region.

An application for resource consent under Rules 14-1 to 14-4 of the One Plan requires the applicant to supply an AEE. The Council's role is to assess the application to ensure it meets the requirements the One Plan and Resource Management Act 1991 (RMA).

A completeness check of the application is carried out to ensure the application contains all the necessary information to enable it to make its assessments. If insufficient information is provided, the Council will likely return the application as being incomplete. Good quality applications assist the Council in its assessments and helps avoid delays.

It is important to ensure that all the application forms are completed and the application includes an adequate AEE. The Council will need to determine if all the necessary resource consents have been applied for and will check for compliance against the One Plan rules and relevant matters under the RMA.

When making decisions on resource consent applications, the Regional Council will assess the application against the One Plan and other statutory documents as required. Once all of the necessary information has been obtained to determine the extent of adverse effects and whether there are any potential affected parties, the Council will determine whether the application should be publically notified, limited notified or non-notified. Depending on the outcome of the notification decision, a hearing may be held to make a decision on consent application.

3. PREPARING A RESOURCE CONSENT APPLICATION REPORT

This section outlines an example layout for a resource consent application report and provides commentary on a section by section basis. It provides guidance as to what information is required specific to intensive farming consents.

I. INTRODUCTION

This section should provide an introduction providing a high level overview of the proposal, consents sought, expected effects and outcomes.

II. DESCRIPTION OF PROPOSED ACTIVITIES

This section should provide a detailed description of the activities being carried out under each of the consents being applied for. Intensive farming activities will include associated discharges and these need to be clearly described as well. The descriptions in this section form the basis for assessing the effects on the environment. The descriptions may rely on, and can refer to descriptions within any attached technical reports such as the nutrient management plan.

A. LAND USE ACTIVITIES

For all intensive land use activities the description should include:

- The type intensive farming, i.e. dairy farming, commercial vegetable growing, cropping or intensive sheep and beef farming.
- A statement as to whether the activities were existing at the dates specified in Table 14.1 of the One Plan, or are new since then.
- The nature and scale of the land use, i.e. area of land farmed, type of crops and areas planted, stock numbers.
- The sources of any likely nutrient losses or leaching on the property.
- Any proposed changes to the existing farming practices.
- The duration of consent sought.

B. DISCHARGE ACTIVITIES

Provide a description of any discharge activities specified under Rules 14-1 to 14-2 of the One Plan.
These include the following:

The discharge of fertiliser	Describe the types, compositions and volumes of fertilisers used. Describe where and how they are applied to land, e.g. aerial or land based application, granular or liquid form, whether GPS technology is utilised. Describe setback distances from waterways, artificial watercourses, site boundaries and sensitive areas such as indigenous vegetation and wetlands. Outline whether there is potential for fertiliser or odour to drift beyond the property boundary.

Annex J

The discharge of contaminants from the use of a feedpad, feed storage and transportation	Identify all areas used for feedpads, storing feed and feeding stock (including feeding silage). Describe feedpad and feed storage infrastructure. Describe the method transportation of stock feed on the property. Describe where the runoff and/or collected leachate from the areas are treated and discharged. Does the Is this in accordance with one Plan Rule 14-11? Describe, with reference to maps, the separation distances from waterways, artificial watercourses and sensitive areas such as bores, indigenous vegetation, wetlands, coastal marine areas and historic heritage sites identified in regional or district plans. Discuss whether there is an ancillary discharge of contaminants into air, including odour or dust beyond the property boundary.
Discharges of grade Aa Biosolids and compost to land	Outline the composition and volumes of the biosolid and where, when and how it is discharged to land. State whether these materials contain any human or animal pathogens or any hazardous substances. Describe, with reference to maps, the separation distances from waterways, artificial watercourses and sensitive areas such as bores, indigenous vegetation, wetlands, coastal marine areas and historic heritage sites contained in regional or district plans. Discuss whether there is an ancillary discharge of contaminants into air, including odour or dust beyond the property boundary.
Discharge of poultry or pig farm litter and associated temporary stockpiling	Discuss the discharge area, nutrient composition, rate and volume of the litter discharged to land. Describe, with reference to maps, separation distances from waterways, artificial watercourses, residential buildings, public spaces, amenity areas, education facilities and sensitive areas such as bores, indigenous vegetation, wetlands, coastal marine areas and historic heritage sites contained in regional or district plans. Discuss whether there is an ancillary discharge of contaminants into air, including odour or dust beyond the property boundary.
Farm animal effluent, including: Dairy shed effluent; Piggery effluent; Sludge from farm effluent ponds; and Poultry farm effluent	Describe the type of effluent and where it is discharged to and how often. Describe the animal effluent storage and treatment facilities. Outline the rate and depth of the discharge and why it is appropriate for the site. Describe any contingency measures in case of bad weather or mechanical issues. State how much storage is available and how much is proposed. (this will need to be based on a Dairy Effluent Storage Calculator (DESC) report for dairy shed effluent discharges. Is the storage facility sealed to restrict seepage of effluent? If so, how? If not, why not? Describe, with reference to maps, the separation distances from waterways, artificial watercourses, residential buildings, public spaces, amenity areas, education facilities and sensitive areas such as bores, indigenous vegetation, wetlands, coastal marine areas and historic heritage sites contained in regional or district plans. Describe where stormwater is discharged to from any ancillary roof areas and hardstand area which not hold animals. If stormwater is discharged to the effluent storage facility, provide evidence to show there is sufficient storage capacity to do so. Discuss whether there is potential for effluent drift, including odour beyond the property boundary.

Annex J

III. DESCRIPTION OF SITE AND RECEIVING ENVIRONMENT

This section should provide descriptions of the farm that is the subject of the consent application, the surrounding environment, and identify and describe the receiving environment of any discharges (namely groundwater for diffuse discharges from stock and any surface water bodies in or around the farm).

A. THE FARM AND SURROUNDING ENVIRONMENT

This section should provide a description of the farm site and the surrounding environment. This description can be split into two sections with the one section describing the farm itself and the other the wider surrounding environment. Matters to include are:

- Farm location and Water Management Sub-Zone;
- Climate, topography, soil types and drainage characteristics;
- Location of all surface water bodies, including rivers, streams, lakes, wetlands, artificial watercourses and drains on the farm and in the surrounding area;
- Location and descriptions of physical infrastructure on the farm, such as races, bridges and culverts, underpasses, buildings, effluent ponds, irrigation infrastructure, fences;
- Location and descriptions of any surrounding towns, dwellings, public water supplies, or other infrastructure that could be affected by the farming activities; and
- Discuss any other natural features such as riparian margins; indigenous or exotic woody vegetation that is forest, treeland, scrub or shrubland.

The above descriptions should be supported by and can refer to maps or plans attached to the application. Maps relating to the proposal should be of a suitable scale to allow easy identification of the features that map is displaying. A map outlining all land parcels on the farm and the associated legal description(s) is a mandatory component of the application. Other typical maps would include:

- A locality map showing the location of the farm and legal description.
- A farm infrastructure plan, showing the farm boundaries, buildings, fences, races, underpasses, bridges and culverts, feedpads, feed storage facilities or stacks, effluent ponds and effluent management infrastructure.
- A plan showing any natural features such as waterbodies as outlined above. If there are rare, threatened or at-risk habitat areas on the farm, (e.g. areas of native bush) these should be identified and shown on the plan.
- An irrigation plan showing areas irrigated by water.
- A plan showing areas where farm animal effluent is discharged. This should show or describe setback distances from residential buildings, public places, education facilities, rare, threatened or at-risk habitat areas, waterways, coastal marine area, bores, and any historic features. This plan should also identify any areas that have artificial drainage.

Please note the definition of wetland is very broad. Some wetlands are also rare or threatened habitats. These are described in the One Plan, in Schedule F. If you require assistance to help identify whether a wet area is a rare or threatened habitat described in Schedule F of the One Plan, please contact Horizons Regional Council on 0508 800 800.

Annex J

B. RECEIVING ENVIRONMENT

The 'receiving environment' is the area or part of the environment that will be affected by the farming activities. It will include the land being farmed itself and the groundwater beneath that land. It will also include surface water bodies that any run-off enters and waterbodies fed by groundwater from the farm. An accurate description of the receiving environment is important because the effects of the farming activity will be assessed against this. A description of the receiving environment should include:

- Identification of any groundwater potentially affected, its depth, flow direction and quality (this will need to draw from a technical report, specific to the application, prepared by a qualified and experienced consulting hydrogeologist or from information that Horizons may hold).
- Identification of any surface waterbodies (rivers, streams, lakes, lagoons, wetlands) which are influenced by the groundwater identified above, or by surface runoff from the farm. A description of the sensitivity of these waterways and their current state should be provided. As with groundwater, this section will need to draw from a technical report, specific to the farm, prepared by a qualified and experienced consulting hydrologist or water quality scientist, or from information that Horizons may hold).

IV. CONSENTS REQUIRED

This section needs to clearly identify what consents are being applied for under the One Plan. It should also identify what standards are being exceeded under the relevant rules and whether any other resource consents are required and whether those consents have been applied for or not. As this has been addressed in Application Form C, you may wish to cross-reference back to this document to avoid repetition.

V. ASSESSMENT OF ENVIRONMENTAL EFFECTS

This section is a critical component of a resource consent application. An assessment of environmental effects (AEE) describes the actual and potential effects of the proposed activities on the environment and ways that any adverse or negative effects are to be avoided, remedied or mitigated.

The RMA requires that certain things are addressed in an AEE. And for intensive farming consents such matters include:

a. An assessment of the actual or potential effects on the environment of the activity.

The primary environmental effects of concern for intensive farming are the effects on groundwater and surface water quality and the consequential effects on their life supporting capacity. This section of the AEE is often a summary of the effects informed by specific technical reports that address the specific effects in detail.

To assess the direct effects on groundwater, nitrate levels can be assessed against the ANZEEC guidelines for stock water and the 2008 Drinking Water Standards for New Zealand for public water.

In respect of surface water, effects will need to be assessed on aquatic life within the water body and on the life supporting capacity of the waterbody. For streams and rivers this will involve assessments against the surface water management values and the surface water quality targets in schedule B and E of the One Plan respectively. This assessment will also need to address cumulative effects of the proposed activities along with other intensive farming and other activities within the catchment. This type of assessment is usually carried out by a water quality scientist or freshwater ecologist.

If there are other non-compliances with specific standards within the rules relating to intensive farming (Rules 14-1 to 14-11) these will also need to be addressed. For instance, if a situation arises where a bridge or culvert cannot be installed and stock cross a waterway, the specific effects of that stock crossing need to be assessed and described.

Any localised effects related to odour, dust, fertiliser drift or effluent drift will also need to be addressed in this section. The table below shows the Regional Standards for air quality relating to odour, dust and agrichemicals.

Contaminant^	Regional Standard
Odour	A discharge^ must not cause any offensive or objectionable odour beyond the property* boundary.
Dust	A discharge^ must not cause any noxious, offensive or objectionable dust beyond the property* boundary.
Agrichemicals*	A discharge^ must not give rise to noxious or dangerous levels of agrichemicals* in terms of human health, non-target plants or animals, or property*.

Note: There are guidelines contained within Chapter 15, Section 15.2 of the One Plan that assist in defining the terms "noxious, dangerous, offensive and objectionable".

b. Describe any proposed measures that will be implemented to avoid, remedy or mitigate effects on the environment.

For intensive farming these might include any changes from the current farm system and new farming practices to reduce nutrient losses. Nutrient loss mitigations are also required to be recorded in the NMP, and it is acceptable to refer to the appropriate section of the NMP for specific detail of such mitigations. If that is the case, this section should provide an overview of the options and their expected outcomes.

c. Identify any persons affected by the proposal, any consultation undertaken, and any response or the views of any person consulted.

d. Discuss whether any on-going groundwater and surface water quality monitoring is proposed, specific to the proposal.

On-going groundwater and surface water quality monitoring will likely be required as part of these consents. The AEE should describe how and by whom the effects will be monitored if the activity is approved.

e. A description of any possible alternative locations or methods for undertaking the farming or discharge activities.

For existing farms the location options may be limited, however, if there is a change in various practices (methods) on the farm, an assessment of the alternative locations for some activities on the farm may be carried out, for example effluent discharges, or for stream crossings, therefore should be discussed.

Annex J

VI. STATUTORY CONSIDERATIONS

All applications will require an assessment of the proposed activities against the relevant provisions of certain statutory documents. The key documents that will need to be considered include:

A. NATIONAL ENVIRONMENTAL STANDARD FOR SOURCES OF HUMAN DRINKING WATER (NESDW).

Under the NESDW the Regional Council cannot grant a resource consent where the proposed activity is likely to introduce or increase contaminants to a water supply so that it no longer meets certain health criteria or increases the concentration of contaminants in a more than minor amount. It also requires certain conditions to be imposed if there is the possibility of an event caused by the proposed farming activity to cause adverse effects on the water supply.

An assessment under the NESDW will need to identify any sources of human drinking water that supply more than 25 people, that might be affected by a farming activity and associated discharges. Horizons Regional Council holds a list of such water supplies within its Region and will be able to provide assistance when identifying water supplies within the vicinity of the farming activity. Consultation with the water supply operator to determine whether there will be any effects on its water supply may be required.

B. NATIONAL POLICY STATEMENT FOR FRESHWATER MANAGEMENT (NPSFM)

The NPSFM sets out water quality and quality objectives as well as objectives regarding integrated management and provision of reasonable opportunity for iwi and hapu involvement in overall freshwater management. An assessment will need to specifically examine Objectives A1 and A2 of the NPSFM. Objective A1 seeks to safeguard the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems of fresh water and the health of people and communities. Objective A2 requires that the overall quality of freshwater within a region is maintained or improved, while protecting the significant values of freshwater in water bodies that have been degraded by human activities to the point of being over-allocated. The One Plan gives effect to the NPSFM, specifically through the inclusion of Policy 14-9 of the One Plan. Applications will need to discuss whether the the proposal is consistent with policy 14-9 of the One Plan, and Objectives A1 and A2 of the NPSFM.

C. NEW ZEALAND COASTAL POLICY STATEMENT (NZCPS)

This document is only relevant if your activity is within or adjacent to the coastal marine area. If applicable, an assessment is required against the NZCPS.

D. HORIZONS ONE PLAN

The objectives and policies from Chapters 5 and 14 are relevant to intensive farming land use activities. Specifically, Objectives 5-1 and 5-2 and Policies 5-7 and 5-8 from Chapter 5 and Objective 14-1 and Policies 14-1, 14-4, 14-5, 14-6 and 14-9 from Chapter 14 are most relevant to intensive farming activities. However, the assessment may also examine Policies 5-2 to 5-6 from Chapter 5 and any other specific policies that might apply to specific activities.

E. SECTION 105 RMA

Under this section of the RMA, if the activity does something that would contravene section 15 or section 15B the Regional Council must have regard to:
a. the nature of the discharge and sensitivity of the receiving environment to adverse effects; and
b. the applicant's reasons for the proposed choice; and
c. any possible alternative methods of discharge; including discharge into any other receiving environment.

F. SECTION 107 RMA

Under this section of the RMA, the Regional Council cannot grant a resource consent for a discharge to water, or to land where a contaminant may enter water, if it causes the following effects, either on its own or in combination with other contaminants:
a. the production of any conspicuous oil or causes grease films, scums or foams, or floatable or suspended materials:
b. any conspicuous change in the colour or visual clarity:
c. any emission of objectionable odour:
d. the rendering of fresh water unsuitable for consumption by farm animals:
e. any significant adverse effects on aquatic life.

The application will need to describe whether the proposed activities will give rise to the effects listed above.

G. DURATION

Refer to Policy 12.5 in the One Plan

H. PART 2 RMA

In terms of the consideration required under Part 2 of the RMA, the application will need to provide a brief description of how the proposal recognises and provides for the matters of national importance listed under Section 6 of the RMA, has particular regard to the matters listed in Section 7 and takes into account the principles of the Treaty of Waitangi. Section 5 of the RMA sets out the principles of sustainable management which in the context of the RMA means managing the use, development, and protection of natural and physical resources. A summary of how the proposal meets the purpose of the RMA as outlined in Section 5 is required.

VII. CONSULTATION

In this section, the report should outline any consultation that has been carried out or the reasons why no consultation has been undertaken. For any consultation that has been undertaken, the report should provide any responses and the views of those people, including any written approvals to the application.

If the farm is located within or adjacent to the coastal marine area, please contact Horizons Regional Council (Horizons) to discuss whether there has been an application made under the Marine and Coastal Area (Takutai Moana) Act 2011. If an application has been made.

In addition, there are a number of statutory acknowledgement areas within the Region. It is important to identify in the application whether the farm encompasses or is adjacent to one of these areas, and whether the iwi group, specifically the trustees of the relevant statutory acknowledgement area, have been consulted with. Again, Horizons can assist with the identification of customary marine tile applicants and statutory acknowledgement areas, if required.

If a Customary Marine Title group is identified, their views sought must be on the application prior to it being lodged. The consent application must outline any views expressed by the iwi groups. The Regional Council will consider the views of the Customary Marine Title group when making decision on the application within the Coastal Marine Area.

VIII. CONCLUSIONS

This section should provide an overall conclusion to wrap up the application report. Often, a summary of the key points is made and will confirm whether the application is consistent with the requirements of the One Plan, RMA and the relevant statutory requirements.

Annex J

4. TECHNICAL ASSESSMENTS AND ATTACHMENTS

The application will likely be accompanied by a number of technical reports and other information as set out below. These should be appended to the application report and referred to as necessary throughout the report. When making decisions on resource consent applications, the Regional Council will assess the application against the One Plan and other statutory documents as required. Once all of the necessary information has been obtained to determine the extent of adverse effects and whether there are any potential affected parties, the Council should then be in a position to determine whether the application should be publically notified, limited notified or non-notified. Depending on the outcome of the notification decision, a hearing may be held to make a decision on consent application.

I. NUTRIENT MANAGEMENT PLAN

A Nutrient Management Plan (NMP) along with the Overseer files is a necessary component of an application for intensive farming under Rules 14-1 to 14-4. Under the One Plan, a Nutrient Management Plan means:

"a plan prepared annually in accordance with the Code of Practice for Nutrient Management (NZ Fertiliser Manufacturers' Research Association 2007) which records (including copies of the OVERSEER® input and output files used to prepare the plan) and takes into account all sources of nutrients for intensive farming and identifies all relevant nutrient management practices and mitigations, and which is prepared by a person who has both a Certificate of Completion in Sustainable Nutrient Management in New Zealand Agriculture and a Certificate of Completion in Advanced Sustainable Nutrient Management from Massey University".

II. HYDROGEOLOGICAL ASSESSMENT

A hydrogeological assessment is required to be undertaken by a suitably qualified and experienced expert. This assessment will examine groundwater properties and quality, soil types and attenuation capacities. It should determine groundwater flow direction and, the extent of surface water bodies particularly affected calculate nutrient loads to the receiving surface water bodies.

III. SURFACE WATER AND ECOLOGICAL ASSESSMENT

A water quality and ecological assessment is required to be undertaken by a suitably qualified and experienced expert. The technical assessment for surface water quality and ecology will need to provide a detailed water quality assessment and assess the effects of the expected contaminant load on the receiving surface water bodies. The assessment will need to identify whether the proposal will maintain or enhance water quality at a sufficient level to support the Values in Schedule B of the One Plan, specific to the Water Management Sub-Zone the farm is located within.

5. FURTHER GUIDANCE

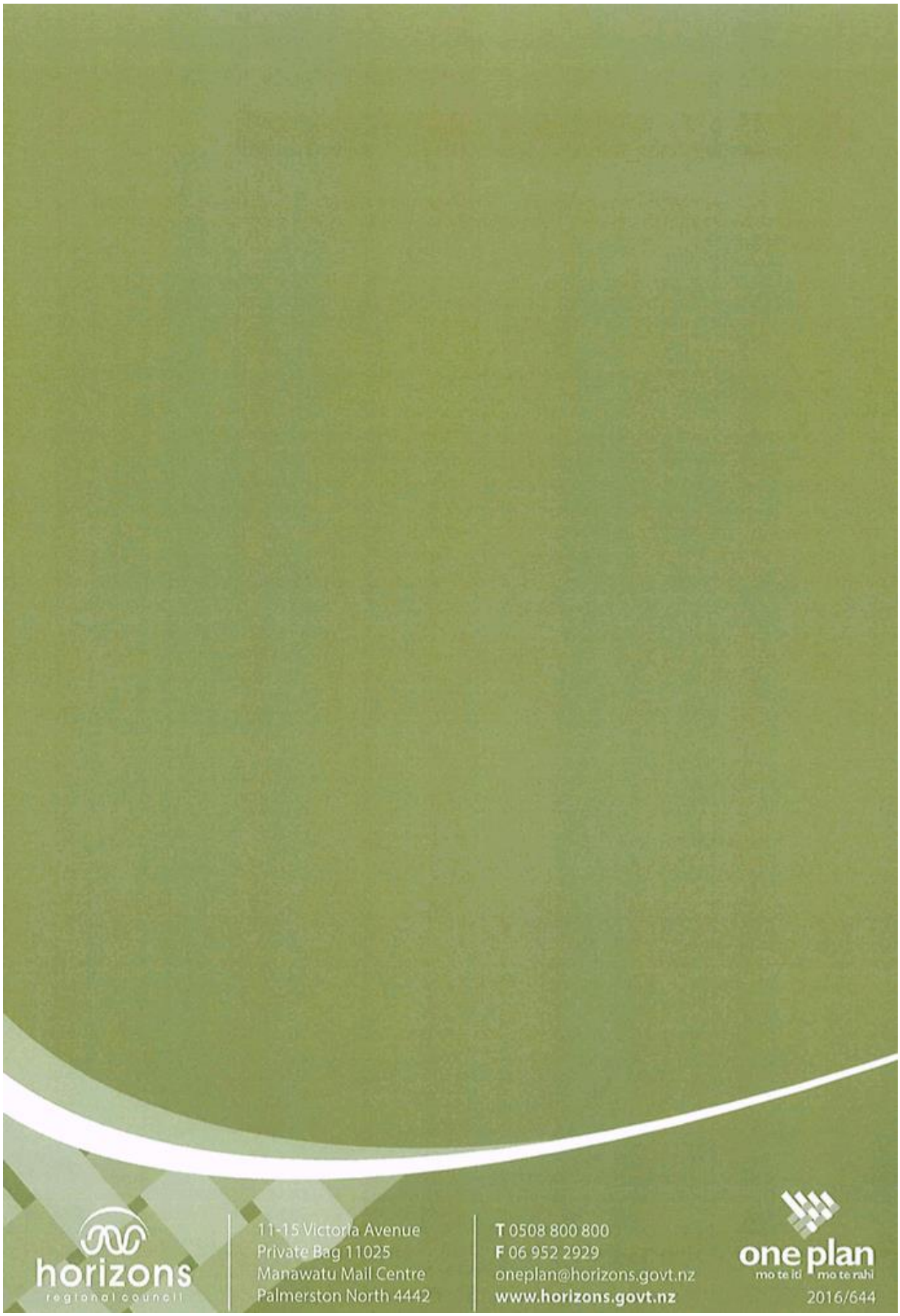
The Ministry for the Environment's website provides guidance material to assist applicants in preparing a basic AEE for a resource consent and understand the consent process. We strongly recommend reading the guidance material below before preparing an application.

http://www.mfe.govt.nz/sites/default/files/media/RMA/aee-guide-aug06.pdf

Also, the Ministry for the Environment's link below provides guidance information on applying for a resource consent to do something that might affect the environment.

http://www.mfe.govt.nz/publications/rma/everyday-guide-rma-applying-resource-consent

Annex J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2016/644

STATUTORY PROVISIONS

RESOURCE MANAGEMENT ACT (RMA)

SECTION 88

MAKING AN APPLICATION

1. **A person may apply to the relevant consent authority for a resource consent.**

2. **An application must—**
   a. be made in the prescribed form and manner; and
   b. include the information relating to the activity, including an assessment of the activity's effects on the environment, as required by Schedule 4.

3. **An application for a coastal permit to undertake an aquaculture activity must include a copy for the Ministry of Fisheries.**

4. **A consent authority may, within 10 working days after an application was first lodged, determine that the application is incomplete if the application does not—**
   a. include the information prescribed by regulations; or
   b. include the information required by Schedule 4.

5. **The consent authority must immediately return an incomplete application to the applicant, with written reasons for the determination.**

6. **If, after an application has been returned as incomplete, that application is lodged again with the consent authority, that application is to be treated as a new application.**

7. **Sections 357 to 358 apply to a determination that an application is incomplete.**

SCHEDULE 4

INFORMATION REQUIRED IN APPLICATION FOR RESOURCE CONSENT

1. **Information must be specified in sufficient detail**

   Any information required by this schedule, including an assessment under clause 2(1)(f) or (g), must be specified in sufficient detail to satisfy the purpose for which it is required.

2. **Information required in all applications**

   1. An application for a resource consent for an activity (the activity) must include the following:
      a. a description of the activity:
      b. a description of the site at which the activity is to occur:
      c. the full name and address of each owner or occupier of the site:
      d. a description of any other activities that are part of the proposal to which the application relates:
      e. a description of any other resource consents required for the proposal to which the application relates:
      f. an assessment of the activity against the matters set out in Part 2:
      g. an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b).

   2. The assessment under subclause (1)(g) must include an assessment of the activity against—
      a. any relevant objectives, policies, or rules in a document; and
      b. any relevant requirements, conditions, or permissions in any rules in a document; and
      c. any other relevant requirements in a document (for example, in a national environmental standard or other regulations).

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3. An application must also include an assessment of the activity's effects on the environment that—
   a. includes the information required by clause 6; and
   b. addresses the matters specified in clause 7; and
   c. includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.

3. Additional information required in some applications

An application must also include any of the following that apply:

a. if any permitted activity is part of the proposal to which the application relates, a description of the permitted activity that demonstrates that it complies with the requirements, conditions, and permissions for the permitted activity (so that a resource consent is not required for that activity under section 87A(1)):
b. if the application is affected by section 124 or 165ZH(1)(c) (which relate to existing resource consents), an assessment of the value of the investment of the existing consent holder (for the purposes of section 104(2A)):
c. if the activity is to occur in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, an assessment of the activity against any resource management matters set out in that planning document (for the purposes of section 104(2B)).

4. Additional information required in application for subdivision consent

An application for a subdivision consent must also include information that adequately defines the following:

a. the position of all new boundaries:
b. the areas of all new allotments, unless the subdivision involves a cross lease, company lease, or unit plan:
c. the locations and areas of new reserves to be created, including any esplanade reserves and esplanade strips:
d. the locations and areas of any existing esplanade reserves, esplanade strips, and access strips:
e. the locations and areas of any part of the bed of a river or lake to be vested in a territorial authority under section 237A:
f. the locations and areas of any land within the coastal marine area (which is to become part of the common marine and coastal area under section 237A):
g. the locations and areas of land to be set aside as new roads.

5. Additional information required in application for reclamation

An application for a resource consent for reclamation must also include information to show the area to be reclaimed, including the following:

a. the location of the area:
b. if practicable, the position of all new boundaries:
c. any part of the area to be set aside as an esplanade reserve or esplanade strip.

ASSESSMENT OF ENVIRONMENTAL EFFECTS

6. Information required in assessment of environmental effects

1. An assessment of the activity's effects on the environment must include the following information:
   a. if it is likely that the activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity:
   b. an assessment of the actual or potential effect on the environment of the activity:
   c. if the activity includes the use of hazardous installations, an assessment of any risks to the environment that are likely to arise from such use:
   d. if the activity includes the discharge of any contaminant, a description of—
      I. the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
      II. any possible alternative methods of discharge, including discharge into any other receiving environment:
   e. a description of the mitigation measures (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce the actual or potential effect:
   f. identification of the persons affected by the activity, any consultation undertaken, and any response to the views of any person consulted:
   g. if the scale and significance of the activity's effects are such that monitoring is required, a description of how and by whom the effects will be monitored if the activity is approved:
   h. if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, a description of possible alternative locations or methods for the exercise of the activity (unless written approval for the activity is given by the protected customary rights group).

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2. A requirement to include information in the assessment of environmental effects is subject to the provisions of any policy statement or plan.

3. To avoid doubt, subclause (1)(f) obliges an applicant to report as to the persons identified as being affected by the proposal, but does not—
   a. oblige the applicant to consult any person; or
   b. create any ground for expecting that the applicant will consult any person.

7. Matters that must be addressed by assessment of environmental effects

1. An assessment of the activity's effects on the environment must address the following matters:
   a. any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects:
   b. any physical effect on the locality, including any landscape and visual effects:
   c. any effect on ecosystems, including effects on plants or animals and any physical disturbance of habitats in the vicinity:
   d. any effect on natural and physical resources having aesthetic, recreational, scientific, historical, spiritual, or cultural value, or other special value, for present or future generations:
   e. any discharge of contaminants into the environment, including any unreasonable emission of noise, and options for the treatment and disposal of contaminants:
   f. any risk to the neighbourhood, the wider community, or the environment through natural hazards or hazardous installations.

2. The requirement to address a matter in the assessment of environmental effects is subject to the provisions of any policy statement or plan.

SECTION 105

MATTERS RELEVANT TO CERTAIN APPLICATIONS

1. If an application is for a discharge permit or coastal permit to do something that would contravene section 15 or section 15B, the consent authority must, in addition to the matters in section 104(1), have regard to—
   a. the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and
   b. the applicant's reasons for the proposed choice; and
   c. any possible alternative methods of discharge, including discharge into any other receiving environment.

2. If an application is for a resource consent for a reclamation, the consent authority must, in addition to the matters in section 104(1), consider whether an esplanade reserve or esplanade strip is appropriate and, if so, impose a condition under section 108(2)(g) on the resource consent.

SECTION 107

RESTRICTION ON GRANT OF CERTAIN DISCHARGE PERMITS

1. Except as provided in subsection (2), a consent authority shall not grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A allowing—

   a. the discharge of a contaminant or water into water; or
   b. a discharge of a contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or
   ba. the dumping in the coastal marine area from any ship, aircraft, or offshore installation of any waste or other matter that is a contaminant,—

   if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar, or other contaminants or water), is likely to give rise to all or any of the following effects in the receiving waters:

   c. the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:
   d. any conspicuous change in the colour or visual clarity:
   e. any emission of objectionable odour:
   f. the rendering of fresh water unsuitable for consumption by farm animals:
   g. any significant adverse effects on aquatic life.

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2. A consent authority may grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 or section 15A that may allow any of the effects described in subsection (1) if it is satisfied—

   a. that exceptional circumstances justify the granting of the permit; or
   b. that the discharge is of a temporary nature; or
   c. that the discharge is associated with necessary maintenance work—
   d. and that it is consistent with the purpose of this Act to do so.

3. In addition to any other conditions imposed under this Act, a discharge permit or coastal permit may include conditions requiring the holder of the permit to undertake such works in such stages throughout the term of the permit as will ensure that upon the expiry of the permit the holder can meet the requirements of subsection (1) and of any relevant regional rules.

PART 2: PURPOSE AND PRINCIPLES

5 Purpose

1. **The purpose of this Act is to promote the sustainable management of natural and physical resources.**

2. **In this Act, sustainable management means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural well-being and for their health and safety while—**
   a. sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
   b. safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
   c. avoiding, remedying, or mitigating any adverse effects of activities on the environment.

6. **Matters of national importance**
   In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:
   a. the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:
   b. the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:
   c. the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:
   d. the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:
   e. the relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga:
   f. the protection of historic heritage from inappropriate subdivision, use, and development:
   g. the protection of protected customary rights:
   h. the management of significant risks from natural hazards.

7. **Other matters**
   In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall have particular regard to—
   a. kaitiakitanga:
      aa. the ethic of stewardship:
   b. the efficient use and development of natural and physical resources:
      ba. the efficiency of the end use of energy:
   c. the maintenance and enhancement of amenity values:
   d. intrinsic values of ecosystems:
   e. [Repealed]
   f. maintenance and enhancement of the quality of the environment:
   g. any finite characteristics of natural and physical resources:
   h. the protection of the habitat of trout and salmon:
   i. the effects of climate change:
   j. the benefits to be derived from the use and development of renewable energy.

8. **Treaty of Waitangi**
   In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi).

NATIONAL POLICY STATEMENT FOR FRESHWATER MANAGEMENT

A guide:
http://www.mfe.govt.nz/publications/fresh-water/guide-national-policy-statement-freshwater-management-2014
The policy document:
http://www.mfe.govt.nz/publications/fresh-water/national-policy-statement-freshwater-management-2014

APPLICABLE POLICIES: WATER QUALITY

Objective A1

To safeguard:
a. the life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems, of fresh water; and
b. the health of people and communities, at least as affected by secondary contact with fresh water;
c. in sustainably managing the use and development of land, and of discharges of contaminants.

Objective A2

The overall quality of fresh water within a region is maintained or improved while:
a. protecting the significant values of outstanding freshwater bodies;
b. protecting the significant values of wetlands; and
c. improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.

Policy A1

By every regional council making or changing regional plans to the extent needed to ensure the plans:
a. establish freshwater objectives in accordance with Policies CA1-CA4 and set freshwater quality limits for all freshwater management units in their regions to give effect to the objectives in this national policy statement, having regard to at least the following:
   ii. the reasonably foreseeable impacts of climate change;
   iii. the connection between water bodies; and
   iv. the connections between freshwater bodies and coastal water; and
b. establish methods (including rules) to avoid over-allocation.

Policy A2

Where freshwater management units do not meet the freshwater objectives made pursuant to Policy A1, every regional council is to specify targets and implement methods (either or both regulatory and non-regulatory), in a way that considers the sources of relevant contaminants recorded under Policy CC1, to assist the improvement of water quality in the freshwater management units, to meet those targets, and within a defined timeframe.

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Annex K

OBJECTIVES AND POLICIES RELATING TO INTENSIVE FARMING

An application for intensive dairy and irrigated sheep and beef farming must include an assessment of the below objectives and policies.

Part One of the One Plan (2016) - Regional Policy Statement

Objective	Policies
5-1 Water management Values 5-2 Water quality	5-1 Water Management Zones and Values 5-2 Water quality targets 5-6 Maintenance of groundwater quality 5-7 Land use activities affecting groundwater and surface water quality 5-8 Regulation of intensive farming land use activities affecting groundwater and surface water quality

Part Two of the One Plan (2016) – Regional Plan

Objective	Policies
14-1 Management of discharges to land and water and land uses affecting groundwater and surface water quality	14-2 Consent decision-making for discharges to land 14-5 Management of intensive farming land uses 14-6 Resource consent decision-making for intensive farming land uses

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An application for intensive vegetable growing or arable cropping must include an assessment of the below objectives and policies.

Part One of the One Plan (2014) - Regional Policy Statement

Objective	Policies
4-2 Regulating potential causes of accelerated erosion 5-1 Water management Values 5-2 Water quality	4-2 Regulation of Land use activities 5-1 Water Management Zones and Values 5-2 Water quality targets 5-6 Maintenance of groundwater quality 5-7 Land use activities affecting groundwater and surface water quality 5-8 Regulation of intensive farming land use activities affecting groundwater and surface water quality

Part Two of the One Plan (2014) – Regional Plan

Objective	Policies
14-1 Management of discharges to land and water and land uses affecting groundwater and surface water quality 13-1-1	14-2 Consent decision-making for discharges to land 14-5 Management of intensive farming land uses 14-6 Resource consent decision-making for intensive farming land uses 13-1 13-2

Annex K

NATIONAL ENVIRONMENTAL STANDARD
FOR SOURCES OF HUMAN DRINKING WATER (NES:SHDW)

The NES:
http://www.legislation.govt.nz/regulation/public/2007/0396/latest/DLM1106901.html?search=ta_regulation_R_rc%40rinf%40rnif_an%40bn%40rn_25_a&p=3
A Users Guide:
http://www.mfe.govt.nz/publications/rma/nes-draft-sources-human-drinking-water
http://www.mfe.govt.nz/node/12079

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2016/644

Annex L

Mitigating nutrient loss and OVERSEER® - measures not included, or well represented

A review of New Zealand Literature

Helene Low, Ian McNab, Jesse Brennan
Rural advice – Horizons Regional Council

Annex L

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Executive summary

This document has been generated as part of Horizons re-examination of the One Plan Consent process in response to the Environment Court Declaration, April 2017. It is a compilation of mitigations that an intensive farming operation could use to reduce its environmental impact.

The mitigations listed are not well represented in OVERSEER®, or don't feature at all. The research cited in this report indicates that these mitigations can reduce nitrogen, phosphorous, sediment and/or E. coli losses to ground and surface water. This will enable farmers that use the relevant mitigations to reduce their N-losses closer to the cumulative N-loss limits based on Land Use Class (LUC) as expressed in Table 14.2 of the One Plan, 2012. The main mitigations described in this report include:

- Wetlands
- Riparian management
- Fertiliser management
- Effluent management
- Crop management
- Alternative forages and pasture species

In terms of reducing N-loss not accounted for in OVERSEER®, wetlands, effluent management and alternative forages have the biggest potential due to the fact that most of the nitrogen lost to the environment is via direct loss into waterways in effluent or leached through the soil profile as nitrate-nitrogen (NO_3-N). The reduction of nitrogen lost to the environment from the mitigations is highly variable due to the complex biological systems involved, so reasonable estimates based on the research will have to be developed that will stand scrutiny and enable these N-loss reductions to be included in Intensive Land Use Consents.

Other good Nutrient Management Practices to reduce losses to waterways that do not have an N-leaching figure attached:

- Storage and Managing leachate from silage stacks
- Crop management – swales and strategic grazing
- Strategies to reduce pugging and soil compaction

Other good Nutrient Management Practices to reduce losses to waterways that are wholly or partially represented in Overseer:

- 18 month lactations
- OAD and 16 hour milkings for whole or parts of the lactation
- Bunding of culverts and bridges (may be captured in 'Stock exclusion' option in Overseer)

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Disclaimer

The following document is a guidance tool on potential mitigations a farm could employ to reduce their nutrient loss. The list is not exhaustive, and it is a preliminary document to provide indications of effectiveness based on New Zealand literature. This report is a working document, and suggestions are welcomed for mitigations not captured in this report.

The descriptions of the mitigation options in this document, including likely reductions in nutrient loss, are provided as an indicative and generic starting point, to then be considered in light of individual properties. Applicants seeking to adopt and rely on any of the mitigation measures will not be able to simply adopt the indicative nutrient loss reduction figures that have been provided.

A properly prepared quantitative and property specific assessment of nutrient loss levels, including the impact of any mitigation measures, would need to be included with the relevant application for resource consent.

Table of Contents

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Table of figures

Annex L

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Glossary

Active bed (i.e. waterbody or waterway)	The bed of a river that is intermittently flowing and where the bed is predominantly unvegetated and comprises sand, gravel, boulders or similar material (Horizons One Plan, 2014)
Attenuation	The permanent loss or temporary storage of nutrients, sediments, or microbes during the process of transportation between where they are generated e.g. paddock, and where they can impact water quality e.g. downstream (McKergow, Tanner, Monaghan & Anderson, 2007)
Breeding worth	Industry index that ranks bulls and cows on their ability to breed efficient and profitable replacement dairy heifers (Dairy NZ, 2016)
Bund	A structure that is used to contain liquid and prevent contaminants being released to the environment (Environmental Protection Authority, 2012)
Denitrification	Microbial production of nitric oxide (NO), nitrous oxide (N_2O) and N_2, from nitrate (McKergow et al., 2007)
Dry matter	Dry weight of pasture in kilograms per hectare above ground level (Meat New Zealand, 2002)
Dyking	A practice that creates a series of closely-spaced soil dams in wheel tracks where water is captured in small soil indentations (Barber, 2014)
Eutrophication	An increase in the amount of nutrients available in a waterbody, which can proliferate the amount of algae present, and lead to water quality degradation (National Institute of Water and Atmospheric Research (NIWA), n.d).
Gibberellic acid	A plant growth regulator found in most plant species, which stimulates cell expansion. GA can be used to promote grass growth without Nitrogen in cooler seasons, where pasture is in a slow growth phase (Jiang, 2011).
Grass filter strip	A managed band of dense grass used to filter runoff (McKergow et al., 2007)
Hydrolysis	The rapid transformation to ammonium by urease, which creates localised alkaline conditions in the soil. This allows the ammonium to form ammonia gas, which can then be lost from the soil through volatilisation (Foundation of Arable Research (FAR), n.d.[b])

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Mole drain	A type of subsurface drain composed of networks of unlined channels below the soil surface to remove excess water from the soil profile. Mole drains can only be made in heavy soils, with a clay subsoil. Long lasting drainage channels require a clay content of 30-35% (FAR, n.d. [a])
Sedimentation	The process of particles and materials depositing at the bottom of a water body to form sediment (Tanner, Sukias & Yates, 2010)
Sediment trap	Excavations in the bed of a watercourse designed to settle and trap coarse particles (McKergow et al., 2007)
Silt trap	A structure to impound surface runoff and ensure sufficient time for suspended sediment to settle. Functionality is increased with volume (Barber, 2014)
Senescence	The process of ageing and eventual leaf death in pasture (Wims, 2016)
Tile drain	A type of subsurface drain composed of networks of perforated plastic tubes below the soil surface to remove excess water from the soil profile (FAR, n.d. [a])
Volatilisation	The degradation of urea during the first 48 hours after application, which can result in varied amounts of ammonia being lost from the soil, and released into the atmosphere as ammonia gas (NH_3) (FAR, n.d. [c])

Annex L

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List of acronyms

BW	Breeding Worth
CSA	Critical Source Area
DC	Duration Controlled (grazing)
DM	Dry Matter
GA	Gibberellic Acid
GFS	Grass Filter Strip
N	Nitrogen
P	Phosphorus
PUE	Protein use efficiency
RG	Rye grass
S&B	Sheep & Beef (intensive)
S	Sediment

Key

*	Low density: 1% (100m^2/ ha) of contributing catchment (5ha)
**	Moderate Density: 2.5% (250m^2/ha) of contributing catchment (5ha)
***	High Density: 5% (500m^2/ha) of contributing catchment (5ha)
^	Assumes most of N in form of Nitrate (~80%) with removal likely to be better in warmer areas of the country and in low-runoff and/or flow variability conditions
#	Area requirement = 10 x average channel density (m^2/ha) (17-30m/ha) with an average width of 10m on both banks
+	Low density: 1% (100m^2/ha) of contributing catchment (100-500ha)
$	2.5% (250m^2/ha) of contributing catchment (100-500ha)

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Chapter 1: Attenuation tools

1.1 Wetlands

	Natural seepage wetland – Paddock
Description	Natural seepage wetlands occur where ground and subsurface water flow re-emerges via springs or seeps. Also known as riparian wetlands, flushes, and valley bottoms, they often occur in naturally boggy areas along the margins of flowing water, and headwaters of catchments. Saturation status can be seasonal, and sizes depend on topography, ranging up to 1ha in area. Natural seepage wetlands could include reinstating existing wetlands, or fencing off wet areas on farm.
Target nutrient	N, P, S
Land use	All farming operations Naturally boggy areas receiving some surface runoff from a surrounding catchment that contains dissolved and particulate contaminants
Likely reductions in nutrient loss	*Low* and high density***:* Reduction ranges: N – 50-75% P – 10% from surface runoff S – 60% of overland flow entering the wetland
Costs	Assume costs: 5 wire (3 electric) for sheep and beef, 2 wire electric for dairy. Assume 1 weed spray per hectare a year
Benefits	High nitrate removal rates; More efficient than other surface wetland systems as water emerges through the wetland soils, which increases contact between water and organic soil, therefore increasing the effectiveness of the denitrification process; Costs of restoring, enhancing (e.g. planting, fencing) and continued maintenance are likely to be low; Utilises land that would otherwise be seasonally ineffective
Limitations	Number and condition of seepage wetlands in the region is uncertain, thus so too is the removal that may occur as a result of wetland enhancement; Lack of information on how to restore effective existing seepage wetlands; Mass removal of nitrate limited by small hydraulic loading rates; Fencing and enhancement is likely to be inexpensive but the small size and scattered distribution will increase these costs
References	▪ McKergow, Tanner, Monaghan & Anderson (2007) ▪ Hamill, MacGibbon & Turner (2010) ▪ Hughes, McKergow, Tanner & Sukias (2013) ▪ McDowell, Wilcock & Hamilton (2013) ▪ Tanner, Sukias, & Burger (2015)

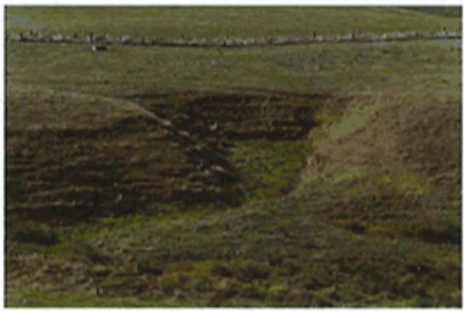

Figure 1 Natural seep area on farm - there is potential here to plant and fence the area to achieve nutrient uptake. Retrieved from https://www.dairynz.co.nz/media/5787389/making-the-most-of-wet-areas-on-farm.pdf

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Annex L

	Facilitated wetland – Paddock, farm and catchment	
Description	Facilitated wetlands involve the modification and damming of existing landscape features e.g. gullies, depressions and valleys, to achieve nutrient removal	
Target nutrient	S, N, P	
Land use	All farming operations Where wet areas, gullies and depressions intercept surface and shallow subsurface runoff, and spring flows	
Likely reductions in nutrient loss	*Low density*:* Reduction range: N^ – 30% (annual range 10-40%) P – 50-60% of particulate P S – ~60% of annual load in surface runoff	*Moderate density**:* Reduction range: N^ – 60% (annual range 40-80%) P – 60-80% of particulate P S – ~80% of annual load in surface runoff
Costs	*Low density*:* Establishment: $5.50/m^2 = $550/ha of catchment Maintenance : $15/ha/year	*Moderate density**:* Establishment: $6.50/m^2 = $1625/ha of catchment Maintenance: $25/ha/year
Benefits	Wildlife habitat; Landscape aesthetics; Low maintenance requirements, i.e. supplementary planting, excavation of sediment (2 yearly or roughly) and weed control; Using natural landscape features improves cost-effectiveness; Wetlands bring biodiversity enhancement on farm	
Limitations	Removes land from production; May be no suitable areas on farm for this particular type of wetland, or the catchment lies outside of the farm area; Wetlands can take numerous years to mature; Year to year fluctuations in nutrient removal; Plants need to be harvested and removed otherwise a significant proportion of up taken nutrients will be released when plants die and decompose; Assumptions of cost based on clay subsoils and exclude a synthetic liner; Requires flood water diversion channels	
References	▪ McKergow et al. (2007) ▪ Hamill et al, (2013) ▪ Tanner et al. (2015) ▪ Praat, Sukias, & Faulkner (2015)	

Figure 2 Previously a gravel pit, the area has now been converted into a facilitated wetland to remove dissolved nutrients. Retrieved from http://www.es.govt.nz/council/major-projects/Pages/Waituna-Lagoon.aspx

	Constructed surface wetland – Paddock, Farm and catchment	
Description	Constructed surface flow wetlands are defined as manmade systems built in the lower reaches of river and stream catchments, to extract nutrient loads from agricultural surface drainage waters. Mimicking the hydrological and biological processes in natural wetlands (including soils, microbial assemblages, and vegetation), constructed wetlands aim to remove, absorb and store nutrient loads in the receiving waters. P and S treatment is achieved through sedimentation, and nutrient treatment more generally is enhanced by manipulating flow paths, water depths, and vegetation characteristics	
Target nutrient	S, N, P	
Land use	All farming operations Surface drains carrying surface and shallow sub-surface run off containing contaminants	
Likely reductions in nutrient loss	*Low density*:* Reduction range: N^ – 30% (annual range 10-40%) P – 50-60% of particulate P S – ~60% of annual load in surface runoff	*Moderate density**:* Reduction range: N^ – 60% (annual range 40-80%) P – 60-80% of particulate P S – ~80% of annual load in surface runoff
Costs	*Low density*:* Establishment \$11/m^2 = \$1100 per hectare of catchment Maintenance: \$10/ha/year	*Moderate density**:* \$13/m^2 = \$3,250 per hectare of catchment Maintenance: \$15/ha/year. Assumptions of cost based on clay soils (exclude synthetic liner)
Benefits	Ability to remove a significant proportion of a catchments N and P load; Low maintenance requirements, i.e. supplementary planning, excavation of sediment (2 yearly or roughly), and weed control; Considerable seasonal variation in treatment performance, which is advantageous for reducing the concentration of dissolved nutrients during summer when most required by algae; Alongside nutrient uptake, constructed wetlands have aesthetic values in addition to providing biodiversity enhancement	
Limitations	Newly constructed wetlands take a number of years to reach full maturity; Large initial investment; Land used for wetlands takes out areas for production, thus requires goodwill from farmers; Wetlands need to be built on relatively flat land, and are most efficient in lower portions of the catchment; Uncertainty surrounds the lifespan of constructed wetland functionality; Plants need to be harvested and removed otherwise a significant proportion of up taken nutrients will be released when plants die and decompose; Requires flood water diversion channels	
References	▪ McKergow et al. (2007) ▪ Tanner, Sukias & Yates (2010) ▪ Sukias & Tanner (2011) ▪ Hamill et al. (2015) ▪ Tanner et al. (2015)	

Figure 3 Owl farm in Cambridge - a constructed surface wetland. Retrieved from http://www.stuff.co.nz/business/farming/91113123/owl-farm-wetland-removes-most-nitrates-in-first-water-samples

Annex L

	Stream flow wetland – Agricultural catchment	
Description	Wetlands developed at the base of a catchment or adjacent to sensitive receiving waters are suitable to treat agricultural runoff. A weir can be constructed across stream/drain to divert normal flows through the wetland, with water then returned back to the stream or adjacent receiving waters.	
Target nutrient	S, N, P	
Land use	All farming operations Land at the base of a catchment/sensitive waters (100-500ha), that would receive drainage and streamflow from surface and subsurface runoff from grazed land	
Likely reductions in nutrient loss	*Low density*:* Reduction range: N^ – 30% (annual range 10-40%) P – 50-60% S – ~60% of annual load	*Moderate density**:* Reduction range: N^ – 60% (annual range 40-80%) P – 60-80% S – ~80% of annual load
Costs	*Low density*:* $15-30m^2$ = $3,000-$7,500/ha of catchment Maintenance: $10/ha/year	*Moderate density**:* $15-30m^2$ = $3,000-$7,500/ha of catchment Maintenance: $15/ha/year
Benefits	Wetlands sized to treat runoff from a larger sub-catchment; Cost based on 2.3ha wetland built for Environment Bay of Plenty; Costs assume clay subsoils thus exclude a synthetic liner, include engineering specialist design, and construction of a timber weir; Benefits can be derived similar to other wetland types e.g. enhanced biodiversity on farm, etc.	
Limitations	May require fish passes; Costs vary significantly depending on the extent of excavation and underlying soil material; Newly constructed wetlands take a number of years to reach full maturity; Large initial investment	
References	▪ McKergow et al. (2007)	

	Constructed subsurface wetland – Paddock, Farm and catchment	
Description	Constructed subsurface flow wetlands hold the same definition as surface flow wetlands, being manmade systems built in the lower reaches of catchments to extract nutrient loads. Subsurface flows are intercepted from agricultural drainage waters, such as mole and tile drains. Mimicking the hydrological and biological processes in natural wetlands including soils, microbial assemblages, and vegetation, constructed wetlands aim to remove, absorb and store nutrient loads in the receiving waters. P treatment is achieved through sedimentation. Nutrient treatment more generally is enhanced by flow paths, water depths, and vegetation characteristics	
Target nutrient	N, P, S	
Land use	All farming operations Where subsurface mole/tile drains carry runoff dominated by dissolved contaminants	
Likely reductions in nutrient loss	*Low density*:* Reduction range: N^– 30% (range 10-40%) P – minimal without P sorbing minerals S – 30-50% assuming majority of sediment is fine clays and silt	*Moderate density**:* Reduction range: N^ – 60% (range 40-80%) P – minimal without P sorbing minerals S – 40-70% assuming majority of sediment is fine clays and silt
Costs	*Low density*:* Establishment: $\$11/m^2$ = \$1100 per hectare of catchment Maintenance: \$10/ha/year	*Moderate density**:* Establishment: $\$13/m^2$ = \$3,250 per hectare of catchment Maintenance: \$15/ha/year
Benefits	As above for constructed surface wetlands: Intercepts flow paths that may otherwise bypass natural attenuation processes in shallow groundwater, and riparian zones; Wildlife habitats; biodiversity enhancement; Ability to remove a significant proportion of a catchments N and P load; Low maintenance costs (one weed spray a year and inspection)	
Limitations	As above for constructed surface wetlands: Requires suitable areas on farm (i.e. catchment within farm area); Requires flood water diversion channels and a sediment trap for enhanced removal; Can take numerous years for vegetation to mature to full nutrient removal potential	
References	▪ McKergow et al. (2007) ▪ Tanner, et al. (2010) ▪ Hamill et al. (2010)	

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1.2 Riparian Management

	Riparian buffers – Paddock
Description	A riparian buffer is a band of managed vegetation between agricultural land, and waterways. Planting native species and trees along the sides of waterways act as an attenuation zone for nutrients and sediment from surface and subsurface runoff. Riparian buffers reduce the momentum and magnitude of surface runoff, thereby allowing for nutrient removal. Riparian buffers should be a secondary restorative measure after controlling pollutants at their original sources
Target nutrient	S, Particulate N and P
Land use	All farming enterprises Accessible margins alongside waterways
Likely reductions in nutrient loss	Effectiveness is dependent on hydrology, vegetation, and buffer width. N - Between 2.2 and 7.6 milligrams of N/m^2/day (up to 93% removal) during active growing periods in summer; decreases between 27 and 28 percent of these values during winter P – removal rates of 43% can be achieved with buffers 4.6m, to 98% removal with buffers 27m wide S – 9.1m buffer strip 84% removal, 4.6m buffer strip 74%
Costs	Price is dependent on area, buffer width, and vegetation used. Dairy NZ has a Riparian Planner tool that calculates costs based on water ways on farm. In cropping: $100 to $250/ha. Assume costs: 2 wire electric fence and 1 weed spray per hectare a year & loss of productive land
Benefits	Provides in stream values including channel shading, improved aquatic habitat, and wood and leaf supply to waterways; Landscape aesthetics; Recreational and cultural benefits e.g. harvesting of flax and other plants; More effective than grass strips; Provides bank stabilisation, flood control and stock exclusion; Short-term grazing or other harvesting is recommended to maintain functionality; The greater the buffer zone the increased biodiversity and reduced need for maintenance
Limitations	Buffer zones over 10m are more effective; Requires active vegetation management of weeds and plants; As with wetland vegetation, riparian plants can take numerous years to mature; Effectiveness is dependent on buffer width and vegetation composition; There is no "one size fits all" approach, meaning sites should be considered on an individual basis
References	▪ Parkyn, Shaw & Eades (2000) ▪ Parkyn (2004) ▪ McKergow et al. (2007) ▪ Wilcock et al. (2008) ▪ Dairy NZ (n.d.)

Figure 4 Example of a well vegetated buffer strip. Retrieved from http://www.ruraldesign.co.nz/integrated-catchment-management/

	Stock exclusion from waterways - Farm
Description	Stock access to waterways can result in direct deposition of faecal nutrients into the waterways as animals wallow. Access can also cause bank destabilisation, which mobilises nutrients as erosion occurs. Ensuring that stock are excluded from all streams, rivers and other waterways on farm by fencing off these areas reduces direct nutrient loss into waterways. This can be achieved by stream fencing, or using shade trees to draw cattle away from vulnerable areas.
Target nutrient	P, E-coli, N
Land use	All farming operations
Likely reductions in nutrient loss	Losses due to cows in streams are approximately 0.5 kg P/ha/year Can result in a 10-30% decrease in both dissolved and particulate P Annual farm scale losses of 0.04kg P/ha from dung and 1.0kg N/ha from urine can be observed from stock access, so excluding stock can result in reductions of this scale
Costs	Assume costs for fencing, and riparian establishment if chosen as management option (as above)
Benefits	Permanent exclusion can remove faecal deposition from waterways and riparian areas proximal to the stream where run-off can deliver pathogens; Sediment and microbes are filtered: Source of soil and pasture damage is removed allowing restoration
Limitations	Can take out land that may have otherwise been used for production; Requires a change in management practice for some farmers
References	▪ Collins, et al. (2007) ▪ McDowell (2012) ▪ Parfitt, Frelat, Clark, & Roygard (2013) ▪ Lucci & Laurenson (2016)

Figure 5 Stock fenced off from a waterway. Effectiveness could be enhanced by planting the buffer area with vegetation. Retrieved from http://www.ruralnewsgroup.co.nz/item/12009-new-stock-exclusion-rules-require-greater-flexibility-feds

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Annex L

	Grass filter strips – Paddock
Description	A grass filter strip (GFS) is a band of managed grass which acts as a buffer between a water body, and potential contaminant loading source. A GFS aims to intercept surface runoff during irrigation or rainfall episodes to remove pollutants by physical filtering, infiltration, and deposition. A GFS is applicable in many situations, including riparian (along waterway edges), and in-paddock. Identifying critical source areas where water converges in swales or the bottom of gullies can be of benefit on farm, and at a catchment level
Target nutrient	S, P, Particulate N, Faecal Microbes
Land use	All farming enterprises, particularly cropping Low to moderate permeability soils, moderate to steep slopes, climate with high intensity rainfall where surface runoff is a significant contaminant pathway
Likely reductions in nutrient loss	Permeable , low clay content soils with flow channelised through the riparian zone reduction range [#]: S – 20-30% P – 15-30% N – 10-20% Permeable , low clay content soils with slopes encouraging even flow reduction range[#]: S – 40-80% P – 30-60% N – 20-40% Permeable , high clay content soils with slopes encouraging even flow reduction range[#]: S – 40-50% P – 20-40% N – 10-20%
Costs	Assume costs: 5 wire (3 electric) for sheep and beef, 2 wire electric for dairy. Assume 1 weed spray per hectare a year
Benefits	Has the potential to stabilise stream banks; Reduced topsoil loss from paddocks; Significant reductions in faecal bacteria from dairy shed effluent e.g. campylobacter and E. coli (80-95% with GFS between 1-4m)
Limitations	Requires weed management; Strips can become clogged with sediment; Buffer success is dependent on slope, vegetation type and density, flow convergence, soil type, topography; Strips between 1-4m can achieve reductions but maximum benefits are achieved at widths greater than 6m
References	▪ Parkyn (2004) ▪ McKergow et al. (2007) ▪ Wilcock, Elliot, Hudson, Parkyn & Quinn (2008) ▪ Wilcock et al. (2009)

1.3 Sediment tools

	Traps, Dams and Ponds – Paddock, Farm
Description	Excavations in the bed of a watercourse are designed to capture the downstream movement of sediment. Water flows are slowed and energy reduced to filter sediment and allow grass growth. Sediment traps should be considered tertiary to prevention; primarily changing land management to reduce erosion and sediment transport e.g. conservation tillage, and secondary keeping sediments on land before they reach the drainage network e.g. grass filter strips. Sediment traps are also required as the upstream component of a constructed wetland.
Target nutrient	P, S
Land use	All farming operations, particularly Cropping/Vegetable growing Surface runoff in ephemeral channels where streamflow can be diverted during flooding events
Likely reductions in nutrient loss	A sediment trap taking surface runoff from the base of a moderately sloping race with a grass filter strip beyond the trap before the stream showed 44% reduction in dissolved reactive phosphate (DRP), 49% reduction in total dissolved phosphate and a 10% reduction in total P. Can also remove 10-20% of particulate P.
Costs	Establishment: ranges between $750-1,300 ha/year, or $360 per kg P retained ha/year Maintenance: $75/ha/year Recommended capacity is 0.5% (50m^3/ha) for catchments less than 5ha, and 1% (100m^3/ha for catchments over 5ha
Benefits	Potential to buffer storm events and downstream flooding; Can reduce the need for drain clearing costs; Stored run-off can be used as a source of livestock drinking water or as an alternative irrigation source; Duck shooting potential on farm; Improved landscape aesthetics;
Limitations	May require resource consent; Ineffective at high flows when mass sediment is being transported; May alter drain hydraulics; Can be ineffective at decreasing P losses if sediment is finely textured (wetlands can capture these particles); Potential for negative impacts on downstream flow e.g. dissolved oxygen which can impact aquatic biodiversity, and water temperatures; Effectiveness depends on the volume of inflow, shape, and the type of incoming particles
References	▪ Hudson (2002) ▪ McKergow et al. (2007) ▪ Dresser (2008) ▪ McDowell & Nash (2012) ▪ McDowell et al. (2013) ▪ Barber (2014)

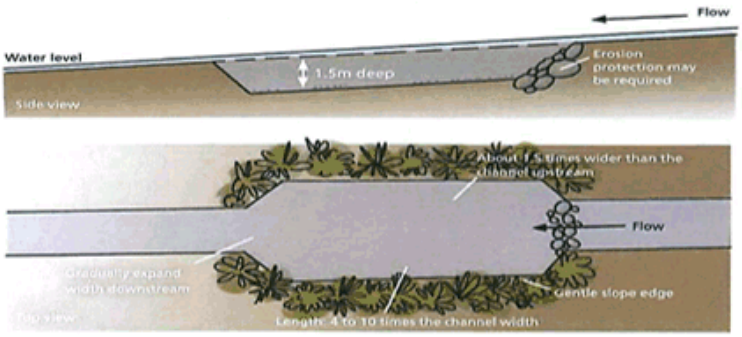

Figure 6 Side and top-view diagram of a sediment trap. Retrieved from https://www.dairynz.co.nz/media/254172/5-9_sediment_traps_2012.pdf

Chapter 2: Fertiliser management

	Buffer distances for fertiliser application – Paddock, Farm	Appropriately timed N fertiliser application – Paddock, Farm
Description	Implementing a minimum 10m buffer strip between application of ground fertiliser and open water as a good nutrient management practice	*Although Overseer can model the reductions that can be made by reducing or managing fertiliser use, it is important to understand how these reductions can be managed and the benefits on farm.* Apply N at particular times of the year, and avoid high risk periods such as Autumn and Winter. The leaching risk of N will increase from fertiliser applications when N application rates exceed the N uptake potential of the pasture. Current fertiliser guidelines include: ➢ Limiting the rate to less than 50 kg N per hectare in any single application per grazing rotation; ➢ Not applying N fertiliser when soil temperatures are below 6°C; ➢ Avoiding application when pasture growth is limited by very dry or very wet conditions, or through soil compaction ➢ Only apply fertiliser to meet plant requirements, e.g. fertiliser amounts at sowing
Target nutrient	N, P	N
Land use	All farming enterprises	All farming enterprises
Likely reductions in nutrient loss	Similar for riparian buffer effectiveness, if land is managed in the same manner	Poorly timed applications (for example in Autumn and Winter) can result in 23-42% leaching loss of the N applied, thus we can expect this reduction range with appropriately timed N applications
Costs	Depends on action – essentially no cost for maintaining filter strip unless the riparian area is managed, thus assume costs of planting and weed spraying	Costs do not change, as it is dependent on current farm expenditure for fertiliser. Good management practice does not cost in this case.
Benefits	Best practice; Reduces chance of direct fertiliser deposition and flow on effects of nutrient loss in waterways; Establishing a riparian buffer brings benefits as detailed above e.g. biodiversity, filter for sediment, etc.	The same level of production can be attained with a more conservative use of N fertiliser (approximately 10% less); Good practice will avoid runoff and can use the fertiliser efficiently lowering costs required
Limitations	Requires precision GPS modelling for accuracy of application; Can take out land that may have otherwise been used for production	Requires education on best management practice, and farmer willingness
References	▪ Fertiliser Association (2014)	▪ De Klein, Monaghan, Ledgard, & Shepherd, (2010) ▪ Parfitt, Frelat, Clark, & Roygard (2013)

2.1 Phosphorus management

	Maintaining good Olsen P health – Paddock, Farm	Use less soluble P fertilisers – Paddock, Farm
Description	*Although Overseer can model the reductions that can be made by reducing or managing fertiliser use, it is important to understand how these reductions can be managed and the benefits on farm.* Limiting P fertiliser application to only soil maintenance needs, or lower to avoid any excess P loss based on regular soil tests. This is due to the magnitude of the runoff being generally proportional to soil P concentration. Generally P fertiliser usage can be relatively high on farms, and although it is important to have adequate soil P fertility for optimum clover growth, only applying minimum levels of P on farm can greatly reduce the risk of P runoff. Generally, direct losses from P fertiliser are low if a farm is using best management practices	Using reactive-phosphate-rock (RPR) on pastures with acidic soils rather than more soluble P fertilisers, due to more soluble fertilisers being able to move short distances to streams. P losses are generally created from dissolved P which is immediately available for algal growth, which is to be avoided
Target nutrient	P	P
Land use	All farming operations	All farming operations Most relevant to hill country operations
Likely reductions in nutrient loss	It is estimated that around 20 percent of dairy farms in the North Island, would observe a 7 – 37% reduction in P loss by applying no more than the optimum P amounts for those soils. Two Manawatu Catchments have predicted P loss reduction of 30-37% by using fertiliser inputs to maintain Olsen values	RPR has been shown to decrease P loss at a catchment scale by approximately 33% in comparison to highly water soluble superphosphate. Can result in a 5-20% decrease in P for both dissolved and particulate P using RPR
Costs	Assume costs for fertiliser based on soil requirements	In a case study of hill country maintenance P (15kg/ha) and S (12 kg/ha as sulphate or 10kg/ha as fine S) plus sufficient lime at 244kg/ha required fertiliser application: Total cost $97.70/ha
Benefits	Can save on fertiliser costs; Optimising Olsen P levels can ultimately give production benefits e.g. clover growth	Previous studies have shown that the efficiency of phosphorus in soils is important to improve pasture or crop yields and to prevent any eutrophication of waterways; Applications should be in fine enough form to stimulate soil microbial activity and maintain soil pH
Limitations	Differs between soil type; Soils need good Olsen P levels to observe reductions; Requires change in practice to only maintain optimal P levels in optimum agronomic range	Any gains will depend on weather conditions, soil type and fertiliser management practises; The magnitude of loss will also depend on the rate of application, form and solubility of P; RPR can be used where annual rainfall is >800mm and soil pH is <6.
References	▪ Monaghan, de Klein, & Muirhead (2008) ▪ Anastasiadis, Kerr, MacKay, Roygard, & Shepherd, (2012) ▪ Parfitt, et al. (2013)	▪ McDowell (2012) ▪ Group One Consultancy Ltd (n.d.)

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Chapter 3: Grazing tools

	Duration Controlled Grazing – Paddock, Farm
Description	DC grazing is a system based upon grazing pasture for shorter periods (commonly 4 hours) before moving cows to a stand-off facility for excretion and rumination. Stored effluent from stand-off facilities is then applied to pasture as slurry when nutrients are required, and when soil conditions are suitable. Stand-off facilities including herd homes, free-stall barns, feed pads, stand off pads, and wintering pads/barns are some of the infrastructure options that are required for an off-pasture animal confinement system to work effectively. As a type of DC grazing, cows can be stood off from pasture during winter where the risk of nutrient loss to waterways is higher. The same benefits and costs can be derived, but over a smaller period
Target nutrient	N, P
Land use	Dairy
Likely reductions in nutrient loss	Massey University Manawatu field trial comparing standard grazing (7 hours per day grazing, 13 hours per night grazing at 22kg TN/ha found that DC grazing (4 hour day or night grazing) resulted in a 36% reduction in total nitrogen to pasture (14kg TN/ha) Urinations on pasture and laneways were reduced from 85% of daily output from "business as usual" (i.e. 24 hour grazing excluding milking times) to 56% with 8 hours of grazing between milking and 50% with 4 hours of available grazing after each milking. This means up to 119 grams per cow per day less of urinary nitrate-N will be subjected to pasture
Costs	N – $41-130 per kilogram of N retained a year ($/kg of nutrient retained/year) P – $41-108 kg P retained per year S – $151-790 kg S retained per year *Capital costs:* Free stall barn: Infrastructure and effluent system costs: $1,500 to $2,000/cow Herd homes: $1,800 to $2,000/cow Covered, deep litter standoff with drainage and effluent capture: $1,200 to $1,500/cow
Benefits	Reductions in direct faecal and urine deposition to pasture; Allows for reductions in pasture damage during wet periods which ensures that the soil structure, drainage and pasture production are maintained; Less fertiliser required; Pasture production in spring compared to wintering on paddock; Reduced need for grazing off farm; Suitable and clean area for calving; Herd urine captured on stand off facilities significant for N reduction; Protection of farm drainage networks; Body weight and conditions scores of cows can be maintained or even increased; Cows are protected from adverse climatic conditions; Better utilisation of supplementary feed; Increased milking period with reduced numbers of dry/empty cows
Limitations	Requires significant capital investment if infrastructure is not present on farm; Research is required to determine how DC grazing can be carried out along with slurry management without compromising pasture production; Greater quantities of effluent; Higher risks of animal health problems e.g. lameness; Maintenance costs e.g. effluent, cleaning, surface materials; Often requires feed supplementation to ensure adequate intakes; Depressed net pasture growth rates because of greater losses through senescence; "pollution swapping" by increasing nitrous oxide emissions; Significant variation in costs due to climate, soil types, and frequency of use; Problems with modelling in OVERSEER®; Reductions in nutrient loss are dependent on no further intensification
References	Clark et al. (2010); Christensen, Hanly, Hedley & Horne (2011, 2012); Beukes et al. (2013); Journeaux (2013); Dairy NZ (2014); Macdonald, Rowarth, & Scrimgeour (2015); Laurenson, van der Weerden, Beaukes & Vogeler (2017)

Figure 7 Example of a free stall barn. Retrieved from https://www.dairynz.co.nz/farm/off-paddock-facilities/freestall-barn/

	Using feedpads or wintering pads – Farm
Description	Similar to DC grazing, infrastructure can be used to keep animals off pasture during the winter months (autumn until calving for 4 months) e.g. a feedpad, where effluent is collected. Keeping animals off pasture during high risk periods can significantly reduce the amount of N lost from urine, and effluent generated by the animal
Target nutrient	N, P
Land use	Dairy/beef
Likely reductions in nutrient loss	N leaching losses were estimated to be reduced by 60%. Farms that are on sedimentary soil and have a wintering pad can have a 15 – 30% reduction in P loss
Costs	Varies depending on type of pad
Benefits	Increase in pasture production due to efficient use of effluent; Reduce pugging of pasture; Improved animal welfare, shelter, and ability to feed out efficiently; Targets urine patches as the largest source of N loss on farm
Limitations	Feedpad type; Effluent storage and management required; Animals should be managed appropriately to avoid any welfare issues
References	▪ Monaghan, et al., (2007) ▪ Monaghan, de Klein, & Muir-head (2008) ▪ Anastasiadis, Kerr, MacKay, Roygard, & Shepherd, (2012)

Figure 8 Example of a covered feedpad. Retrieved from http://www.nrc.govt.nz/Environment/Farm-Management/fde/feed-pads/

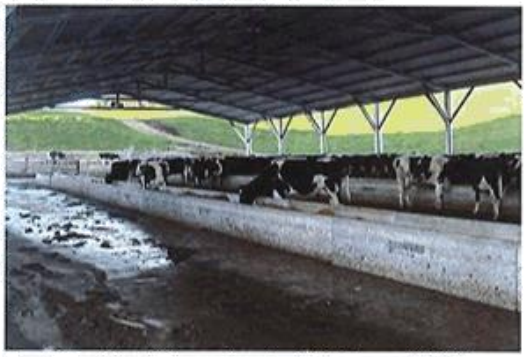

Figure 9 Example of a wintering barn. Retrieved from https://www.sheds.co.nz/tools/blog/wintering-barns-and-dairy-sheds/

Chapter 4: Inhibitors and growth hormones

	Urease – Paddock, Farm	Gibberellic acid – Paddock
Description	Using Urea fertiliser treated with urease inhibitor N- butyl thiophosphoric triamide (Agrotain) (nBPT – trade name SustaiN), which aims to reduce the rate of hydrolysis, ammonia production and volatisation	Use of GA plant growth hormone to reduce N-fertiliser application in early spring. Reduces N-content of pasture
Target nutrient	N	N
Land use	All farming enterprises	All farming enterprises
Likely reductions in nutrient loss	With all figures based on typical application rate at 25kg/ha of urea, nitrate leaching losses can be reduced by 36-55% compared with granular urea (uptake in ryegrass). Assuming 5kg N/ha of loss, treated urea (e.g. SustaiN) will conserve 2.5kg N/ha	Reduce annual urine-N leaching 4-29% by reducing N-intakes by stock
Costs	Approx. $3.20 per hectare more than applying commercial urea	5 kg costs $2,800, which equals $1.80 per gram. Application at 20g/ha =$36/ha
Benefits	Can increase N-response efficiency between 31-96%, Herbage dry matter production can increase from 10kg $DMkg^{-1}$ to 23kg $DMkg^{-1}$ with fine particle urea treated with Agrotain	Increased pasture production in August-September; Reduced need for N-fertiliser applications
Limitations	Relatively limited information but starting to emerge in NZ context; Benefits are variable and depend on the same variables that control ammonia volatisation	Must be used within 5 days of grazing; Applied as liquid so requires spray equipment or contractor
References	▪ Edmeades (2004) ▪ Dawar, Zaman, Rowarth, Blenner-hassett & Turnbull (2011) ▪ Zaman, Croom, Blenner-hasset & Nguyen (2011) ▪ Dawar, Zaman & Rowarth (2012) ▪ Zaman, Saggar & Strafford (2013)	▪ Ghani, Ledgard, Wyatt & Catto (2014) ▪ Bryant, Edwards & Robinson (2016)

Figure 10 Close up of urea prills treated with nBPT. Retrieved from http://www.groupone.co.nz/enquire/improving-efficiency-of-fertiliser-urea-with-onesytem/

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Chapter 5: Hydraulic connectivity

	Managing runoff from farm infrastructure – Paddock, Farm
Description	Surface runoff from farm infrastructure has been highlighted as a potential greater source of P, S load and microbial loss to waterways than runoff from pasture. Management requires good track design, bunding of culverts and bridges, careful driving/ use of lightweight vehicles, and gently sloped revegetated batters to reduce bank erosion
Target nutrient	P, S, Faecal Microbes
Land use	Dairy, Intensive S & B Any on farm infrastructure including gateways, lanes and tracks
Likely reductions in nutrient loss	Application of steel melter slag rich in Iron and Aluminium oxides encased in mesh to the side of laneways: decreased Total P loss in runoff by 95% and suspended sediment by 99%. Could reduce losses by 0.1 kg P/ha/yr
Costs	Varies dependent on farm structure
Benefits	Well maintained laneways can increase milk production with improved health and cow traffic flow; Efficiently designed and constructed laneways can reduce issues of lameness; Water directed to paddocks will be less likely to flow into waterways
Limitations	Can be difficult and costly to change established farm infrastructure; May not be practical depending on topography, etc.
References	▪ McKergow et al. (2007) ▪ McDowell (2007) ▪ Dresser (2008) ▪ Parfitt, Frelat, Clark, & Roygard (2013)

Figure 11 Retaining walls and drainage on a farm track. Retrieved from http://johnstoneng.co.nz/wp-content/uploads/2015/05/Retaining-Walls-and-Drainage.jpg

Chapter 6: Effluent management

	Using effluent as a fertiliser – Paddock, Farm
Description	Application of effluent to land using low rate deferred irrigation will minimise the risks of nutrients leaching. This involves storing farm dairy effluent in a holding pond, and applying it strategically when the soil water deficit is enough to prevent any direct drainage. Using an irrigator that can apply very low application rates of effluent can reduce the likelihood of any overland flow and the effluent can be recycled at the root zone more efficiently. To reduce the risk of nutrient loss on farm, apply no more than the maximum annual rates of N, split application, and have exclusion periods for animal grazing after application. The application of effluent to land should be restricted to those soils that have a low risk of runoff. Low rate effluent application increases nutrient use efficiency, and reduces nutrient losses.
Target nutrient	N, P
Land use	Dairy
Likely reductions in nutrient loss	A direct effluent discharge from an aerobic pond has been shown to discharge 35 kg of P per 100 cows, whereas samples of winter drainage from grazed plots sprayed with effluent has only been shown to discharge 10 kg of P per 100 cows; therefore showing that less P is lost using differed irrigation of effluent. Deferred effluent irrigation on a case study farm in NZ found a 5% reduction in N loss and could reduce P loss by 1 kg P/ha/year
Costs	May have to upgrade effluent infrastructure i.e. new effluent pond, lining an existing effluent pond, new irrigator, upgrade of sumps/wedges which will need to comply with your regional council's rules; Costs will vary depending on scale of existing farm infrastructure, or upgrade
Benefits	Effluent can be used as a substitute for fertiliser, so farm wide costs on fertiliser can be reduced; Can save 10 – 15% in a farm's annual fertiliser requirement
Limitations	Sealing of ponds; Type of effluent storage facility; Management of effluent system; Irrigator type; Soil type; Weather; Farm drainage systems; Only having the minimum area permissible (150kg N/ha) creates animal health risks due to elevated soil potassium
References	▪ Monaghan, et al., (2007, 2008) ▪ Monaghan (2011 ▪ Parfitt et al., 2013)

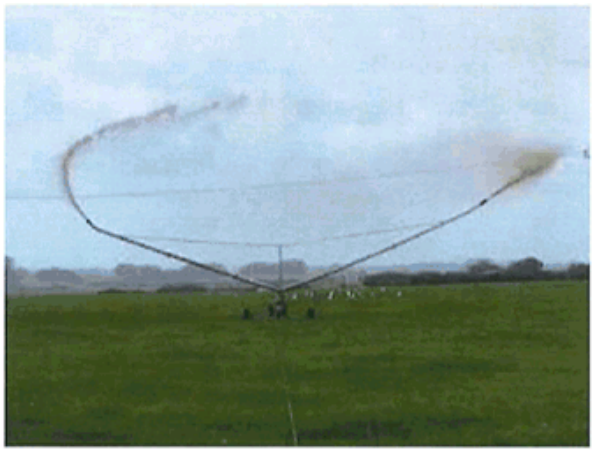

Figure 12 Effluent being sprayed to pasture via a travelling irrigator. Retrieved from http://www.ruralnewsgroup.co.nz/dairy-news/dairy-management/treat-poo-as-fert

Chapter 7: Crop management

	Benched/contoured headlands – Paddock	Contour drain - Paddock
Description	A measure to direct soil and water runoff to the side of the paddocks, or a particular drain within a paddock. The headlands are shaped away from the rows with runoff directed to an earth bund. Headlands are grassed to encourage silt and sediment uptake before entering drains	Contour drains are temporary drainage to collect runoff water. By reducing the length of rows that runoff water can flow down, water is collected in shallow drains that run at a gradient across the slope of paddocks. This allows water to be channelled into permanent drains
Target nutrient	S	S
Land use	Cropping, Vegetable production	Cropping, Vegetable production
Likely reductions in nutrient loss	50-80%	30-70%
Costs	$65/ha	$75/ha
Benefits	Used in good effect to break up the length of long paddock runs; Grassing headlands protects them from scouring and encourages silt to drop out before flowing to surface drainage	Contour drains must discharge into permanent drains otherwise erosion is just shifted to the margins; The steeper the slope, the greater the number of contour drains needed
Limitations	Construction of the headland; Rainfall and management can all impact the effectiveness of the headland	
References	▪ HortNZ (2010) ▪ Barber (2014)	▪ Barber (2014)

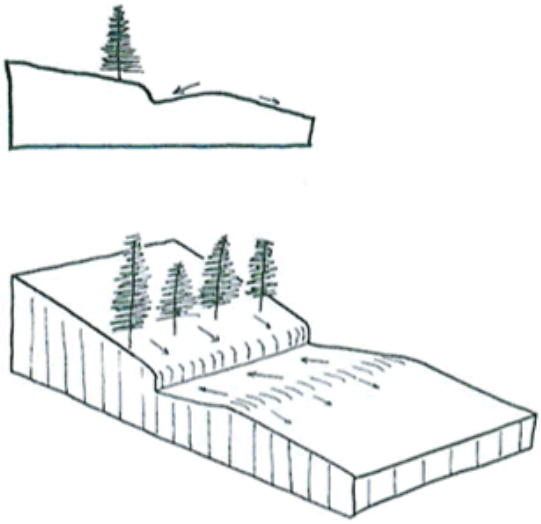

Figure 13 Diagram of a benched headland. Retrieved from https://www.horizons.govt.nz/HRC/media/Media/One%20Plan%20Documents/COP-Vegetable-Growing-in-MWRC-2010-V2.pdf

	Controlled drainage – Paddock, Farm	Wheel track ripping/dyking – Paddock
Description	Restrict or control drainage discharge to prevent it from leaving the system using a weir or water flow control to raise the water level in the drainage outlet, and hold water in the drain. The drainage levels ensure optimal plant productivity, but can be a potential route for dissolved nutrients loss. To help reduce the risk of nutrient loss an option is to use weirs to strategically control drainage	Compacted wheel tracks can act as drainage channels. Ripping wheel tracks to below the cultivation compaction zone allows water to infiltrate into the soil, thus aims to reduce crop and soil loss. Similarly, dyking is a simple practice that creates closely spaced soil indentations along tracks which can achieve the same effect
Target nutrient	N	S
Land use	Cropping, Vegetable production	Cropping, Vegetable production
Likely reductions in nutrient loss	Studies have shown N loss reduction ranging from 57 – 86%, but this varies dramatically with soil types. It is mostly effective on mainly flat with a gentle gradient land, and land that has an impermeable clay layer about 1-3m below the surface	50-80%
Costs	Cost is dependent on existing drainage systems	$35/ha
Benefits	Can be used to accommodate the growth of specific crops, soil types and reduce the stress to crops; Soil water storage; Flood attenuation	Primary measure for minimising runoff, which reduces soil and nutrient loss, thus takes pressure off sediment control devices e.g. sediment traps; Reduced erosion rate; Minimised paddock ponding
Limitations	Water depth and water table management; Soil type; Land use type; Crop type; Requires active management; Unsuitable for mole-tile drained land	Wheel tracks used for spraying should not be ripped, as loose tracks make spraying difficult
References	▪ McKergow et al. (2007) ▪ Ballantine & Tanner (2013)	▪ Barber (2014)

Figure 14 Example of wheel track ripping. The water logged tracks have not been ripped, as they are used for the sprayer. Retrieved from http://www.hortnz.co.nz/assets/Uploads/Auckland-Waikato-ES-Control-Guidelines-1-1.pdf

Figure 15 Example of wheel track dyking. Retrieved from http://www.hortnz.co.nz/assets/Uploads/Auckland-Waikato-ES-Control-Guidelines-1-1.pdf

	Cover crops – Paddock	Super silt fence - Paddock
Description	A crop which is grown to be ploughed into the soil, but not harvested , in order to improve soil quality	Temporary sediment trapping measure for runoff from catchments smaller than 0.5ha, and a slope of 40m. Geotextiles with good filtering characteristics are attached to a wire fence posts e.g. a chain link fence, to capture sediment. Super silt fences are best suited for cultivated growing situations
Target nutrient	N, S	S
Land use	All farming operations	Cropping, Vegetable growing
Likely reductions in nutrient loss	Mean reductions in N leaching for an early sown cover crop in March 70-80%, late sown cover crop in June approx. 25% (Waikato)	80-95%
Costs	Range from $80/ha dependent on cover crop grown	$380/ha
Benefits	Stabilises soil to help prevent erosion; Improves drainage and soil structure; Traps nutrients left in the soil from previous crops; Stimulates soil biological activity; Some species can be nitrogen fixing; Can smother weeds and reduce weed control costs	Can serve as a better constructed, and more permanent silt trap
Limitations	Can have significant reductions in total N leached for certain crops e.g. barley, but can have very little impact on whole farm results dependent on rotation	If used on larger catchments, consideration of site characteristics is needed, or alternative mitigations may be more appropriate; Slope steepness determines design criteria
References	▪ HortNZ (2010) ▪ Barber (2014) ▪ Zykowski, Teixeria, Malcolm, Johnstone & de Ruiter (2016)	▪ Barber (2014)

Figure 16 Oats emerging through the pervious crop. Retrieved from http://www.hortnz.co.nz/assets/Uploads/Auckland-Waikato-ES-Control-Guidelines-1-1.pdf

Figure 17 Example of a super silt fence. Retrieved from http://esccanterbury.co.nz/wp-content/uploads/2017/02/sc-super-silt-fence.jpg

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Annex L

	Decanting earth bund – Paddock
Description	A decanting earth bund is a temporary berm of compacted soil to create a damming area where ponding can occur. They are constructed along flat contours at the bottom of paddocks. By moving the headland further up the paddock, the full width of the paddock allows runoff to be held long enough for sediment to drop out
Target nutrient	S
Land use	Cropping, Vegetable growing
Likely reductions in nutrient loss	80-95% Recommended capacity is 0.5% (50m^3/ha) for catchments less than 5ha, and 1% (100m^3/ha for catchments over 5ha
Costs	$130/ha
Benefits	Avoids the need to build deeper silt traps
Limitations	Decanting rate needs to be monitored to ensure sediment has time to settle
References	▪ Barber (2014)

Figure 18 Example of a decanting earth bund. Retrieved from http://www.hortnz.co.nz/assets/Uploads/Auckland-Waikato-ES-Control-Guidelines-1-1.pdf

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	Grazing management – Paddock
Description	Stock grazing crops where there is a risk of sediment and nutrient losses by overland flow should start in the least risky areas (tops of paddocks), and graze towards the highest risk areas, such as paddock depressions or waterways (called Critical Source Areas, CSA). Depressions and grass buffers alongside waterways should be left un-tilled and grazed last, if at all.
Target nutrient	N, P, S
Land use	Dairy, S & B Grazing forage crops, particularly in winter, but applicable to summer crops as well
Likely reductions in nutrient loss	Highly effective in reducing losses due to overland flow, depending on slope and rainfall
Costs	Minimal extra cost; Areas of land not sown will reduce total yield fractionally (less than 2.5% of paddock area in trials)
Benefits	Reducing losses from overland flow means top soil and the nutrients it contains are kept in the paddock
Limitations	
References	▪ Orchiston, Monaghan & Laurenson (2013)

Figure 19 Cows grazing the last bite of a winter crop of kale. Retrieved from http://www.agresearch.co.nz/news/trial-suggests-winter-management-can-cut-runoff-losses/

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Chapter 8: Alternative forages

	Chicory – Paddock	Plantain - Paddock
Description	Use of chicory (and clover) as a summer crop, sown in spring, and permanent ryegrass pasture can be over-sown into the chicory/clover crop in autumn; and/or included in a ryegrass/clover pasture mix sown in autumn.	Use of plantain as a summer crop; and/or included in a ryegrass/clover pasture mix
Target nutrient	N	N
Land use	Dairy, Intensive S & B	Dairy, Intensive S & B
Likely reductions in nutrient loss	Known effectiveness for reducing N leaching, but literature is sparse	Plantain reduced NO_3-N loss from urine from 340 kgN/ha (RG + clover) to 240 kg N/ha from plantain pastures 29% reduction 20% reduction in N-leaching from urine spots. In round figures there is 30% less N loading per ha from cow urine when there is a reasonable proportion of plantain in the pasture (probably need 20 to 30%)
Costs	Chicory seed $24/kg (including super strike)	Plantain seed $20/kg (including super strike)
Benefits	Deep tap root reduces N-loss after winter crop; Reduces N-leaching; Total annual dry matter (DM) production can be close to that achieved with ryegrass based pasture, however, pastures with chicory grow better in summer and maintain feed quality over this period; Chicory swards can consistently produce better quality feed than plantain, sustaining between 12 and 13MJ ME/kg DM throughout the year	Total annual dry matter (DM) production can be close to that achieved with ryegrass based pasture, however, pastures with plantain grow better in summer and maintain feed quality over this period; Winter-active and persists longer in ryegrass pasture mix, resulting in more forage dry matter production and less N-leaching from pasture
Limitations	Chicory should not be grazed in winter; Prices vary depending on how the seed is applied; Chicory can yield less DM than plantain and more plants died over an 18-month period; Costs of using chicory or plantain vary depending on how the seed is applied, i.e. if broadcast over existing pasture the cost will merely be the cost of the seed	Costs of using chicory or plantain vary depending on how the seed is applied, i.e. if broadcast over existing pasture the cost will merely be the cost of the seed; Susceptible to broad leaf herbicides, so controlling weeds can be more difficult compared to ryegrass pasture, for example.
References	▪ Perks (2011) ▪ Lucci, Shepherd & Carlson (2015) ▪ Edwards & Cameron (2016)	▪ Gawn, Harrington & Matthew (2012) ▪ Ledgard (2015) ▪ Box, Edwards & Bryant (2016) ▪ P. Kemp, personal communication (June 13, 2017)

Figure 21 Cows grazing chicory. Retrieved from https://www.dairynz.co.nz/about-us/research/

Figure 20 A crop of plantain. Retrieved from https://www.dairynz.co.nz/feed/crops/plantain/

	Pasture mixes – Paddock	Italian ryegrass - Paddock
Description	A combination of plantain and chicory mix pastures	Use of faster growing pasture species to reduce N-leaching in winter
Target nutrient	N	N
Land use	Dairy, Intensive S & B	Dairy, Intensive S & B
Likely reductions in nutrient loss	20% reduction in urine-N concentration, 18% reduction in urinary –N excretion, Urinary N output half that of cows grazing RG	24-54% less leaching of NO_3 compared to Perennial RG pasture
Costs	$20-24/ha for over-sowing 1 kg/ha. If added to pasture mix it is usually sown at 2 kg /ha, so $40-48/ha over above the normal cost of new pasture. If the land is sprayed cultivated and sown with clover as a summer crop, it can cost $1500/ha with or without the seed, which at 6 kg herb/ha & 6 kg clover can cost around $500/ha	18 kg seed/ha @ $25/kg = $450/ha plus sowing
Benefits	Both species really came into their own for animal production when the quality of ryegrass pasture dropped to 9.6MJ ME/kg DM in summer; Feeding first year chicory or plantain to between 20-40% of the total diet increased DM intake of cows by about 1kg per day, and milk solids by about 17 percent compared with cows fed ryegrass pasture only; Feeding either chicory or plantain can reduce the concentration of nitrogen in cow urine, so there is a evident potential environmental benefit from these species through lower nitrate leaching	Costs to establish these forages if yields are sufficient, are off-set by the gains in feed quality and supply at critical times of the year; High yield and can be grazed in autumn to put weight on cows before winter; Establishes quickly and grows well in winter periods; Reductions in soil damage as soils aren't saturated, which enables Italian RG to be sown to remove the fallow period after fodder beet has been eaten, meaning cows only need maintenance through winter; Reduced N leaching; Enables feed supply management; If grown after a summer crop it also enables another spraying out of problem weeds before permanent pasture is sown the following autumn
Limitations	Sowing herbs limits the use of herbicide to control broadleaf weeds in pasture; Weed control is limited to topping and/or more expensive herbicides	
References	▪ Woodward, Waghorn, Bryant & Benton (2012) ▪ Totty, Greenwood, Bryant & Edwards (2013) ▪ Edwards et al. (2015) ▪ Edwards & Cameron (2016)	▪ Malcolm, Cameron, Di, Edwards & Moir (2014)

Figure 22 Up close photo of Italian ryegrass. Retrieved from https://www.dairynz.co.nz/media/4439057/technical-series-june-2016.pdf

Note: Herb/clover mixes can be used multiple ways, for example as stand-alone summer crops or added to rye-grass pastures. Mixtures can be over-sown (broadcast) to fill in spaces in damaged or over-grazed pasture, or under-sown into run-out ryegrass pastures. They establish best in spring and can last for 2-3 seasons, with the clover used to suppress weeds where herb plants have died. Forage herbs can be used as part of a pasture mixes at 1-2kg/ha, as a specialist sole crop, or mixed with white and/or red clover. Herb/clover pastures can also be used where weed grasses are a problem such as needle grass or couch, with these sprayed out while paddocks are in herbs (Edwards & Cameron, 2016).

Figure 23 Clover and plantain mixed pasture. Retrieved from http://www.stuff.co.nz/business/farming/agribusiness/74661433/inverary-station-team-runs-the-rule-over-its-farm-performance

	Fodder beet – Paddock
Description	Use of fodder beet as an autumn/winter crop
Target nutrient	N
Land use	Dairy, Intensive S & B
Likely reductions in nutrient loss	Nutrient loss is achieved by a reduction in urine N concentration: 3g N/litre (L) with fodder beet or kale, compared to RG at 7g N/L
Costs	$3,000/ha
Benefits	Can be fed *in situ* or harvested, stored and fed on a feed pad or in the paddock; Costs to establish these forages, if yields are sufficient, are off-set by the gains in feed quality and supply at critical times of the year; High yield and puts weight on cows before winter; Reduced N leaching; Enables feed supply management
Limitations	Fodder beet is expensive to establish, with the potential for a high yield; Requires free-draining soil; Requires a high level of management due to animal health risks
References	▪ Jenkinson, Edwards & Bryant (2014)

Figure 24 Cows break feeding on a fodder beet crop. Retrieved from http://www.premierrural.co.nz/agri-business/fodder-beet/

Annex L

Chapter 9: Cow genetics

	Animal breeding and/or Bull selection – Farm
Description	Identifying cows that are able to produce more milk from the same amount of feed, or having fewer cow numbers with high genetic merit and high breeding worth (BW) cows. NZ BW (genetic merit) linked to higher PUE (protein use efficiency)
Target nutrient	N
Land use	Dairy
Likely reductions in nutrient loss	Could be effective based on protein use efficiency statistics: Low BW - 0.28g MS/g protein High BW - 0.30g MS/g protein
Costs	Varies dependent on cow breed
Benefits	Higher protein use efficiency reduces N-loss
Limitations	Difficult to find a clear correlation. It is a risky breeding strategy to select for 1 trait, making improvements in NUE slower than what otherwise be the case.
References	▪ Wheadon, Cheng, Dewhurst & Edwards (2013)

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Annex L

van Voorthuysen
Environmental Limited

MEMORANDUM

To: Andrew Bashford

From: Rob van Voorthuysen

Date: 26 June 2017

Topic: ONE PLAN – RDA CONSENT FORMS AND GUIDANCE DOCUMENTS

As requested, I have reviewed the documents that you provided to me, other than the Nutrient Management Plan template given that you advise it is a work in progress and it is largely a document addressing the technical requirements of Overseer.

At the outset I should note that I have substantial concerns regarding the documents, which will be apparent from my detailed 'track changes' comments on each of them (provided separately), summarised as follows:

- the Overview document (document 1) needs some minor amendments;
- Form 2b (Application for Resource Consent) needs to be greatly expanded to be of practical use to applicants and HRC. As currently worded it assumes too much knowledge of the One Plan provisions;
- Document 2c (Application Form C - AEE) needs some reordering and some significant expansion (to deal with matters such as rare habitats, historic heritage, evidential proof of storage pit seepage rates, etc). Part 4 of the document causes me concern as I do not consider that a farmer applicant could usefully complete it.

I consider that these three documents could be made to work if they are expanded and amended as I suggest, apart from section 4 of Form C - AEE.

However, in my view the 'Guidance document AEE' (document 3) is simply impractical and unworkable for a farmer applicant. It deals with many relatively esoteric[1] matters that a farmer will have little or no detailed knowledge of (NPSFM, NZCPS, NZDWS, other external guidelines, etc) and will not be qualified to address. Even consultant planners will struggle with some of the questions posed. The Guideline document may be 'theoretically" correct in terms of ticking all of the RMA s104 boxes, but I cannot see how it can work in practice. I am not sure what you can do about this if HRC continues to require individual farmers to prepare their own applications.

The 'Potential mitigation outside of Overseer' document (document 4) is very useful in terms of advising farmers about good management practices for their farm. However, I do not see how it can be used to quantitatively move a farmer from Rule 14-2 back into Rule 14-1 in terms of complying

[1] From a lay person's perspective.

1

with the Table 14.2 CNMLs if they do not currently do so. The reason for that is the effect of the mitigations on nutrient losses cannot be quantified by Overseer.

My overall conclusion is that it is impractical and unrealistic to expect individual farmers to prepare and submit an application under Rule 14-2 that ticks all the RMA s104 boxes, despite what the Environment Court said about that in its recent declaration. I doubt that a complete application addressing all of the matters in the 'Guidance document AEE' (document 3) could be completed even by a consultant planner or scientist.

The reason for that conclusion is that you can only quantify the effects of a single farm's nutrient losses on the environment in the context of the cumulative effect of the losses from all land uses in a catchment (including non-intensive farms, Rule 14-1 compliant farms, and other non-farming land uses). This requires a knowledge of the on-farm (or on-site) nutrient losses from all land uses in the catchment (Overseer modelling results), catchment scale groundwater and surface water quality modelling (to translate the on-farm nutrient losses into receiving water body nutrient concentrations), with spatial (within an aquifer and down a river) and temporal (seasonal) interpretations of the results and the impact of that on aquatic ecology, life-supporting capacity, the One Plan Schedule B values, and the One Plan Schedule E water quality targets.

It is a nonsense to expect a single farmer to accomplish that in any kind of sensible way that would be of probative value to a consent decision-maker.

In my view, this means that HRC has no practical option but to promote (and undertake) catchment scale cumulative effects assessments of all intensive farming land uses in each Table 14.1 catchment and to do this on behalf of all of the applicants. This should be done overtly with the costs of that not insignificant task being apportioned across the intensive farming activity land use resource consent applicants (or perhaps across all land use activities by way of a targeted rate since all land uses contribute nutrient load to the catchment water bodies).

Other concerns I have include:

- Regarding Rule 14-1, the Table 14.2 Year 5 CNMLs have application within some catchments as early as July 2019. The documents are silent on this and the need to show compliance with those CNMLs (I am assuming that no farmer will seek a consent duration less than 2 years).
- Also regarding Rule 14-1, depending on the consent duration sought, a farmer will need to demonstrate future compliance with the Year 5, 10 or 20 CNMLs now. For example, if a farmer seeks a 15 year consent duration they would need to provide Overseer files showing that the Table 14.2 Year 5 and 10 CNMLs can be met in those years by the intended future farming practices in those years. In the absence of that evidential basis HRC would be unable to conclude that Rule 14-1 condition (c) is met. The documents are also silent on this.

In the absence of HRC undertaking catchment based cumulative effects assessments for all intensive land use farming activities I do not see how the One Plan Rule 14-2 provisions can be made to work in practice.

The other option would be a plan change to remove the problematic CNMLs (given they have no actual link to desired water quality – the achievement of desired water quality may require CNMLs in practice that are greater or lesser than those in Table 14.2), but that would be a contentious multi-

year project given the proven interest of the conservation advocacy agencies in the One Plan and its implementation.

Annex M

GSL DIAGNOSTIC
DRIVING PROFIT THROUGH INNOVATION

The feasibility of nutrient leaching reductions (N leaching) within the constraints of minimum impact on the profitability and production of five dairy farms in the Horizons Region

A Report for

horizons regional council

Author: Barrie Ridler, GSL Diagnostic

JUNE 30th 2016

Annex N

An additional in-depth analysis of Horizons Farms with emphasis and discussion on model structure as related to marginal economics and ability to determine nitrogen abatement costs.

Ropere Consulting.
Peter Fraser.

Table of Contents

List of Tables

List of Figures

Technical Forward

Explanation of marginality and profit maximisation

This report makes extensive reference to marginal analysis - so it is vital the reader has a working understanding of the concepts employed - otherwise large sections of the report will sound - at best - counterintuitive and - at worst - 'just plain wrong'.

A useful starting point is considering a simple 'accounting' view of profit (π), which conceptualises profit as a residual; or what is 'left over' when total cost (TC) is subtracted from total revenue (TR).

This can be expressed thus:

π = TR - TC (or 'profit equals what you earned less what you spent to earn it')

Economics goes a step further, and distinguishes between a firm that 'makes a profit' versus one that is 'profit maximising'; with marginal analysis being the key to determining the latter.

In microeconomics, the term 'marginal' simply means 'one more' or 'one less' - so 'marginal cost (MC) is simply the cost associated with producing one more 'widget' (i.e. a widget is some type of good or service), whereas 'marginal revenue[1]' is the revenue generated from selling one more widget.

Widgets are made by 'firms' (where a dairy farm is analogous to a firm if the widget in question is milk). The standard assumption is firms will maximise profits, which occurs when marginal costs equals marginal revenue: or 'when the last dollar *spent* equals the last dollar *earned*'.

At this point the marginal (or extra) profit ($M\pi$) from producing an extra widget is **zero** - implying no further gains can be made.

The result is akin to a 'tipping point', where:

- if marginal cost is *less* than marginal revenue then it is profitable to *increase* production and thereby *increase* profitability (as the last dollar spent is less than last dollar earned - so 'add cows'); however
- if marginal cost is *greater* than marginal revenue then it is profitable to *decrease* production to *restore* profitability (as the last dollar spent is more than the last dollar earned - so 'reduce cows').

Marginal analysis is especially useful when making decisions to increase or decrease production - which is something dairy farmers do all the time.

A practical example neatly illustrates the theory.

[1] For the mathematically inclined, MC and MR are merely the first derivative of TC and TR.

Annex N

Let's assume a hypothetical farm is currently producing 900 kgMS HA (which is a little under the national average). The farmer is therefore considering increasing production; so is targeting 1100 kgMS HA production over the same land area via greater intensification. As planning figures, let's assume:

- Farm gate milk price is $5 kgMS
- Fixed costs (FC) are $4 kgMS
- Variable costs (VC) range from 20 cents to $2.50 kgMS depending on intensity
- Current farm working expenses [FWE] are $4.50 kgMS
- Whilst the farm is currently doing 950 kgMS HA, the possible range is 700 kgMS HA - 1,200 kgMS HA.

The results are summarised in the table below.

Table A: *Hypothetical farm profitability analysis*

KgMS HA	FC $	VC $	AC $	TC per HA $	MC $	TR $	MR $	π per HA $	M π $
700	4.00	0.25	4.25	2975.00	-	3500	-	525.00	-
750	4.00	0.25	4.25	3187.50	212.50	3750	250	562.50	37.50
800	4.00	0.20	4.20	3360.00	172.50	4000	250	640.00	77.50
850	4.00	0.25	4.25	3612.50	**252.50**	4250	**250**	637.50	-2.50
900	4.00	0.30	4.30	3870.00	277.50	4500	250	630.00	-7.50
950	4.00	0.50	4.50	4275.00	**385.00**	4750	**250**	475.00	-155.00
1000	4.00	1.00	5.00	5000.00	725.00	5000	250	0	-475.00
1050	4.00	1.75	5.75	6037.50	1037.50	5250	250	-787.50	-787.50
1100	4.00	2.00	6.00	6600.00	**562.50**	5500	**250**	-1100.00	-212.50
1150	4.00	2.25	6.25	7187.50	587.50	5750	250	-1437.50	-337.50
1200	4.00	2.50	6.50	7800.00	612.50	6000	250	-1800.00	-362.50

Colour code

Profit maximising output

Actual or targeted production

Loss making production

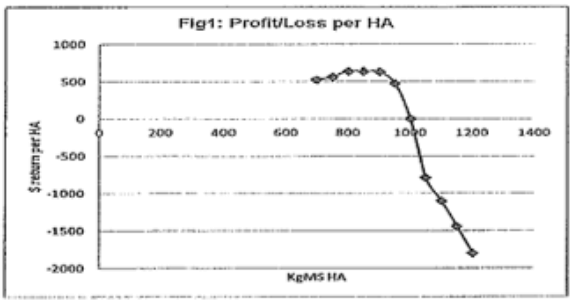
The table illustrates the following:

- At an expected milk price of $5 kgMS, any level of production above 1000 kgMS HA will be unprofitable - so that targeted expansion should be abandoned
- Current production of 950 kgMS HA, whilst profitable, is not optimal - as MC is greater than MR - so the farm will benefit from *reducing* production.
- Profit maximising production is almost exactly 850 kgMS HA, so in this case a 21% drop in production leads to a 34% increase in profitability
- The column denoting profit per HA achieves a maximum before reaching a 'tipping point' and declining; whereas the marginal profit approaches zero at the maximum - and is negative thereafter.

The fundamental problem with an output or production based objective is there is no consideration given to profit maximisation - with the result typically being systemic

overstocking. This implies a farm essentially has 'two herds': the first is the profit maximising herd (so makes money); whereas the second is a 'parasitic' herd that generates net costs (and thereby *reduces* the profitability of the entire farm).

In the example above, the cows producing the marginal 100 kgMS per HA (between 850 and 950 kgMS HA) are the parasitic herd. Profitability per HA at different production levels is represented in figure 1 (below).



A counter argument is often expressed thus: 'well, that's fine when the milk price is down, but more intensive farms will make plenty of money when the milk price is higher'. As table B shows, this is also flawed thinking. In table B the milk price assumption is increased to $6.00 kgMS but the cost structure remains unchanged. As can be seen:

- the 1100 kgMS production target is now at breakeven (compared to an $1100 HA loss) so is still nowhere near optimal
- the existing 950 kgMS level of production has improved; but is also not optimal - as profit maximisation is closer to 900 kgMS HA (so at 950 kgMS the farmer is just starting to rebuild a parasitic herd)
- A 20% increase in milk price only resulted in only a 6% increase in output from the previous optimum (and a 5% reduction from status quo).

Table B: *Revised farm analysis*

KgMS HA	FC $	VC $	AC $	TC per HA $	MC $	TR $	MR $	π per HA $	M π $
700	4.00	0.25	4.25	2975.00	-	4200	-	1225.00	-
750	4.00	0.25	4.25	3187.50	212.50	4500	300	1312.50	87.50
800	4.00	0.20	4.20	3360.00	172.50	4800	300	1440.00	127.50
850	4.00	0.25	4.25	3612.50	252.50	5100	300	1487.50	47.50
900	4.00	0.30	4.30	3870.00	277.50	5400	300	1530.00	42.50
950	4.00	0.50	4.50	4275.00	385.00	5700	300	1425.00	-95.00
1000	4.00	1.00	5.00	5000.00	725.00	6000	300	1000.00	-425.00
1050	4.00	1.75	5.75	6037.50	1037.50	6300	300	262.50	-737.50
1100	4.00	2.00	6.00	6600.00	562.50	6600	300	0	-252.50
1150	4.00	2.25	6.25	7187.50	587.50	6900	300	-287.50	-287.50
1200	4.00	2.50	6.50	7800.00	612.50	7200	300	-600.00	-312.50

In reality, it is not possible with a biological system like a farm to obtain the level of precision outlined in the tables - but one can closely approximate. However, very few farmers actually employ any type of profit maximising analysis - and models like Farmax

(and the plethora of industry benchmarks) are incapable of profit maximising as they are based on averages, whereas markets clear 'at the margin'. For example, Farm Working Expenses (FWE) is basically a total cost/total revenue approach with average cost analogous to FWE. However, on its own FWE is merely a point estimate - so while FWE can confirm whether a profit is made (or not), unless you have *all* the FWEs for each level of production for the specific farm in question, it is impossible to profit maximise.

A further reason why profit maximising analysis is almost never employed is many farmers erroneously assume that higher production must equate to higher profitability - so the result, is essence, is a form of 'output maximisation' ('productionism') rather than profit maximisation.

The productionist assumption of 'more production means more profit' only occurs if there are economies of scale (EoS) where a farm is struggling to achieve minimum efficient scale. In this case average costs are falling - so all a farmer needs to do is keep expanding until average costs stabilise (at which point there are constant returns to scale - or if an additional 20% of resources are added then widget production should likewise increase by 20%).

However, all systems are ultimately bound by diminishing marginal returns (which occurs when at least one input is fixed - so that becomes the system constraint). For example, the number of cows, the amount of fertiliser applied, and volumes of bought in feed (BiF) can all be increased; but if land area is fixed then that becomes the constraint within a pastoral farming system. Beyond constant returns one has diseconomies of scale due to decreasing marginal returns, so it is marginal costs - rather than average costs - that are critical.

This is illustrated in figure 2.

Figure 2: NZ Dairy Industry – Scale economies over time

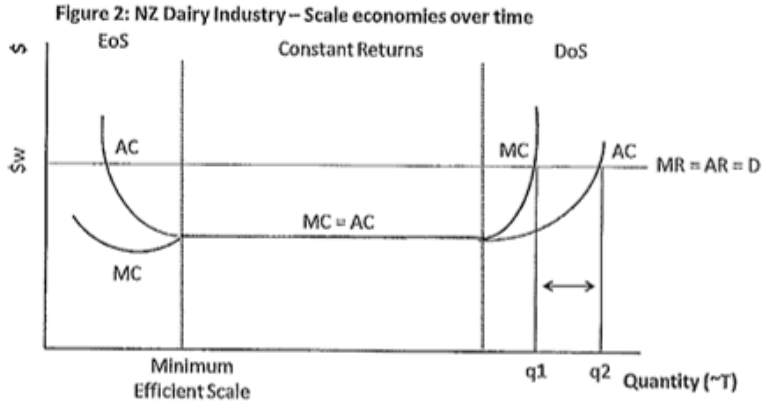


Figure 2 assumes a constant world price for dairy commodities - labelled $w. With a constant price over the production range the result is marginal revenue and average revenue (AR) are identical, and together form the demand curve (labelled D).

A firm's supply curve is merely its marginal cost curve (which is why a supply curve slopes upwards - this is due to diminishing marginal returns) but, as noted above, most farms produce based on average costs; which is represented by quantity q2. However,

the profit maximising output is where marginal costs match marginal revenue - and this is represented by point q1. The difference between q1 and q2 is the cost to the farm (or industry) of parasitic cows.

In summary, from an economic perspective all that is required to optimise a system is a thorough understanding profit maximisation; but one cannot profit maximise without knowing a farm's marginal cost and marginal revenue.

Overview of GSL and explanation of why it is different

The explanation above regarding diminishing marginal returns, profit maximisation and the concept of a parasitic herd is an excellent segue into understanding how GSL is fundamentally different from other farm models (such as *Farmax* or the *Whole Farm Model*). In simple terms, GSL is an economic model that uses linear programming (LP) techniques[2] to undertake marginal analysis. GSL can thereby ascertain both where a farm 'is' (i.e. what is the base case) but also where a farm can 'be' (i.e. its individual Y or point of profit maximisation - or alternatively, loss minimisation).

A real strength of LP is its ability to handle constraints: for example, to profit maximise subject to a nitrogen (N) leaching constraint by 'crunching' alternative resource combinations. For example, in terms of energy production the application of N and the purchase of BiF are substitutes - albeit with significantly different cost structures. However, the entire issue of energy production becomes irrelevant if an alternative strategy: reducing stocking rates - is also considered.

In essence, once a constraint is identified GSL will calculate the least cost method of addressing that constraint subject to an overall objective of profit maximisation - and in doing so will 'de-clutter' the analysis by seamlessly eliminating a myriad of inferior outcomes.

The analytical power of GSL becomes apparent when one considers the use of benchmarks within the dairy industry. The rationale for benchmarks is simple: given an inability to maximise numerous variables subject to one or multiple constraints on a 'farm by farm' basis the simplifying assumption is made that farms are, on the whole, homogenous in nature (so are akin to standardised multisite processes such as a McDonald's Restaurant). This assumption is critical as it permits the application of simple benchmarks (e.g. comparative analysis such as kgMS/HA, kgMS/cow, cows/HA, milk production targets, per cow production targets, production at X percentile etc.) that are - at best - irrelevant (as they do not provide the information farmers require to make informed decisions) and - at worst - misleading or erroneous (as the averaging processes masks useful farm specific information).

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[2] Linear programming is defined as a mathematical technique used in computer modelling (simulation) to find the best possible solution in allocating limited resources. An example of LP is solving the best assignment of 70 people to 70 jobs. The computing power required to test all the permutations to select the best assignment combination is vast; the number of possible configurations exceeds the number of particles in the observable universe. However, it takes only a moment to find the optimum solution by posing the problem as a linear program. The theory behind linear programming it that it drastically reduces the number of possible solutions that must be checked (see: https://en.wikipedia.org/wiki/Linear_programming).

Annex N

In comparison, GSL can analyse a farm 'as is' to provide a base case that alternative strategies can be considered. For example, in the material that follows for farm 1, run 1 is the base case whereas runs 2 and 3 are the application of existing industry 'wisdom'. This is essentially a standard template or 'cookie-cutter' approach to farming where stock numbers are held constant and an energy deficit that was previously filled by the application of N is substituted via the purchase of BiF.

In all farms assessed, this approach led to a significant decrease in farm profitability compared to the base case, with a marginal cost of N abatement of up to $1,225 per kg/HA. From a public policy perspective, this implies that N abatement cannot be achieved without imposing significant economic harm on farmers.

In comparison, in runs 4-7 the templated prescription is progressively abandoned and other resource options are considered (i.e. grazing off, reducing stock numbers, optimising stock numbers) - albeit within the overall objective of profit maximisation.

In stark contrast with runs 2 and 3, resource re-allocation via GSL not only significantly reduced N leaching (more so than the industry solutions), but results in an increase in profitability compared to the base case. However, there is a warning here: each farm had an N 'tipping point' where further reductions made the farm in question economically infeasible.

The public policy implications of these findings are also stark: compared to status quo is it possible for almost all dairy farmers to make substantial reductions in N leaching at little or no economic cost - indeed, in most cases, farmers would be *better off* (implying a Pareto-safe policy outcome - and positioning farmers for any future move to bring agriculture in the emissions trading scheme [ETS]).

However, for a Pareto safe outcome to occur each farmer needs to know what his or her base case is, and what are the specific combination of changes necessary to profit maximise. Moreover, in the absence of such knowledge policy makers run the risk of:

- Imposing significant - and unnecessary - economic harm on farmers
- 'Locking in' the status quo (via grand parented allocations providing a 'license to pollute') whilst at the same time penalising efficient farmers (who would get comparatively small allocations) whilst rewarding gross polluters (who would get large allocations).

Summary

Executive Summary

1. Existing industry approaches to N mitigation provide relatively modest reductions in leaching, albeit at the cost of imposing significant economic harm on farmers. This is completely unnecessary.

2. The starting point matters - in that all farms surveyed were overstocked so are therefore carrying a 'parasitic herd'. The difference in outcome between industry approaches and GSL is simply that GSL identifies and eliminates the parasitic herd - and therein lies the ability to reduce negative externalities (such as N leaching and GHG emissions) whilst also improving farm profitability. This implies that the marginal cost of abatement is either positive or zero over a key part of the desired abatement range.

3. Based on five case studies of dairy farms within the Horizon's region, it is possible for New Zealand dairy farmers to make significant reductions in N leaching at little or no economic cost compared to the status quo - though beyond certain levels a 'tipping point' emerged where further N reductions made the farm financially unviable (NB: these findings are entirely consistent with GSL analysis generally).

Detailed Points

- All farms could allocate resources more efficiently: but these changes are dependent on the opportunity for marginal increases in efficiency vs. the marginal N leach reduction required.

    - N leach limits create differing levels of constraint that are more dependent on soils and climatic influences than efficiency of resource use.
    - The imposition of set "caps" on farms fails to acknowledge the distinction between efficient and inefficient resource allocation.

- There are options for mitigation which will *reduce N leach and reduce profit* (i.e. the current industry based approaches) and others that will *reduce N leach but improve profit* (i.e. those identified by GSL based on profit maximisation).

    - Current industry recommendations for reducing N may reduce N leach but reduce profit (Refer Tables 1A and 1B Farm 1 analyses; 72 ha).
    - GSL model resource allocation progressively reduces N leaching with least impact on profit (Compare model Runs Farm 1 Runs B-H).
    - Reducing herd number, grazing off and no winter cropping provide the best options if available and acceptable.

        - Acceptability may not be a factor for some of the farms as they have combinations of soil type and rainfall that combine to make dairying unacceptable both financially and environmentally with current costs, prices and N leach caps.

Annex N

- Depending on response rate, nitrogen provides the best and cheapest additional feed when applied correctly (date and rate); however, Overseer® penalises nitrogen applications at the times when most economic benefit can be extracted (spring and autumn).

  - On all soil types, as Overseer® approaches a lower limit of N leach, the N leach reduction "curve" flattens.
  - **This can increase the marginal cost of any additional N leach reduction required to a point where the farm system becomes unviable.**
  - This may require a change in stock type or perhaps a "hybrid" system of dairy and beef (Example Farm 4.).

- Several of these farms have intensified (or plan to intensify) and will incur large decreases in overall profit and increased N leaching. These increases are possible due to soil and rainfall interacting "favourably" with Overseer criteria (Farms 2 and 3).

  - Much of the decrease in profit is due to unrecognised non-cash costs (depreciation), maintenance costs associated with intensification (infrastructure and machinery), and costs that are now "fixed variable costs" due to use of new infrastructure (insurance, labour, interest, feeds) i.e. the costs associated with intensification.
  - Use of marginal analysis may have prevented this level of intensification where in one case, almost $3.5 million of added capital has been spent for a net increase of about 50,000kgMS (about $70/kg additional MS.)

    A better investment may have been to buy more land.

  - Such intensification is not only unprofitable, it also increases Nitrates to soil.

- Marginal analysis identifies such intensification as being unprofitable. Gross Margin and cash budgets average costs equally across all production income. The marginal cost associated with specific actions are therefore hidden within all-encompassing accounting "categories".

  - This makes any reliance on Gross Margins, averages, benchmarks and ratios fraught with misinterpretation and leads to erroneous "causal relationships" when used for analysing between systems, mitigating nutrient loads or as a basis for policy decisions.
  - If the concept of marginal analysis was more widely understood (Appendices 3, 4 and 5 provide the means for understanding this concept) both farmers' profits and the environment would benefit.

- Existing debt levels impact by altering the point at which resource use reaches a 'tipping point" with reduced profits. Optimisation techniques provide a means to distinguish how critical each debt level may be for any resource combination. N

leaching caps impose an added constraint which supersedes that of maximising profit.

- A more co-ordinated National approach that encompasses N leaching "bands" and associated CO2 emissions combined with specific resource input taxes (bought in feeds, fertilisers, additional fuel) will penalise the less efficient producers proportionately more than efficient producers, create an overall more profitable agricultural industry and provide funds for the environmental improvement now required.

Five farms were selected from a short list of dairy farms in the Horizons Regional Council area which provide insight of these points.

Annex N

Project Objectives

Service description: Overview

The work is to understand feasibility of nutrient leaching reduction (N leaching), by modelling a small sample of farms' responses to different system changes and changes in assumptions (e.g. debt, product price scenarios), within the constraints of minimum impacts on:

(a) Farms' profitability, and
(b) Farm production

What opportunity do the sample farms have, to achieve N leaching reductions?

More specifically: modelling of 5 case study examples

Objective 1.0 – Initialise and optimise each farm to illustrate the marginal and overall response to progressive decreases in nitrate leaching values

Based on the knowledge gained from the initial runs, the contractor will modify the underlying assumptions in order to test the sensitivity of results to various assumptions.

Objective 1.1 – sensitivity testing around the optimum. The contractor will also test a range of costs and milk solids prices for a range of scenarios to provide an understanding of what remains achievable and affordable for farmers under more recent dairy price scenarios.

This will provide additional insight into the impact of constraining N leach under differing product price and cost scenarios.

The impact of debt on such scenarios will also be explored in order to better describe the impact the required N leach reductions will have on final farm profit.

Conclusions

The Opening Summary lists the important points.

- Sensitivity analysis indicates that the "optimal" resource use and $surplus provided by these farms at current $4.50/kgMS and input prices will prevail until a price of over $7 /kg MS is paid.
- This depends on the production of milk-solids per cow achieved. Higher per cow production and efficient management in terms of cost structures allows better profits and may allow use of BIF at about $7.
- The marginal benefit from BIF even at this price will be small and may not warrant the extra risk and management expertise.
- Emphasis must go back to profitable farming. This will involve efficient resource use which will reduce inputs and in turn reduce detrimental environmental legacies.
- Farmers need reassurance that pasture farming is not difficult but also may not always appear "perfect" in terms of perception of what pastures should look like at all times.

For any "message" to be understood well enough to be implemented requires farmers to participate in, not just "perceive" what is being put forward. The same applies to those who are making rules. Those rules need to be carefully thought through after all avenues of knowledge have been investigated. This may seem to make the conclusions that can then be taken from such work, a simple exercise.

The problem with this however is that often maligned quote offered by Donald Rumsfeld: "There are known knowns. These are things we know that we know. There are known unknowns. That is to say, there are things that we know we don't know. But there are also unknown unknowns. These are things we don't know we don't know". Donald Rumsfeld.

This report has conducted analyses, some simple and some very complex, in order to expand the knowledge on what the outcomes may be from making resource allocation changes to complex systems. However the final analysis relies on Overseer which is a computer model that deals more with 'known knowns' but is used to make decisions on what are still at best known unknowns, but that also include unknown unknowns. The data used within Overseer® is merely an averaged snapshot of what a particular farm system may have resembled at one point in time. The subsequent calculations then rely upon ratios and extrapolations to provide a guide to future outcomes.

The GSL model provides the opportunity to delve deeper into what, how and why each resource contributes to a farm system and to provide a range of outcomes. These outcomes are dependent upon the relationships and resource constraints that may apply. The GSL model itself may choose pathways and resources that simpler input/output model (I/O models) are incapable of detecting. I/O provides a single option whose parameters require to be changed each time a new solution is sought. Even the "optimisation" routine in such models is limited.

The iterations undertaken as the final step Linear Programming by the GSL model ensures the best resource allocation will emerge from the large range of options offered

from the initial data functions. Both specified input and output constraints can be used to ensure logical progression of outcomes towards a specified goal. In this project's case, this was to find the best economic solutions to decreasing N leach.

The GSL model is therefore capable of pushing past perception and providing deeper understanding of what may be possible. This is getting to know what the unknowns may look and perform like. But this still leaves the unknown of how best to firstly present such new concepts and ideas and secondly how to manage our way through that change.

The good news is that New Zealand farming was very close to managing the changes required in the years from 1958 (McMeekan: From Grass to Milk) to about 1986 when the "more production through intensification" wave began.

The past four to five years, management at the Lincoln University Dairy Farm combined with the work by Chris Glassey of DairyNZ should be reviving this simplification; but that work does not yet include the production economics backing to clinch the argument (despite GSL being used to initiate the 2011 changes at LUDF).

Useful references include:

- Pellow, R; Lee, S; Metherell, A; McCallum, R; Moir, J; Roberts, A; Wheeler, D. 2015: Assessing the impact of input choices within Overseer ® (V6) on the modelled N losses to water for Lincoln University Dairy Farm (LUDF) *Occasional Report No. 26.* Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand.
- Glassey, C.B; Roach, C.G.; Lee, J.M; Clark, D.A. 2013: The impact of farming without nitrogen fertiliser for ten years on pasture yield and composition, milksolids production and profitability; a research farmlet comparison. *Proceedings of the New Zealand Grasslands Association* **75**: 71-78.
- Glassey, C.B.; Pinxterhuis, I. 2015: Nutrient Management. Stocking rate: more is not always better. Presentation by DairyNZ., Hamilton, NZ. *Pers comm.*

This report attempts to tie this (economics, implementation, environment) together with an emphasis on reducing N leach at least cost while providing a number of "asides" to examine and explain why many of the current perceptions about production, efficiency and economics are not fallacious. An additional message is that by presuming some of the 'known unknowns', regulations should not be enforcing rules that condemn efficient farmers to relinquish farming while inefficient farmers continue to waste resources.

Appendices

Three graphs to illustrate intensification of pasture systems:

Figure 1 All pasture self contained

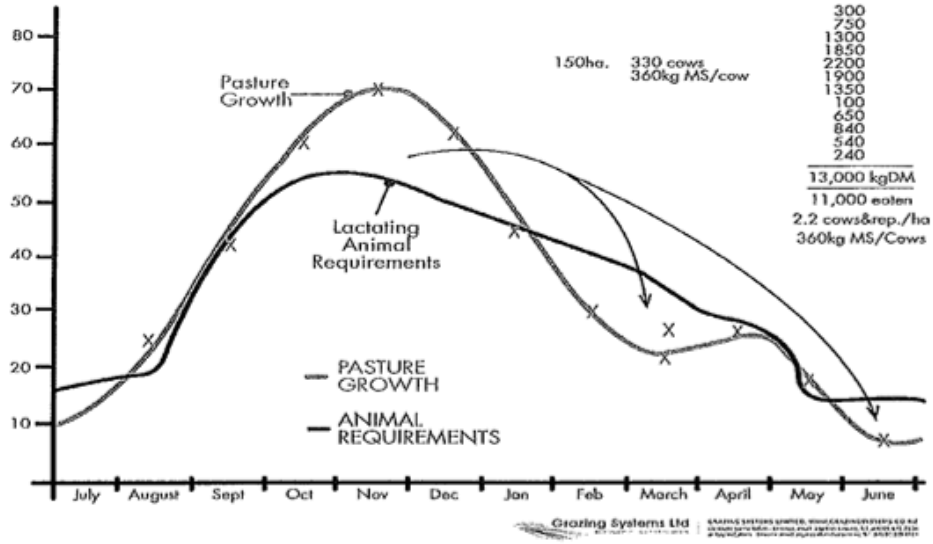


Figure 2 Increased intensification. Now more feed required (blue line) than basic farm pasture growth (green line) can produce so buy in feeds for much of year.

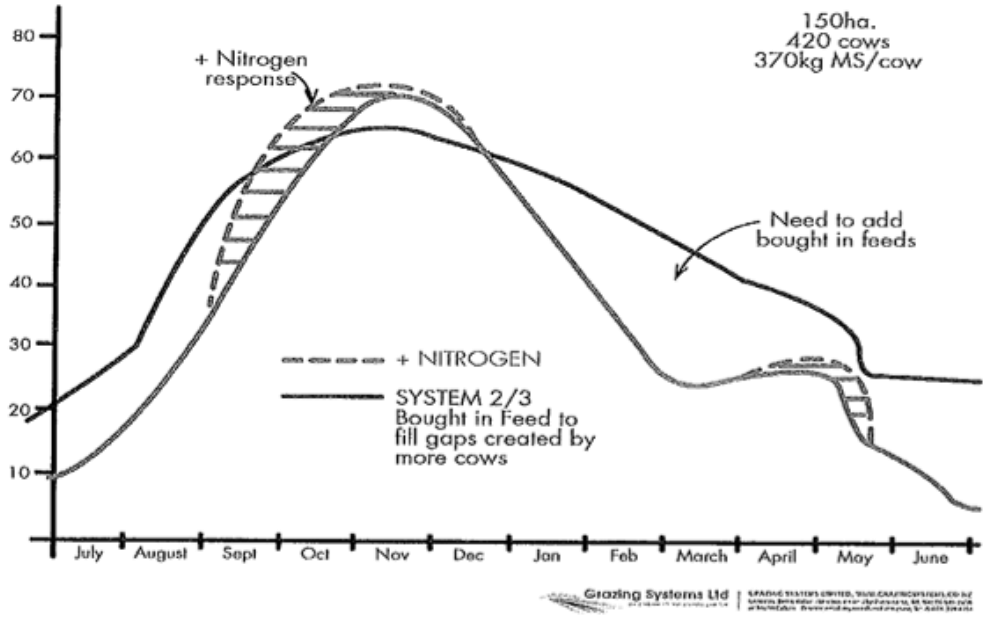
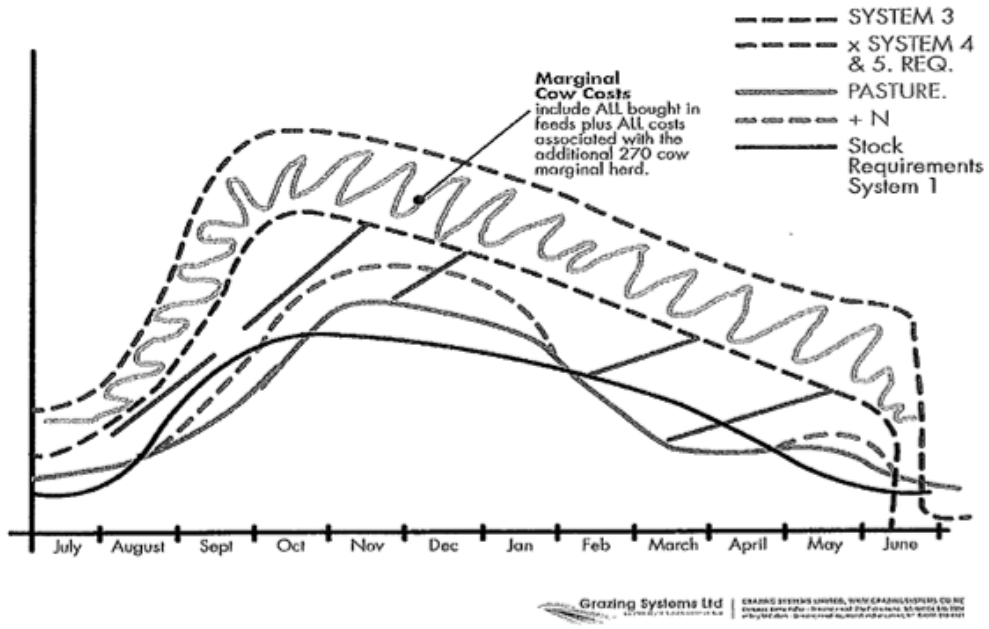


Figure 3 Now intensified and 600 cows at higher MS per cow require bought in feeds (BIF) throughout the full year.



Real costs of BIF (Bought In Feed)

Simple mathematical calculation of true cost of bought-in feed vs pasture.
The important point is to be able to identify when **supplementary feed** (to fill in genuine feed gaps when feed demand is balanced with production required) becomes **bought-in feed** (when additional animals are supported solely from bought-in feed or **BiF**).

1 kg of bought-in feed example:

Most farmers (and many advisors) use the actual purchase price of **BiF** to perform a simple margin over feed cost (MOFC) comparison. This is incorrect. Buy-in cost 28 cents per kg off truck but may be 90% DM (PKE type products and many concentrates), but:

- To feed 1 kg of say 11MJME feed means a cost of 3– 8 cents /kg wet weight depending on where fed (labour, machinery costs), which implies 31-36 cents /kg 'wet weight'.
- Utilised at 85% (higher if barn/feed pad but feed out costs higher as costs of silos, in-shed feeding infrastructure)
- This brings the consumed cost to 36.5 cents/kg wet weight fed.
- At 90% DM, this brings cost per kgDM consumed to **40.5** cents

- BIF substituting for pasture at 11.5 MJME/kgDM requires 6.5% more BIF than pasture.
- This adds another 3 cents to the comparative costs of bought in feed vs. pasture eaten.
- Total cost of about **43 cents/kg pasture equivalent** being substituted.

If this is a true supplement that fills in genuine feed gaps only and meets required production targets, this 43 cents /kgDM cost should now be used for calculations.

However, if there are more cows being run than pasture growth allows, the **additional cows** can be viewed as consuming a complete feed intake of **all BiF** (NB: an optimisation model such as GSL identifies the tipping point where supplements become **BiF**).

If this is the case, the simple calculation takes on another dimension as ALL costs associated with the additional cows must now be attributed to those cows.

- A 400 kgMS cow (quite efficient by NZ standards) with a replacement rate of 25% requires about 6000kg of 11.5 MJME DM to sustain its full herd contribution (Milk + part replacement) each year.
- Simplistically, if all bought in feed is used the feed cost is 6000 x $0.43 = $2,580.
- It may be simple to think that $2,580/400kgMS = $6.45/kgMS price covers this, but this is wrong.
- There are also all the additional costs that are incurred by that additional animal.
- These include not only the feed costs but the costs of rearing a replacement (8 weeks), animal health, AI, proportion of animal management costs (shed, labour) interest costs on actual cow and shares but also added infrastructural costs if enough extra cows are milked to require them.
- These add at least a minimum $500 of additional costs (more with infrastructure) which now requires a $3080/400 kgMS
- Break-even product price is now $7.70 /kgMS but also brings extra risks, stress and requires better management ability.

The tipping point (where marginal costs exceed marginal return) is critical when assessing where to attribute costs. Averages, benchmarks and ratios used in Input/Output (I/O) models cannot identify this tipping point as no marginal analysis is possible because substitution of resources that show negative diminishing marginal values are unable to be identified within the I/O model format.

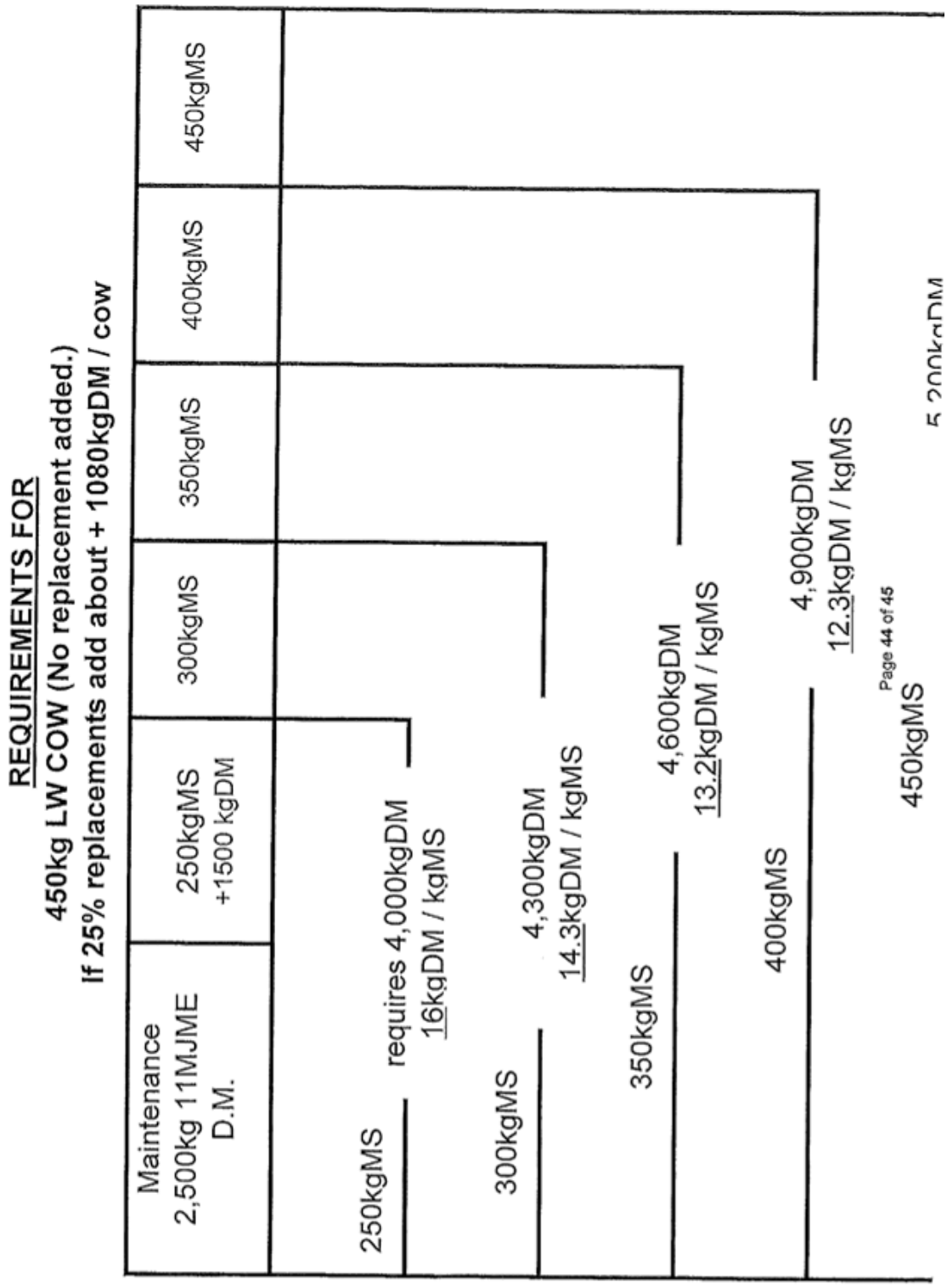
Such costs are averaged equally across all production income in the account structured databases and the costs associated with specific actions are also hidden within all-encompassing accounting "categories" (such as Fuels and Oil; Repairs and Maintenance – Machinery; Dairy Shed, Supplementary Feeds...). This makes any reliance on averages, benchmarks and ratios fraught with misinterpretation and erroneous "causal relationships".

This calculation allows the marginal cost of additional cows to be established. However, this calculation also depends on the kg milk solids per cow. As per cow performance

increases, so the efficiency of feed improves (as less maintenance "fixed cost" feed relative to that used for milk solids ("variable feed".)

In the following diagram, choose the level of per cow production that seems possible for a farm and this will indicate the kgDM required. If ALL this feed is for an additional cow compared to what pasture can supply, use the BiF cost of feed calculation to find the cost of feed to compare with MS produced. If the cow is additional to what the pasture can supply, add per cow costs to this figure to find a milksolid price that must be achieved to breakeven.

Annex N


REQUIREMENTS FOR
450kg LW COW (No replacement added.)
If 25% replacements add about + 1080kgDM / cow
Maintenance
2,500kg 11MJME
D.M.
250kgMS
+1500 kgDM
300kgMS
350kgMS
400kgMS
450kgMS
250kgMS
requires 4,000kgDM
16kgDM / kgMS
300kgMS
4,300kgDM
14.3kgDM / kgMS
350kgMS
4,600kgDM
13.2kgDM / kgMS
400kgMS
4,900kgDM
12.3kgDM / kgMS
450kgMS

An Impact Assessment of One Plan policies and rules on farming systems in the Tararua District and the Manawatu Wanganui Region

26th June 2017

Terry Parminter

Annex O

Title: An Impact Assessment of One Plan policies and rules on farming systems in the Tararua District and the Manawatu Wanganui Region

Date: 26th June 2017

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Annex O

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Contents

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1. Acknowledgements

This report was prepared by Terry Parminter of KapAg Ltd. Most of the farming systems analyses were carried out by Stefan Bryant of BakerAg and Scott Ridsdale of RD Consulting. The report would not have been possible without their hard work.

Fergus Rutherford of BakerAg provided advice on property valuation.

Lynette Baish, Helene Lowe and Ian McNabb at Horizons provided client support and feedback for the report. They made it very much a team effort.

Katie Bicknell, lecturer in applied econometrics at Lincoln University, has checked the report to ensure that the appropriate methods for this analysis have been applied.

Despite my very heart-felt appreciation for the above people, they are in no way responsible for the opinions expressed in this report. I take full responsibility for its contents.

2. A Guide for Readers

This report has been prepared for the Councillors of the Manawatu-Wanganui Regional Council and for the staff working with them in policy development for the One Plan. The report may also help to inform discussions between the Council and industry and environmental groups. It will have done its job if this report helps makes Council's decisions easier and not harder.

In this report I have focussed on the financial implications to farmers of changes in the consenting process. For that reason the report describes its results at the farm scale. They have not yet been multiplied up to the whole of the catchment or the region, although that is possible at some stage in the future. I have not addressed the cultural outcomes, environmental outcomes and the needs of other social groups that might be described in other work.

After the summary and introduction, the next section of the report describes its purpose and how I went about responding to that. You may prefer to go straight to the results section and that should be able to be read without referring to any of the other chapters. The farm data is difficult to present clearly. I expect that if you have a lot of farming experience, that I have not provided enough information and if you have no farming knowledge, there may not be quite enough.

After the results section there is a discussion and conclusions section. Like the results section this is intended for you to be able to jump straight in and read from here. There are no recommendations in the discussion. Like this report, it is intended to be informative rather than directive. I have included a graph in here summarising the results to save people having to flick back to the results section. The last chapter is about the assumptions and limitations and ways in which this report could be improved still further.

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3. Executive Summary

This report has been prepared for the Councillors of the Manawatu-Wanganui Regional Council and for the staff working with them on policy implementation and a review of the One Plan. In this report I have focussed on the financial implications to farmers of meeting the requirements of the intensive farming land use provisions in the One Plan following the Regional Council's response to a recent declaration by the Environment Court specifying opportunities for improvement. For that reason the report describes its results at the farm scale. They have not yet been multiplied up to the whole of the catchment or the region, although that will be possible at some stage in the future.

The purpose of this report is to "calculate the costs associated with applications for intensive land use activities and the economic impact of mitigations to reduce nitrogen leaching likely to be incurred as a result of the recommended improvements in the consenting process." It is a small-scale study of on-farm economic impacts associated with Council's intensive land use consenting and policy framework. It is intended to provide information to Council staff implementing and reviewing the existing rules and policies in the One Plan. For the latter, further work at a catchment and regional scale will be needed.

The author responded to the project brief by focussing on four dairy farms in the Tararua District and two arable farm systems in the Rangitikei District. These farming systems have been described and mitigations applied to achieve the standards in Table 14.2 and Table E2 of the One Plan. Appendix A of this report includes a copy of Table 14.2 . The costs of applying for the modified landuse consents have also been calculated. Taken together these form the basis of the discussion and conclusions towards the end of the report.

To determine the costs to individual farmers of obtaining and implementing their landuse consents, a farm management approach was taken in this report. This approach involved considering the operation of specific farming systems and attaching costs and returns to each of those operations. These costs and returns are then accumulated into an operational profit. The operational profit of farms before and after they have obtained a landuse consent is the main method used to show its economic impact. Some of the mitigations involve significant capital investments. These changes are evaluated in this report by calculating the return on capital on the farms before and after the mitigations have been introduced. The farms each have a calculated capital value and some commentary is provided on how that might be affected on farms that have been modified like these.

The process that was used involved selecting suitable farm systems, determining the changes needed in those systems for them to apply to the Council for a consent, and then evaluating the costs of introducing those changes. The farms were not existing farms. Instead each model farm was created around a particular farm system. The models were synthesised from many different farms known to exist in the region and adjusted to represent dairy farming systems that can be found in the Tararua District and arable farms in the Rangitikei District. These districts were selected because that is where most of the unconsented farms can be found.

The farm management changes between the base farms and the adjusted farms will require many farmers to grow their capability in managing pasture cover and pasture quality. The costs of a change in capability has not been included in this analysis.

The analytical results that were used were:

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Farm Model: Self-contained dairy farm

This farm model has all the heifers grazed off the farm for 12 months from 9 months of age. It assumes that there has already been some adjustment to reducing its environmental footprint by grazing half the dairy cows off the farm over winter. Regular soil tests are taken and maintenance phosphate fertiliser is applied. A summer forage crop of turnips is grown to manage a possible risk of a dry summer. On average 30kg N/ha is applied in early spring and autumn to extend pasture production in those seasons.

To meet Table 14.2 in the One Plan, the farm has to reduce the number of dairy cows from 270 to 140 animals. It can no longer apply nitrogen fertiliser and must stop all cropping. The farm is expected to no longer bring in feed supplements for the cows. Instead it harvests 288 tonnes of pasture DM and sells most of this off the farm. The sale of surplus feed is a very important part of pasture management on this farm because animal consumption has dropped to almost 6,000 kgDM/ha/yr. Without harvesting surplus feed, the quality of the pasture would fall and in a few years pasture composition would suffer.

The farm started with leaching 32 kgN/ha and was modified to be leaching only 18 kgN/ha, a reduction of 44%. These changes reduced the expected farm profit from $1,627/ha to $629/ha, a drop of over 60%. The return on assets dropped from 5.3% to 2.0%.

The self-contained farm model has had to reduce its labour but it has surplus pasture available for alternative landuses, and therefore its adaptability might increase overall. Nitrogen conversion efficiency has increased to 66% and so it can be expected to be more sustainable in its use of natural resources. However, its profitability is not enough to support the level of debt found on many farms in this region. The return on assets is insufficient to attract off-farm investment, should that be required for future improvements. Unless farms like this have less than half the amount of debt as the model farm, they will not survive the changes required to address Table 14.2 .

Farm Model: Low-intensity dairy farm

The low-intensity dairy farm is very common in the Tararua District and in the region generally. In this model there are more cows and they have greater production than the self-contained farm. On this farm there is more supplementary feed (260 tonnes DM) brought onto the farm and greater use is made of cropping in both winter and summer. Over the whole farm more than 100 kgN/ha is applied, mainly to lengthen the grass growing season in spring and autumn.

To meet Table 14.2 in the One Plan, the farm has to reduce the number of cows from 400 to 250 animals. They will also need to reduce nitrogen fertiliser applications toan average of 5 kgN/ha/yr and stop importing supplementary feed and growing a winter crop. The summer crop remains, and 443 tonnes of DM are conserved. Three quarters of the conserved feed is sold off the farm to maintain pasture quality.

The farm started with leaching 42 kgN/ha and was modified to be leaching only 17 kgN/ha, a drop of 60%. These changes reduced the expected farm profit from $1,848/ha to $1,064/ha, a drop of over 40%. The return on assets dropped from 6.4% to 3.7%.

The low intensity farm model has not reduced its labour and it has surplus pasture available for alternative landuses. It's adaptability might increase overall. Nitrogen conversion efficiency has

increased to 56% and so it can be expected to be more sustainable in its use of natural resources. However, its profitability is not enough to pay tax and support the level of debt found on many farms in this region. The return on assets is insufficient to attract off-farm investment, should that be required for future improvements. Unless farms like this can reduce the amount of debt below that of the model farm they will not survive the changes required to address Table 14.2 .

Farm Model: Moderate-intensity dairy farm

This farm has 600 cows and achieves high production. The farm imports 757 tonnes DM, grows winter and summer crops and applies an annual application of over 150 kgN/ha.

To achieve Table 14.2 in the One Plan this farm has a covered barn installed for all the cows so that they can be housed all year. Although inside for much of the time, the cows are grazed outside for fixed periods throughout the year – 8 hours per day while lactating and 2 hours per day over winter. The farm imports the same amount of supplementary feed as it did previously and harvests another 38 tonne of supplements to maintain production. Dairy effluent is applied across the whole of the milking platform and nitrogen fertiliser applications reduced to 50 kgN/ha.

The farm started with leaching 54 kgN/ha and was modified to be leaching only 17 kgN/ha, a drop of almost 70%. These changes reduced the expected farm profit from $2,283 /ha to $1,745/ha, a drop of almost 25%. The return on assets dropped from 7.0% to 5.0%.

The moderate intensity farm model has not reduced its labour but it has had to increase its overall pasture utilisation. Its adaptability might therefore decrease overall. Nitrogen conversion efficiency only increases slightly to 27% and so there is not much improvement expected in the sustainable use of natural resources. However, the profitability of this farm is sufficient to support its expected level of debt and it has sufficient return on assets to provide financial security for its owners.

Farm Model: Irrigated high-intensity farm

The irrigated high intensity dairy farm in the base model has 640 cows and has a centre pivot irrigator and a feed pad. The farm imports 757 tones DM per year as a supplement or 1,180 kgDM/cow. It uses 187 kgN/ha of nitrogen a year.

To meet the requirements of Table 14.2 in the One Plan this farm has built housing for the cows so that they can be kept inside all year. The farm already had a feed pad and so the effluent system for housing the animals was already in place. While they are lactating, the cows are grazed outside for up to 8 hours per day. The amount of imported supplements on this farm is increased to 1,170 tonnes DM and 22 tonnes of supplements are made on the farm.

The farm started with leaching 64 kgN/ha and was modified to be leaching only 17 kgN/ha, a drop of over 70%. These changes reduced the expected farm profit from $2,456/ha to $1,850/ha, a drop of 25%. The return on assets dropped from 6.8% to 4.8%.

The irrigated high intensity farm model has not reduced its labour but it has had to increase its overall pasture utilisation. Its adaptability might therefore decrease overall. Nitrogen conversion efficiency only increases slightly to 28% and so there is not much improvement expected in the sustainable use of natural resources. However, the profitability of this farm is sufficient to support its expected level of debt and it has sufficient return on assets to provide financial security for its owners.

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Farm Model: Arable farm with livestock

Both the arable farms are larger than the typical farms to be found in the Manawatu. Making them larger makes it easier to compare these farms with the dairy farms that have a similar size. This farm specialises in grain production over summer. It has been able to do that without irrigation. Half of the farm is used for growing barley and in winter it has been growing ryegrass for finishing livestock. The farm finishes lambs and heavy cattle over a 12 month period. Over the year 150 kgN/ha is applied to the cropping area or an average of 60 kgN/ha across the whole farm.

The changes required to meet Table 14.2 in the One Plan are to dispose of all the livestock and harvest as silage and hay the permanent pasture and ryegrass green crop. The area in barley had to be reduced from 100ha to 70 ha. Over a whole year 1,399 tonnes of pasture dry matter was made and exported from the farm.

The farm started with leaching 39 kgN/ha and was modified to be leaching only 24 kgN/ha, a drop of almost 40%. These changes decreased the expected farm profit from $915/ha to $477/ha, a decrease of 47%. The return on assets dropped from 2.6% to 1.3%.

The arable with livestock farm model has not reduced its labour but it has become dependent on the supplementary feed market. Its adaptability might therefore decrease overall. Nitrogen conversion efficiency has increased to 89% and so natural resource sustainability has also increased. The profitability of this arable farm is insufficient to support its expected level of debt and it has insufficient return on assets to provide much financial security for its owners.

Farm Model: Arable farm with potatoes

This model farm was again large for a cropping farm. This time there were no livestock and instead two different rotations were modelled. The second rotation of potatoes and brussels sprouts required a total application of 428 kgN/ha over a year. The other rotation of maize silage and winter oats for forage only needed 110 kgN/ha. Irrigation was used over summer on the potato crop and 500mm/yr was used.

The changes required for meeting Table 14.2 in the One Plan included reducing the amount of nitrogen fertiliser going on to the potato rotation (332 kgN/ha) and better timing fertiliser applications to align with crop requirements. A new rotation growing barley for grain was introduced to replace some of the area originally in a high nitrogen feeding crop (potatoes). To reduce drainage from excess irrigation a moisture probe was installed and a water budget put in place. This reduced the amount of water needed to 380mm/yr.

The farm started with leaching 60 kgN/ha and was modified to be leaching only 25 kgN/ha, a drop of almost 60%. These changes reduced the expected farm profit from $3,192/ha to $1,152/ha, a drop of over 64%. The return on assets dropped from 8.2% to 3.0%.

The arable with potato farm model has some reduction in casual labour and it has had to increase the range of crops being grown. Its adaptability might therefore increase overall. Nitrogen conversion efficiency has increased to 94%, a big improvement in the sustainable use of its natural resources. However, the profitability of this farm is insufficient to support its expected level of debt and it has insufficient return on assets to provide financial security for its owners.

Annex O

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Costs of Consents

There are expected to be four consent application pathways for farmers:

- An existing farm may already be able to meet the conditions and standards of a controlled activity in the One Plan. That means that it can show that it will be able to meet the cumulative nitrogen leaching maximum in Table 14.2 of the One Plan and has appropriate mitigation of waterway contamination from phosphorus, sediment, and E.coli. The application will need to provide enough evidence from Overseer® to support the Council approving a controlled consent. The main costs will be for an agricultural consultant to describe the existing farm system and carry out a standard AEE. This should show that the farming business can operate within the effects anticipated by the One Plan with effects less than minor. The total cost for a consent application is likely to be about $10,600.

- Some existing farms may be able to meet the leaching caps in Table 14.2 of the One Plan and mitigate any potential waterway contamination from phosphorus, sediment, and E.coli but their mitigations cannot be calculated using Overseer. These will require extra preparation work to quantify the benefits of these mitigations. Such farms will need to apply for a restricted discretionary consent that shows calculations of the effectiveness of their mitigations. Generally the size of the benefits from these mitigations will be quite site specific and so information about the site as well as the mitigation will need to be provided. For example, the use of high carbon ditches to intercept nitrogen leaching will depend on the hydrology of the site. An agricultural consultant working with a farmer can provide the Council with this information with the support of industry scientists. The total cost for a consent application is likely to be about $13,900.

- Farms that can meet the nitrogen leaching caps in Table 14.2 within four years will need to address through their AEE the effects of the four year delay in meeting the Table. The additional costs for these farmers are generated from needing the advice of a professional ecologist and obtaining information from the Council about the cumulative effects for the catchment. The total cost for a consent application is likely to be about $13,800.

- The farms that are not anticipated to meet the nitrogen caps in Table 14.2 will need to apply for a restricted discretionary consent and prepare a very robust AEE. They will need to employ technical expertise to show that their effects on the environment are less than minor. The total cost for a consent application is likely to be about $21,000. It is probable that these applications could be publically notified and an additional deposit for this will need to be made to Horizons. The deposit may be around $8,000 in addition to these costs.

These costs could easily vary by 20% either up or down depending upon the complexity of the work involved.

Adaptability, Sustainability and Viability

The model farm systems are changed significantly in order to meet the criteria for consents in the One Plan. The self-contained dairy farm, the low intensity dairy farm and the arable farm with potatoes might become more adaptable as a result of these changes. All of the model farms improved their efficiency of nitrogen use for production. They might therefore be considered to have become more sustainable production systems.

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However, all of the model farms became less profitable as a result of introducing the mitigations necessary to comply with the conditions in the One Plan. The self-contained dairy farm and the low intensity dairy farm do not have sufficient profit to remain viable at typical industry levels of debt. All the model farms returned less than 5% on assets except for the moderate intensity dairy farm (ROA=5%). Therefore, all their owners now lack future financial security from their investment in these farming businesses. The reduced profitability is likely to result in a downward pressure on the future property values for these farms.

4. Introduction

This report and the work described, was produced at the request of the Manawatu Wanganui Regional Council (Horizons). A summary of the brief for this work is provided in Appendix A.

The One Plan for managing all the natural resources in the Manawatu Wanganui Region became fully operational in 2012. It was called the One Plan because it combined the previous regional policy statement (RPS) and the regional plan (RP) in one document. There are two chapters relating to the management of freshwater in the region. Chapter five has the objectives and policies for water quality to achieve the values and standards in Schedule B, Table 1 and Schedule E, Table 2. It could be considered the RPS part of the plan. Chapter 14 has the policies and rules relating to discharges to land and water. It is the RP part of the plan. The One Plan sets out a framework for managing water quality in fresh water and seeks to control the effects of both point source and non-point source discharges to maintain good water quality and enhance poor water quality. Through the One Plan, intensive farming land users require resource consents in the targeted water management sub-zones identified in the Plan.

Landuse consents for dairy and arable farms consider four main risk areas from non-point sources affecting waterways. These are: nitrogen losses, phosphorus losses, sediment and pathogens (e.g. E.coli). The latter three are managed through the adoption of good management practices. and nitrogen losses are managed through the cumulative nitrogen leaching maximums set out in Table 14.2. Applicants for land use consents use the Overseer software package and farm system inputs to model on-farm nitrogen leaching loads and determine their activity status for the consenting process.

Dairy and arable farmers have been applying to Horizons for landuse consents to continue their existing or establish new farming activities in the region. Horizon's consenting process was challenged in the Environment Court earlier this year and their decision identified some opportunities for improving Horizon's processes. Changes to the consenting processes are likely to have economic implications for applicants and Horizon's intends to quantify these as much as possible.

This report was commissioned in June 2017 to "calculate the costs associated with applications for intensive land use activities and the economic impact of mitigations to reduce nitrogen leaching likely to be incurred as a result of the recommended improvements in the consenting process." A summary of the project brief is provided in Appendix A.

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The author responded to the project brief by focussing on four dairy and two arable farm systems. These farming systems have been described and mitigations applied to achieve the standards in Table 14.2 and Table E2. The costs of applying for the modified landuse consents have also been calculated. Taken together these form the basis of the discussion and conclusions towards the end of the report.

In order to progress this report in the time available some assumptions have had to be made and these are described in the penultimate chapter. There are some limitations to the report, particularly if its results are being applied outside the original brief. Finally, in the last chapter there is some further reading to assist those readers that want to examine further the principles behind this study.

5. Purpose

Natural resource management in the Manawatu Wanganui Region requires both voluntary efforts by land owners and their compliance with the policies and rules contained in the One Plan. The policies and rules in the One Plan are intended to achieve natural resource improvements benefiting the values of all people in the region. Achieving these improvements now and in the future requires time, effort and resources. Farmers will face new and additional costs in order to mitigate the impact on waterways of their farming activities.

The purpose of this report is to "calculate the costs associated with applications for intensive land use activities and the economic impact of mitigations to reduce nitrogen leaching likely to be incurred as a result of the recommended improvements in the consenting process." It is a small-scale study of on-farm economic impacts associated with Council's intensive land use consenting and policy framework and it is intended to provide information to Council staff considering implementation of the existing rules and policies; and preparing for future One Plan development. For the latter, further work at a catchment and regional scale will be needed. A summary of the project brief is included in Appendix B.

6. Problem Solving Approach

To determine the costs to individual farmers of obtaining and implementing their landuse consents, a farm management approach was taken in this report. This approach involved considering the operation of specific farming systems and attaching costs and returns to each of those operations. These costs and returns are then accumulated into an operational profit. The operational profit of farms before and after they have obtained a landuse consent is the main method used in this report to show its economic impact. Some of the mitigations involve significant capital investments. These changes are evaluated by calculating the return on capital on the farms before and after the mitigations have been introduced. The farms each have a calculated capital value and some commentary is provided on how that might be affected on farms that have been modified like these to achieve Table 14.2 in the One Plan.

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The problem solving approach used here involved selecting suitable farm systems, determining the changes needed in those systems for them to apply to the Council for a consent, and then evaluating the costs of introducing those changes. The farms were not existing farms. Instead each model farm was created around a particular farm system. The models were synthesised from many different farms known to exist in the region and adjusted to represent farming systems that can be found in the Tararua and Rangitikei Districts. These districts were selected because that is where most of the remaining unconsented farms can be found for dairying and cropping respectively.

Four dairy farm systems were selected to reflect the different farm systems to be found in the Tararua District. The dairy farms were standardised for land area, rainfall and soil types. Each farm was then adjusted to reflect the differences in farm system and matched to the expected nitrogen loss rate.

The analysis followed the following steps for each dairy farm:

(i). The base farm was established in Overseer®, compared to the initial specifications and modified if necessary to better fit these.
(ii). The farm was entered into Farmax® and the stock reconciliation checked and the supplementary feed inventory checked.
(iii). Any changes in Overseer as a result of the Farmax exercise were made.
(iv). The farm's operational profit and loss account was finalised to provide the base farm information summarised in the results section.
(v). The farm in Overseer was modified until it could achieve the nitrogen loss profile in year 20 of Table 14.2
(vi). The modified farm was again checked in Farmax.
(vii). Any consequential changes in Overseer were made.
(viii). The farm's new operational account was finalised and compared to the base farm account
(ix). Return on capital was calculated.

The two cropping farm systems were processed in a similar way to the four dairy farms.

The analyses have included considerable changes in the way that farming – both dairy and arable will need to be done in the future. The adjustments require growing farming capability and building new expertise amongst the professionals advising them. The structures and costs of human development have not been addressed in these analyses.

In this report the initial state of each of the farming businesses has been compared with those same farming businesses in year 20 of Table 14.2. At the end of year 20 each of the farms would be fully compliant with the intensive land use rules in the One Plan. Between year 1 and year 20 in Table 14.2 the model farms would need to step down their nitrogen leaching by almost 25%. However, due to the length of time involved, on many farms, the completion of this transition process is likely to occur after there have also been changes in farm ownership. The uncertainty of the transition is increased by a possible plan review of the One Plan during that time and structural adjustments in the market to accommodate the adaptations required in farming systems.

Annex O

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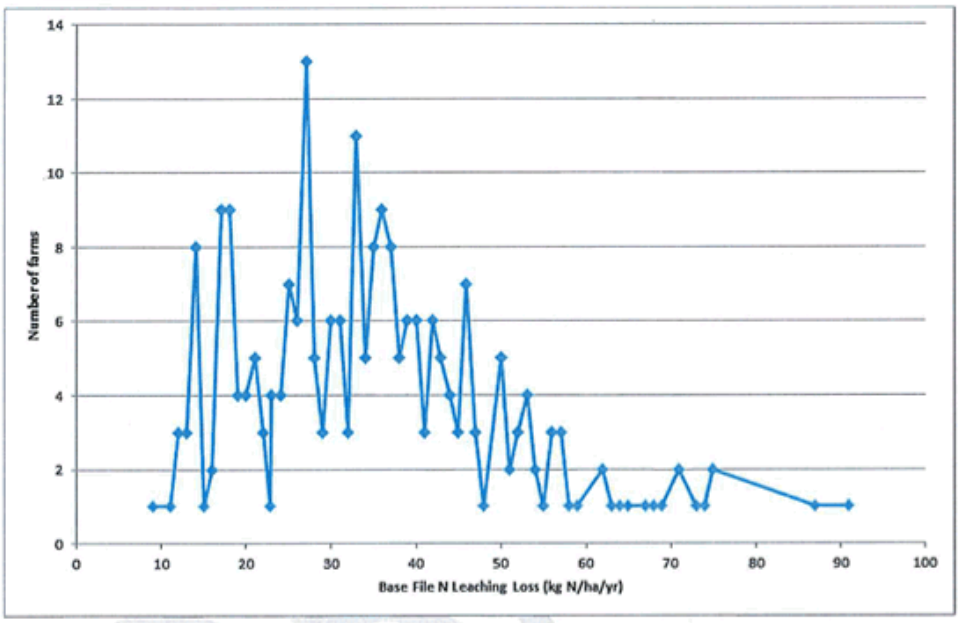
7. Results

7.1 Farming Systems

There were no figures from industry available to guide the development of representative dairy farms in the region. However, Horizons were able to provide a chart of base file nitrogen losses found in the region and this was used to guide the development of the model farms (Figure 1).

Figure 1. Base file nitrogen leaching of resource consents currently granted in the Horizons region.



The data below 20 kgN/ha in Figure 1 are likely to be from specialist dairy farms or discrete parcels of land on part-farm's that required consenting rather than whole-farms. The figures above 60 kgN/ha are likely to be from high-input farms in high rainfall areas and on soils with a propensity for high nitrate leaching.

Farm consultant's in the region work with a range of farm systems, from low intensity to high intensity systems. For this study, different dairy farm systems were matched with the likely nitrogen loss rates to be found in Tararua District (Table 1). The table highlights that only four combinations of farm systems and nitrogen losses were selected in this study. However they are spread out across the table. Although other combinations of farm systems and nitrogen loss rates might be possible in the region it was hoped that their results could be approximated using the results of this study.

The two arable farms were modelled as farms similar in size to the dairy farms (200 ha). One arable farm included livestock as a significant source of its nitrogen losses, the other arable farm had no livestock but did have potatoes and brussels sprouts as the most significant sources of its nitrogen losses.

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Table 1. Selected dairy farm systems and their associated nitrogen loss rates

Expected Annual Nitrogen Loss (kgN/ha)	Dairy System			
	Type 1-2 System	Type 2-3 System	Type 3-4 System	Type 3-4 System
30 kgN/ha	Self-contained			
40 kgN/ha		Low intensity		
50 kgN/ha			Moderate intensity	
70 kgN/ha				Irrigated

The non-irrigated Tararua dairy farms shared the same soil types and had an annual average rainfall of 1200-1300mm. The irrigated dairy farm was modelled in a slightly drier area in the Tararua District. It had an average annual rainfall 100mm lower than the other dairy farms, and used irrigation to add an additional 600mm. The three most intensive farm models included runoffs for grazing replacement animals and wintering non-lactating (dry) cows. The runoffs were also sometimes used for cropping and making surplus grass into supplementary feed. The self-contained farm had no runoff. In Table 14.2 the dairy farms all had the same mix of land classes. The milking platforms were: LUC II (20%), LUC III (65%) and LUC IV (15%). The runoffs were: LUC III (40%) and LUC IV (60%). The dairy farms had to operate inside a leaching cap by year 20 of 18 kgN/ha per year.

The Rangitikei arable farms were both on the same soil type in an area receiving about 900mm annual rainfall. The arable farm with irrigation added a further 500mm/ha. In Table 14.2 the cropping farms each operated on LUC II with a leaching cap in year 20 of 21 kgN/ha.

There were no farms modelled that in their initial state could reach Table 14.2 in the One Plan without making some changes to their farming practices. The expected trajectory in nitrogen leaching loss of the farms modelled is shown in Figure 2. In the Figure all the dairy farm models have to be leaching below 24 kgN/ha by year 1, and the arable farms below 27 kgN/ha. By year 20 the dairy farms have to be below 18 kgN/ha and the arable farms below 21 kgN/ha. The modelled dairy farms in Tararua District had to reduce their nitrogen leaching to between 60-25% of their current leaching. The modelled arable farms in the Rangitikei District had to reduce their nitrogen leaching to 50-35% of their current leaching.

In the next section a one page summary of each of the farms is provided before their farm systems have been modified to achieve the expected results in Table 14.2. The summary of each farm is divided into four sections. At the top is a description of the farm infrastructure and soils. This includes the amount of maintenance fertiliser required annually that has been calculated by Overseer.

The next sections are labelled "herd" and "pasture and feed". For each farm the balance between feed supply and animal requirements has been checked in Farmax to ensure that it is a feasible farming system and that it is in a stable equilibrium.

The "nutrients" section of each farm summary provides results from the nutrient budget in Overseer. This includes both nitrogen losses to water (mainly as leaching) and phosphorus losses to water (mainly as runoff).

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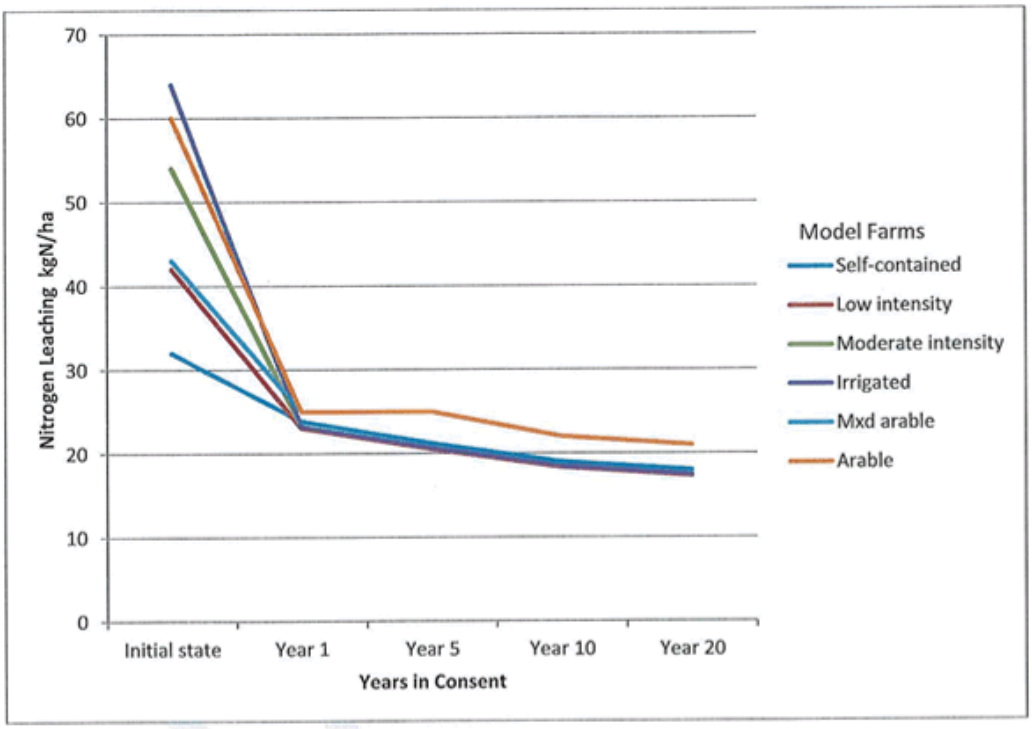
The final section in the summary addresses the operational profit for each of the farms. See Appendix E for some of the financial assumptions applied in this analysis. Each dairy farm has milk and livestock income. They have fixed farm overheads such as repairs and maintenance, land costs such as weed spraying, and livestock costs such as animal health.

The depreciation costs for plant and machinery, and the costs of labour and drawings are all in the fixed farm overheads. The farmers' operational profits are what they use to reinvest in the farm and to repay mortgages and loans.

Figure 2. The nitrogen-loss trajectory of all the models in this study



The farm's return on assets (ROA) indicates how much better (or worse) the farm might be if it is compared with selling the farm and investing the money in an alternative business. Even money in the bank can return around 5% to its investor and most of the farms started out in this study earning their owners above that amount.

The arable farm models have profiles that have similar information to the dairy farms except that the description of the cropping rotations has also been included.

Annex O

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7.2 Base-line Farm Results

PRODUCTION SYSTEM	Self-Contained			
INFRASTRUCTURE				
Farm Area	125 ha	Milking platform	120 ha	
Feedpad	N/A	Effluent system and area	Sump, to pond and travelling irrigator	17 ha
		Irrigation system	N/A	
Soils	Dannevirke SL	Flat	Fert (PKS): 32.38.07	102 ha
	Matamau SL	Rolling	Fert (PKS): 29.51.20	18 ha
HERD				
270 cows	59 replacements (grazed off for 12 months from 9 months of age)	Cow wintering	Half the herd for 2 months	
86,163 kgMS	718 kgMS/ha MP	319 kg MS/cow		
PASTURE AND FEED				
Pasture eaten (Overseer)		10,010 kgDM/ha/yr		
Imported feed		23 T DM		
Winter forage crop		N/A		
Summer forage crop		6 ha	Crop - Turnips	10 T/ha yield
Imported feed and grazing off as a percentage of the total feed offered		21%		
NUTRIENTS				
Clover nitrogen	136 kg/ha	Other nitrogen	5 kg/ha	
Imported nitrogen	30 kg/ha	Available nitrogen	171 kg/ha	
Surplus nitrogen	119kg/ha	Nitrogen conversion efficiency	29 %	
Lost nitrogen to water	32 kg/ha	Phosphorus losses	0.6 kg/ha	
OPERATIONAL PROFIT				
Farm fixed overheads	$151,230	Milk income	$551,444	
Land operational costs	$96,605	Livestock income	$25,822	
Livestock & feed costs	$135,284	Operational profit	$195,291	
Farm working expenses	$4.45/kgMS	Per eff. hectare	$1,627	
		Per cow	$723	
Capital Value (total assets)	$3,685,428	Return on assets	5.3%	

26/06/2017 18

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PRODUCTION SYSTEM		Low Intensity		
INFRASTRUCTURE				
Farm Area	210 ha			
Milking platform	150 ha	Irrigation system and area	N/A	
Runoff	50 ha	Effluent system and area	Sump, to pond and travelling irrigator	25 ha
Soils	Dannevirke SL	Flat	Fert (PKS): 27.22.06	127.5 ha
	Kopua SL	Flat	Fert (PKS): 26.31.10	20 ha
	Matamau SL	Rolling	Fert (PKS): 25.33.15	52.5 ha
HERD				
400 cows	91 replacements grazed on runoff from weaning until 23 months		Cow wintering	Half herd on MP, half herd on RO on crop
144,312 kgMS	962 kgMS/ha MP		361 kg MS/cow	
PASTURE AND FEED				
Pasture eaten (Overseer)			10,644 kgDM/ha/yr	
Pasture conserved			50 T DM	
Imported feed T DM			260 T DM	
Winter forage crop			9 ha	Kale	12 T DM/ha yield
Summer forage crop			9 ha	Turnips	10 T DM/ha yield
Imported feed and grazing off as a percentage of the total feed offered			13.2%	
NUTRIENTS				
Clover nitrogen	93 kg/ha		Other nitrogen	28 kg/ha
Imported nitrogen	101 kg/ha		Available nitrogen	222 kg/ha
Surplus nitrogen	171kg/ha		Nitrogen conversion efficiency	23 %
Lost nitrogen to water	42 kg/ha		Phosphorus losses	0.7 kg/ha
OPERATIONAL PROFIT				
Farm fixed overheads	$228,250		Milk income	$923,595
Land operational costs	$184,957		Livestock income	$40,350
Livestock costs	$180,971		Operational profit	$369,682
Farm Working Expenses	$4.12/kgMS		Per eff. hectare	$1,848
			Per cow	$936
Capital Value (total assets)	$5,810,922		Return on assets	6.4%

26/06/2017

19

Annex O

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PRODUCTION SYSTEM		Moderate Intensity		
INFRASTRUCTURE				
Farm Area	262 ha	Milking platform (MP)	200 ha	
		Runoff (RO)	50 ha	
Feedpad	N/A	Effluent system and area	Sump, to pond and travelling irrigator	42 ha
		Irrigation system and area	N/A	
Soil Type	Dannevirke SL	Flat	Fert (PKS): 24.05.03	170 ha
	Kopua SL	Flat	Fert (PKS): 24.25.08	20 ha
	Matamau SL	Rolling	Fert (PKS): 25.30.16	60 ha
HERD				
600 cows	136 calves grazing on the runoff from weaning with half grazed off for a further 12 months of age from 11 months old.		Cow wintering	Half herd on MP, half herd on RO on crop
240,677 kgMS	1203 kgMS/ha MP		401 kg MS/cow	
PASTURE AND FEED				
Pasture eaten (Overseer)	11,753 kgDM/ha/yr			
Pasture conserved	30 T DM			
Imported feed T DM	757 T DM			
Winter forage crop	14 ha	Kale	12 T DM/ha yield	
Summer forage crop	14 ha	Turnips	10 T DM/ha yield	
Imported feed and grazing off as a percentage of the total feed offered	26%			
NUTRIENTS				
Clover nitrogen	72 kg/ha	Other nitrogen	65 kg/ha	
Imported nitrogen	151 kg/ha	Available nitrogen	288 kg/ha	
Surplus nitrogen	222 kg/ha	Nitrogen conversion efficiency	23 %	
Lost nitrogen to water	54 kg/ha	Phosphorus losses	0.7 kg/ha	
OPERATIONAL PROFIT				
Farm fixed overheads	$396,050	Milk income	$1,540,331	
Land operational costs	$243,751	Livestock income	$64,011	
Livestock costs	$393,708	Operational profit	$570,834	
Farm Working Expenses	$4.29/kgMS	Per eff. hectare	$2,283	
		Per cow	$951	
Capital Value (total assets)	$8,183,862	Return on assets	7.0%	

26/06/2017 20

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PRODUCTION SYSTEM		High Intensity with Irrigation		
INFRASTRUCTURE				
Farm Area	210 ha	Milking platform (MP)	150 ha	
		Runoff (RO)	50 ha	
Feedpad	Yes	Effluent system and area	Sump, to pond and travelling irrigator.	90 ha
		Irrigation system and area	Centre pivot	80 ha
Soils	Dannevirke SL	Flat	Fert (PKS): 24.14.00	170 ha
	Kopua SL	Flat	Fert (PKS): 23.15.07	20 ha
	Matamau SL	Rolling	Fert (PKS): 28.47.18	60 ha
HERD				
640 cows	145 calves grazing on the runoff from weaning with half grazed off for a further 12 months of age from 11 months old.		Cows wintered off	Half herd on MP, half herd on RO on crop
281,376 kgMS	1407 kgMS/ha MP		440 kg MS/cow	
PASTURE AND FEED (Milking platform)				
Pasture eaten (Overseer)	13,103 kgDM/ha/yr			
Pasture Conserved	38 T DM			
Imported feed T DM	757 T DM			
Winter forage crop	15 ha	Kale	12 T DM/ha yield	
Summer forage crop	15 ha	Turnips	10 T DM/ha yield	
Imported feed and grazing off as a percentage of the total feed offered	29%			
NUTRIENTS				
Clover nitrogen	63 kg/ha	Other nitrogen	73 kg/ha	
Imported nitrogen	187 kg/ha	Available nitrogen	323 kg/ha	
Surplus nitrogen	247 kg/ha	Nitrogen conversion efficiency	24 %	
Lost nitrogen to water	64 kg/ha	Phosphorus losses	0.8 kg/ha	
OPERATIONAL PROFIT				
Farm fixed overheads	$473,350	Milk income	$1,800,806	
Land operational costs	$280,322	Livestock income	$72,250	
Livestock costs	$505,504	Operational profit	$613,881	
Farm Working Expenses	$4.48/kgMS	Per eff. hectare	$2,456	
		Per cow	$959	
Capital Value (total assets)	$9,053,006	Return on assets	6.78%	

26/06/2017 21

Annex O

KapAg

PRODUCTION SYSTEM		Arable with Livestock		
INFRASTRUCTURE				
Farm Area	210 ha	Permanent pasture	100 ha	
Effective farm area	200 ha	Cropping area	100 ha	
		Irrigation	Nil	
Animals				
Cattle sold store	80	Cattle sold prime	220	
Lambs sold store		Lambs sold prime	1,200	
CROPS				
Rotation				
Spring Sown Barley 100ha		8 T/ha/yr		
Autumn Sown Annual Ryegrass 100ha		6 T/ha/yr (grazed)		
NUTRIENTS				
Clover nitrogen		78 kg/ha	Other nitrogen	2 kg/ha
Imported nitrogen		88 kg/ha	Available nitrogen	168 kg/ha
Surplus nitrogen		115 kg/ha	Nitrogen conversion efficiency	31 %
Lost nitrogen to water		45 kg/ha	Phosphorus losses	0.3 kg/ha
OPERATIONAL PROFIT				
Farm fixed overheads		$128,250	Cropping income	$269,730
Land operational costs		$98,265	Trading sheep & wool income net of purchases	$44,020
Livestock costs		$7,841	Trading beef income net of purchases	$240,221
Cropping costs		$136,710		
Operational profit		$182,905		
Per eff. hectare		$915		
Capital Value (total assets)		$7,125,000	Return on assets	2.6%

26/06/2017 22

KapAg

PRODUCTION SYSTEM		Arable with Potatoes		
INFRASTRUCTURE				
Farm Area	210 ha	Permanent pasture	Nil	
Effective farm area	200 ha	Cropping area	100 ha	
		Irrigation	Travelling Irrigator	100 ha
Animals				
Cattle sold store	Nil	Cattle sold prime	Nil	
Lambs sold store	Nil	Lambs sold prime	Nil	
CROPS				
Rotation				
Spring Sown Maize Silage 100ha		17 T/ha/yr		
Autumn Sown Forage Oats 100ha		7 T/ha/yr		
Rotation				
Spring Sown Potatoes 100ha		55 T/ha/yr		
Autumn Sown Brussel Sprouts		12 T/ha/yr		
NUTRIENTS				
Clover nitrogen		2 kg/ha	Other nitrogen	7 kg/ha
Imported nitrogen		280 kg/ha	Available nitrogen	289 kg/ha
Surplus nitrogen		31 kg/ha	Nitrogen conversion efficiency	89 %
Lost nitrogen to water		50 kg/ha	Phosphorus losses	0.8 kg/ha
OPERATIONAL PROFIT				
Farm fixed overheads		$175,050	Cash Cropping income	$1,690,272
Land operational costs		$39,500	Forages Sold	$461,700
Cropping costs		$1,299,000		
Operational profit		$638,422		
Per eff. hectare		$3,192		
Capital Value (total assets)		$7,785,000	Return on assets	8.2%

26/06/2017 23

Annex O

KapAg

7.3 Mitigations for Reducing Environmental Effects under the One Plan

The least difficult mitigating practices to introduce on farm are operational changes that don't disrupt existing farming systems. These are generally also the most preferred by farmers. However, to achieve larger reductions in nitrogen losses, farmers may need to make system changes. The dairy farm systems have not been optimised to minimise their costs of production. Instead farm practices have been introduced that suit the existing systems and the assumed managerial capability required to operate them at their current level of efficiency. Opportunities for farmers to increase cow performance are assumed to equally exist both now and in the future and have not been changed in this analysis.

In higher rainfall areas and free-draining soils such as can be found in the Tararua District, capital investments may have to be made to enable the farm system to be adapted further to meet Table 14.2 in the One Plan. The mitigations applied to each dairy farm system in this report are shown in Table 2. Further information on these practices can be found in Appendix C.

The dairy farms were each expected to have one or more wetlands and riparian areas that could be fenced off from livestock. The fenced wetlands and riparian areas could protect native habitat and also trap runoff coming from farms containing sediment and phosphorus. The farms are expected to have to provide extra cutoffs along farm races and around the farm dairy to ensure that stormwater travels across grassy paddocks before entering water channels. The grassy paddocks act as filters. On some farms, drains may be converted to swales to increase nutrient filtering. Some drains may be shortened to stop them discharging directly into streams. Instead they may be able to allow water to run over grassy areas or riparian vegetation. As part of their consent, each model farm is expected to invest $10,000 towards these mitigations.

The model dairy farms were assumed to be fully fenced from waterways, including their run-offs. This mitigation was considered the main way of reducing E.coli losses into nearby waterways and so no further action was taken.

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Table 2. The mitigations applied on the dairy farms in the order in which they were applied

	Dairy Farm System			
Mitigations	Self-contained	Low intensity	High intensity	Irrigation and high intensity
Operational practice changes				
Remove nitrogen fertiliser from the effluent area	✓	✓	✓	✓
Remove winter applications of nitrogen (April to July inclusive)	✓	✓	✓	✓
Reduce nitrogen to a maximum of 60 kgN/ha	✓	✓	✓	✓
Aggressive summer culling of cows	✓	✓	✓	✓
Replace high protein feed with low protein	✓	✓	✓	✓
System practice changes				
Spread effluent to reduce rates to 100kgN/ha	✓	✓		
Remove all nitrogen fertiliser and export surplus feed	✓	✓		
Irrigation applications optimised				✓
Winter cows off the farm	✓	✓		
Reduce cow numbers and bring grazed off heifers home to replace them	✓	✓	✓	✓
Reduce overall stocking rates	✓	✓	✓	✓
Use a stand-off pad in wet winter weather			✓	✓
Structural practice change				
Covered feed pad			✓	✓
Housed cows with duration controlled grazing			✓	✓

The arable farms had simple crop rotations on the two different blocks on each farm. For the mitigations added to the arable farms see Table 3. Further information on these practices can be found in Appendix D. On the mixed livestock arable farm, in order to reduce nitrogen leaching enough for Table 14.2, all the livestock had to be removed from the system and surplus stock feed sold off the farm. The arable farm with potatoes was able to reduce some nitrogen use and reduce its use of irrigation by installing a moisture meter and water budgeting. On this farm the area in the potato crop rotation also needed to be reduced. It was replaced with a grain crop rotation that included a green mulch to incorporate some nitrogen back into the soil organic matter.

Annex O

KapAg

Both of the arable farms avoided having extended fallow periods between crops. They provided enough space to add a bund around their intensively cropped areas to reduce runoff containing sediment and nutrients from running into nearby waterways.

Table 3. The mitigations applied on the arable farms in the order in which they were applied

	Arable Farm System		Notes on Overseer
Mitigations	Arable with livestock	Arable with potatoes	
Operational practice changes			
Use minimal tillage and direct drilling between crops in rotation	✓	✓	Able to be modelled in Overseer
Minimise nitrogen applications to industry good practice	✓	✓	Able to be modelled in Overseer
Apply nitrogen fertiliser in side dressings		✓	Not able to be modelled
Spread nitrogen applications of over 45kgN/ha over several weeks.	✓	✓	Difficult to model
Add a bund between the block and waterways to catch runoff	✓	✓	Difficult to model the effect of a bund but reduced crop area can be included.
System practice changes			
Install moisture metering probe and move to active water management	✓	✓	Able to be modelled in Overseer
Replace fallow periods with actively growing crops or 'green mulch'	✓	✓	Able to be modelled in Overseer
Remove livestock	✓		Able to be modelled in Overseer
Harvest and export surplus green feed as fodder	✓	✓	Able to be modelled in Overseer
Replace heavy nitrogen feeding crops with grain crops		✓	Able to be modelled in Overseer

26/06/2017 26

KapAg

7.4 Mitigated Farm Results

PRODUCTION SYSTEM		Self-Contained		
INFRASTRUCTURE				
Farm Area	125 ha	Milking platform (MP)	120 ha	
Feedpad	N/A	Effluent system and area	Sump, to pond and travelling irrigator	17 ha
		Irrigation system and area	N/A	
Soils	Dannevirke SL	Flat	Fert (PKS): 28 0 06	102 ha
	Matamau SL	Rolling	Fert (PKS): 35 71 21	18 ha
HERD				
140 cows	28 replacements grazed on the farm from weaning to calving, but wintered off as yearlings (May-July)		Cows wintering	Half the herd for 2 months
49,522 kgMS	496 kgMS/ha MP		354 kg MS/cow	
PASTURE AND FEED				
Pasture eaten (Overseer)		6,028 kgDM/ha/yr		
Imported feed		Nil		
Supplements Made		288 TDM	Supplements Exported	212 TDM
Imported feed and grazing off as a percentage of the total feed offered		11.3%		
NUTRIENTS				
Clover nitrogen		127 kg/ha	Other nitrogen	2 kg/ha
Imported nitrogen		0 kg/ha	Available nitrogen	129 kg/ha
Surplus nitrogen		43 kg/ha	Nitrogen conversion efficiency	66 %
Lost nitrogen to water		18 kg/ha	Phosphorus losses	0.5 kg/ha
OPERATIONAL PROFIT				
Farm fixed overheads		$131,230	Milk income	$316,940
Land operational costs		$94,973	Livestock income	$13,718
Livestock & feed costs		$103,128	Income from Capital Released	$21,095
Operational profit		$75,510	Income from Exported Supplements	$53,100
Per eff. hectare		$629		
Farm Working Expenses		$6.65/kgMS		
Capital Value / Employed		$3,695,428	Return on assets	2.0%

Annex O

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PRODUCTION SYSTEM		Low Intensity		
INFRASTRUCTURE				
Farm Area	210 ha	Milking platform	150 ha	
		Runoff	50 ha	
Feedpad	N/A	Effluent system and area	Sump, to pond and travelling irrigator	25 ha
		Irrigation system and area	N/A	
Soils	Dannevirke SL	Flat	Fert (PKS): 32.44.08	127.5 ha
	Kopua SL	Flat	Fert (PKS): 26.31.10	20 ha
	Matamau SL	Rolling	Fert (PKS): 28.38.19	52.5 ha
HERD				
250 cows	55 replacements grazed on runoff from weaning until 21 months, but with all heifers off for the months of May, June and July		Cows wintering	100 % of cows off for 2 months
100,364 kgMS	669 kgMS/ha MP		401 kg MS/cow	
PASTURE AND FEED				
Pasture eaten (Overseer)	5,835 kgDM/ha/yr		Imported feed T DM	0
Supplements Made	443 TDM		Supplements Exported	293 TDM
Summer forage crop	9 ha		Turnips	10 T DM/ha yield
Imported feed and grazing off as a percentage of the total feed offered	12.5%			
NUTRIENTS				
Clover nitrogen	119 kg/ha		Other nitrogen	4 kg/ha
Imported nitrogen	5 kg/ha		Available nitrogen	128 kg/ha
Surplus nitrogen	56kg/ha		Nitrogen conversion efficiency	56%
Lost nitrogen to water	17 kg/ha		Phosphorus losses	0.6 kg/ha
OPERATIONAL PROFIT				
Farm fixed overheads	$210,150		Milk income	$642,333
Land operational costs	$160,732		Livestock income	$25,593
Livestock & feed costs	$185,842		Income from Capital Released	$28,424
Operational profit	$212,813		Income from Exported Supplements	$73,188
Per eff. hectare	$1,064			
Farm Working Expenses	$5.55/kgMS			
Capital Value / Employed	$5,820,922		Return on assets	3.7%

26/06/2017 28

KapAg

PRODUCTION SYSTEM		Moderate Intensity		
INFRASTRUCTURE				
Farm Area	262 ha	Milking platform	200 ha	
		Runoff	50 ha	
Barn with Feed Pad	Used Feb – Aug	Effluent system and area	Sump, to pond and travelling irrigator	170 ha
		Irrigation system and area	N/A	
Soils	Dannevirke SL	Flat	Fert (PKS): 31.0.0	170 ha
	Kopua SL	Flat	Fert (PKS): 32.13.20	20 ha
	Matamau SL	Rolling	Fert (PKS): 23.20.06	60 ha
HERD				
550 cows	120 replacements grazed on runoff from weaning with half grazed of at 11 months from May to May		Cows wintering	All cows wintered on – grazing 2 hours/day and then in barn
238,892 kgMS	1194 kgMS/ha MP		434 kg MS/cow	
PASTURE AND FEED				
Pasture eaten (Overseer)	10,779 kgDM/ha/yr		Imported feed T DM	814 T DM
Supplements Made	38 TDM		Supplements Exported	nil
Summer forage crop	12 ha		Turnips	10 T DM/ha yield
Imported feed and grazing off as a percentage of the total feed offered	25.7%			
NUTRIENTS				
Clover nitrogen	136 kg/ha		Other nitrogen	58 kg/ha
Imported nitrogen	51 kg/ha		Available nitrogen	245 kg/ha
Surplus nitrogen	222 kg/ha		Nitrogen conversion efficiency	27 %
Lost nitrogen to water	17 kg/ha		Phosphorus losses	0.8 kg/ha
OPERATIONAL PROFIT				
Farm fixed overheads	$419,900		Milk income	$1,528,099
Land operational costs	$267,897		Livestock income	$57,451
Livestock costs	$395,261		Other income	$-
Cost of Additional Capital	$65,958			
Operational profit including capital cost	$436,321		Profit per eff. hectare	$1,745
Farm Working Expenses (incl cost of additional capital)	$ 4.82/kgMS			
Capital Value / Employed	$8,784,602		Return on assets	5.0%

26/06/2017 29

Annex O

KapAg

PRODUCTION SYSTEM		High Intensity with Irrigation		
INFRASTRUCTURE				
Farm Area	262 ha	Milking platform	200 ha	
		Runoff	50 ha	
Barn with Feed Pad	Used from Feb through to Aug	Effluent system and area	Sump, to pond and travelling irrigator.	170 ha
		Irrigation system and area	80 ha centre pivot	
Soils	Dannevirke SL	Flat	Fert (PKS): 03.02.03	170 ha
	Kopua SL	Flat	Fert (PKS): 23.15.06	20 ha
	Matamau SL	Rolling	Fert (PKS): 31.20.20	60 ha
HERD				
620 cows	136 replacements with half grazed off from 1 May for 12 months		Cows wintered off	Nil (all wintered on in barn)
277,200 kgMS	1386 kgMS/ha MP		470 kg MS/cow	
PASTURE AND FEED (Milking platform)				
Pasture eaten (Overseer)		11,207 kgDM/ha/yr	Imported feed T DM	1,170 T DM
Supplements made T DM		Nil	Supplements Exported	Nil
Summer forage crop		15 ha	Turnips	10 T DM/ha yield
Imported feed and grazing off as a percentage of the total feed offered		32%		
NUTRIENTS				
Clover nitrogen		135 kg/ha	Other nitrogen	83 kg/ha
Imported nitrogen		51 kg/ha	Available nitrogen	269 kg/ha
Surplus nitrogen		194 kg/ha	Nitrogen conversion efficiency	28 %
Lost nitrogen to water		17 kg/ha	Phosphorus losses	0.8 kg/ha
OPERATIONAL PROFIT				
Farm fixed overheads		$495,250	Milk income	$1,790,445
Land operational costs		$295,839	Livestock income	$70,839
Livestock costs		$533,105	Income from Capital	$
Cost of Additional Capital		$74,512	Income from Exported Supplements	
Operational profit including capital cost		$462,578		
Per eff. hectare		$1,850		
Farm Working Expenses		$5.00/kgMS		
Capital Value/Employed		$9,731,656	Return on assets	4.8%

26/06/2017 30

KapAg

PRODUCTION SYSTEM		Arable with Livestock		
INFRASTRUCTURE				
Farm Area	210 ha	Permanent pasture	150 ha all harvested & exported for pasture silage	
Effective farm area	200 ha	Cropping area	50 ha	
		Irrigation	Nil	
Animals				
Cattle sold store	Nil	Cattle sold prime	Nil	
Lambs sold store	Nil	Lambs sold prime	Nil	
CROPS				
Rotation				
Spring Sown Barley 50ha		8 T/ha/yr		
Autumn Sown Annual Ryegrass 50ha		6 T/ha/yr (harvested and sold as baleage)		
Supplements Made		1,549 TDM		
Supplements Exported		1,549 TDM		
NUTRIENTS				
Clover nitrogen		61 kg/ha	Other nitrogen	2 kg/ha
Imported nitrogen		38 kg/ha	Available nitrogen	101 kg/ha
Surplus nitrogen		11 kg/ha	Nitrogen conversion efficiency	89 %
Lost nitrogen to water		20 kg/ha	Phosphorus losses	0.2 kg/ha
OPERATIONAL PROFIT				
Farm fixed overheads		$128,250	Cropping income	$119,880
Land operational costs		$76,800	Sale of Surplus Feed	$277,500
Livestock costs		$0		
Cropping costs		$95,760		
Cost of Additional Capital		$1,098		
Operational profit including capital cost		$95,472		
Per eff. hectare		$477		
Capital Value (total assets)		$7,135,000	Return on assets	1.3%

26/06/2017 31

Annex O

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PRODUCTION SYSTEM		Arable with Potatoes		
INFRASTRUCTURE				
Farm Area	210 ha	Permanent pasture	nil	
Effective farm area	200 ha	Cropping area	200 ha	
		Irrigation	Travelling Irrigator	100 ha
Animals				
Cattle sold store	Nil	Cattle sold prime	Nil	
Lambs sold store	Nil	Lambs sold prime	Nil	
CROPS				
Rotation				
Spring Sown Maize Silage 100ha		17 T/ha/yr		
Autumn Sown Forage Oats 100ha		7 T/ha/yr		
Rotation				
Spring Sown Potatoes 10ha		55 T/ha/yr		
Autumn Sown Brussel Sprouts 10ha		12 T/ha/yr		
Rotation				
Spring Sown Barley 90ha		7 T/ha/yr		
Autumn Sown Annual Rye 90ha		5 T/ha/yr		
NUTRIENTS				
Clover nitrogen		1 kg/ha	Other nitrogen	4 kg/ha
Imported nitrogen		186 kg/ha	Available nitrogen	191 kg/ha
Surplus nitrogen		11 kg/ha	Nitrogen conversion efficiency	94 %
Lost nitrogen to water		19 kg/ha	Phosphorus losses	0.4 kg/ha
OPERATIONAL PROFIT				
Farm fixed overheads		$175,050	Cash Cropping income	$819,538
Land operational costs		$39,500	Forages Sold	$191,250
Cropping costs		$564,812		
Cost of Capital		$1,098		
Operational profit		$230,328		
Per eff. hectare		$1,152		
Capital Value (total assets)		$7,795,000	Return on assets	3.0%

26/06/2017 32

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7.5 Changes in Farm Profitability

All the modelled farms had reduced profitability after making the system changes. In Table 4 the future profitability of the self-contained and low intensity dairy farms and the arable farms are very dependent on being able to sell their surplus feed to other livestock farmers.

Table 4. Summary of profit, capital and labour changes between the base farm models and their profitability after farm system adjustments

Farms	Self-Contained ($)	Low Intensity ($)	Moderate Intensity ($)	High Intensity with Irrigation ($)	Arable with Livestock ($)	Arable with Potatoes ($)
Base Total Income	578,411	963,860	1,604,343	1,873,057	553,971	2,151,972
Base Total Expenses	383,120	594,178	1,033,509	1,259,176	371,066	1,513,550
Base Profit	**195,291**	**369,682**	**570,834**	**613,881**	**182,905**	**638,422**
Base Profit / ha	1,627	1,848	2,283	2,456	915	3,192
Extra Income (from invested capital)	21,095	28,424	N/A	N/A	N/A	N/A
Extra Income (from exported supps)	53,100	73,188	N/A	N/A	277,500	191,250
Additional Capital Costs	N/A	N/A	65,958	74,512	1,098	1,098
Adj Income (From Produce)	330,646	67,925	1,585,337	1,861,284	119,880	819,538
Total Adj Expenses	329,331	556,724	1,083,058	1,324,194	300,810	779,362
Change in Expenses	-53,789	-37,454	49,549	65,018	-70,256	-734,188
Adjusted Future Profit	**75,510**	**212,813**	**436,321**	**462,578**	**95,472**	**230,328**
Adjusted Future Profit / ha	629	1,064	1,745	1,850	477	1,152
Change In Profit	-119,781	-156,869	-134,513	-151,303	-87,433	-408,094
Change In Profit / ha	-998	-784	-538	-605	-437	-2,040
% Change in Profit	-61%	-42%	-24%	-25%	-48%	-64%
Net Capital Investment	10000	10000	600740	678650	10000	10000
Base Capital Value	3,685,428	5,810,922	8,183,862	9,053,006	7,125,000	7,785,000
Base Return on Assets	5.3%	6.4%	7.0%	6.8%	2.6%	8.2%
New Capital Employed	3,695,428	5,820,922	8,784,602	9,731,656	7,135,000	7,795,000
Adjusted Return on Assets	2.0%	3.7%	5.0%	4.8%	1.3%	3.0%
Change in ROA	-61%	-43%	-29%	-30%	-48%	-64%
Base Farm Labour	Owner plus casual	Owner plus 1 FTE	Owner plus 3 FTE	Owner plus 3 FTE	Owner plus casual	Owner plus casual
Adjusted Future Labour	Owner	Owner plus 1 FTE	Owner plus 3 FTE plus casual	Owner plus 3 FTE plus casual	Owner plus casual	Owner plus casual

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Two of the dairy farmers have additional income provided from the capital value of the livestock that they sold. The more intensively managed farms with greater supplementary feed inputs are able to consider housing their cows. In these models the cows were able to be housed and effluent systems expanded for less than $1,200 per cow.

On current valuations, all the initial farms were expected to return over 5% on capital except for the arable farm with livestock. After the farm systems had been adjusted, all the dairy farm models had returns drop to 5% or less than assets. The results suggest that there will be a contined downward pressure on dairy farm valuations to readjust for improved returns on assets.

It is common in the dairy industry for farmers to have about $21/ kgMS of debt on their farms. Based upon an interest rate of 7% that would mean each of the model farms has the following annual interest payments.

Self-contained: $126,660

Low intensity: $212,139

Moderate intensity: $353,795

Irrigation and high intensity: $413,623

Arable with livestock: $157,576

Arable with potatoes: $530,134

All of the model farms in their base operation would be able to pay this amount of debt from their profit. After the farms have been adjusted to achieve Table 14.2 only the dairy farms at moderate to high intensity could still cover this amount of debt. The low intensity dairy farm might need a slight reduction in debt to survive. The self-contained dairy farm and the two arable farms would need to almost halve their debt.

The reduction in profitability of the modelled farms in order to meet the requirements of Table 14.2 is likely to reduce their market value while they are under these constraints. In the case of farms where their intensive use and profitability is reduced, the market would "consider" what the resulting highest and best use of the farm could be after these changes.

The market for dairy milking platforms that are no longer viable may change to them being viewed as a dairy run off or intensive finishing farms for dry stock. Both of these options would reduce their value on a per hectare basis. While the underlying value of the bare land may only experience a small decrease (say 5%) the value of the specialist dairy improvements (cowshed, effluent system, races) would be virtually nil under an alternative land use scenario.

In the case of farms that have used capital expenditure (e.g. cow housing) to meet Table 14.2, the market would factor in the added value of these new assets to a degree, but probably not enough to reflect the total capital cost of installing the infrastructure.

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In the example in Table 5 it has been assumed that 70% of the cost to install the cow housing is reflected in changed capital value. This is reflective of how the market "prices" such infrastructure at present.

Table 5. Hypothetical examples of changes in farm capital value following mitigation

Self-Contained Farm		**125ha**		**Irrigated high Intensity farm**		**262ha**
Status Quo Value		**$3,000,000**		Status Quo Value		**$6,200,000**
Split as: -				Split as: -		
	Land Value	2,600,000			Land Value	5,000,000
	Cowshed	120000			Cowshed	600000
	Effluent System	50000			Effluent System	120000
	Races	25000			Races	50000
	Other Improvements	$205,000			Other Improvements	$430,000
Value After System Change		**$2,680,000**		Value After System Change		**$6,550,000**
Split as: -				Split as: -		
	Land Value	2,470,000			Land Value	5,000,000
	Cowshed	nil			Cowshed	600000
	Effluent System	nil			Effluent System	120000
	Races	5000			Races	50000
	Other Improvements	$205,000			Cow housing (70% of cost)	350000
					Other Improvements	$430,000

Annex O

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8. Costs Associated with the Consenting Process

The One Plan in Chapter five has objectives and policies regarding the management of water quality in sensitive catchments identified within the Manawatu and Wanganui region. The water quality values for each subzone within the catchments are shown in Table B2 of the One Plan and the water quality targets are shown in Table E2.

Under policies 14.5 and 14.6 of the One Plan the owners of all intensive farming operations must apply for a land use consent to continue operating. Rule 14.1 and Table 14.2 describe the conditions under which the Council can issue a controlled consent. The focus of this chapter in this report is on the costs for applicants of applying for a consent, with particular application to dairy farmers applying for a restricted discretionary consent.

There are expected to be four consent application pathways for farmers (Table 6):

- Where an existing farm is able to meet the nitrogen leaching caps in Table 14.2 of the One Plan and to mitigate any potential waterway contamination from phosphorus, sediment, and E.coli, their application will need to provide enough evidence from Overseer® to support the Council approving a controlled consent. The main costs will be for an agricultural consultant to describe the existing farm system and carry out a standard AEE. This should show that the farming business can operate within the effects anticipated by the One Plan with effects less than minor.
- Some existing farms may be able to meet the leaching caps in Table 14.2 of the One Plan and mitigate any potential waterway contamination from phosphorus, sediment, and E.coli but their mitigations cannot be calculated using Overseer. These will require extra preparation work to quantify the benefits of these mitigations. Such farms will need to apply for a restricted discretionary consent that shows calculations of the effectiveness of their mitigations. Generally the size of the benefits from these mitigations will be quite site specific and so information about the site as well as the mitigation will need to be provided. For example, the use of high carbon ditches to intercept nitrogen leaching will depend on the hydrology of the site. An agricultural consultant working with a farmer can provide the Council with this information with the support of industry scientists.
- Farms that can meet the nitrogen leaching caps in Table 14.2 within four years will need to address through their AEE the effects of the four year delay in meeting the Table. The additional costs for these farmers are generated from needing the advice of a professional ecologist and obtaining information from the Council about the cumulative effects for the catchment.
- The farms that are not anticipated to meet the nitrogen caps in Table 14.2 will need to apply for a restricted discretionary consent and prepare a very robust AEE. They will need to employ technical expertise to show that their effects on the environment are less than minor. It is probable that these applications could be publically notified and an additional deposit for this will need to be made to Horizons. The deposit may be around $8,000 in addition to the costs already shown in Table 4.

The costs shown in Table 6 could easily vary by 20% either up or down depending upon the complexity of the work involved.

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Table 6. Detailed costing of consent application options (Horizon's costs in italics)

	Existing farm system meets Table 14.2 ($)	Existing farm system could meet Table 14.2 with mitigations ($)	Delayed farm system change to meet Table 14.2 with mitigations ($)	Restricted Discretionary consent outside Table 14.2 ($)
Site description with Farm system description	1000	1000	1000	1000
Maps from Horizons	500	500	500	500
Information from Horizons about cumulative catchment condition		400	400	400
Activity and proposal (Overseer)	4000		4500	
Activity and proposal (Overseer plus)		6000		6000
Information from the Rural Advice Team in Horizons	300	500	300	300
Assessment against One Plan rules	1000	1000	1000	1000
Assessment against NPSFM and One Plan policies (Planner)				1000
Assessment of environmental effects (ESHMAK)	2500	2500		
Information from catchment advice team in Horizons			600	800
Experts • Ecologist • Hydrogeological			4000	4000 4000
Consent application fee	1300	2000	1500	2000
Total	$10,600	13,900	13,800	21,000

Farmers are annually required to provide information to Horizons so that the Council can monitor their consent conditions. If farm consultants provide this for their clients the cost could be about $1500 per farm.

The costs for individual farmers obtaining a consent may be able to be reduced if the fertiliser companies and milk processing companies provide the base farm information and annual monitoring services for their clients. It may be that the owners of the Overseer Company decide not to introduce charging, and it may be possible for all the farms in a subzone to share a single

Annex O

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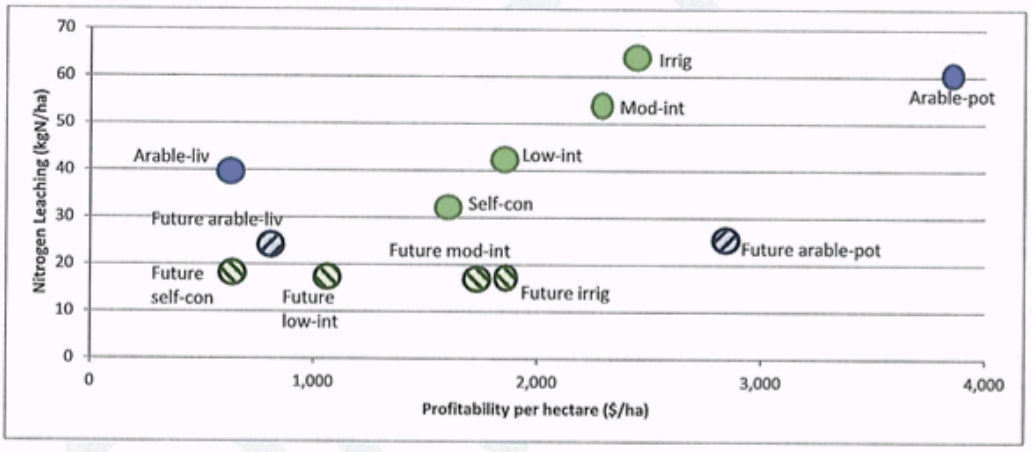
environmental assessment. Industry groups may be able to provide templates for completing an assessment of mitigations not included in Overseer.

9. Discussion and Conclusions

There were six farm models developed in this study. The summarised results are shown in Figure 3. The figure is a graph of profit ($/ha) related to nitrogen leaching (kgN/ha). In the graph the lowest leaching farm in its initial state is the self-contained dairy farm. That farm has a profit of $1,627/ha and nitrogen leaching of 32 kgN/ha. The highest leaching farm is an irrigated highly intensive dairy farm with a profit of $2,456/ha and nitrogen leaching of 64 kgN/ha.

Figure 3. A graphical representation of the model farms before and after they have been adjusted to meet the nitrogen caps in year 20 of Table 14.2 of the One Plan



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The graph also displays in striped colours where each of the farms moves towards after they have been adjusted to meet the requirements of Table 14.2. In that case, all the dairy farms on soils in the Tararua District are below 18 kgN/ha. Both the arable farms on soils in the Rangitikei District are below 24 kgN/ha.

The significance of these changes can be determined from how much they might affect the adaptability, the sustainability, and the viability of farms like these in the region. Their adaptability could be influenced by how much change in management intensity these farms require. The more intensive the management, the less opportunity there is for farmers to explore new ways of doing things. In this report, any farms that have to reduce the amount of labour they can employ and that have to increase pasture utilisation can be considered to be becoming less adaptable. Diversifying their product range can also increase the adaptability of farming systems.

The sustainability of the farm systems can be related to the efficiency with which they utilise available natural resources. In this report farms that are able to increase their nitrogen efficiency can be considered to be becoming more sustainable in their use of natural resources.

The viability of the farm businesses will be related to their profitability and their ability to service their debt and achieve sufficient return on investment to provide financial security for their owners.

Self-Contained dairy farm

This farm model has all the heifers grazed off the farm for 12 months from 9 months of age. It assumes that there has already been some adjustment to reducing its environmental footprint by grazing half the dairy cows off the farm over winter. Regular soil tests are taken and maintenance phosphate fertiliser is applied. A summer forage crop of turnips is grown to manage a possible risk of a dry summer. On average 30kg N/ha is applied in early spring and autumn to extend pasture production in those seasons.

To meet Table 14.2 in the One Plan, the farm has to reduce the number of dairy cows from 270 to 140 animals. It can no longer apply nitrogen fertiliser and must stop all cropping. The farm is expected to no longer bring in feed supplements for the cows. Instead it harvests 288 tonnes of pasture DM and sells most of this off the farm. The sale of surplus feed is a very important part of pasture management on this farm because animal consumption has dropped to almost 6,000 kgDM/ha/yr. Without harvesting surplus feed, the quality of the pasture would fall and in a few years pasture composition would suffer.

The farm started with leaching 32 kgN/ha and was modified to be leaching only 18 kgN/ha, a reduction of 44%. These changes reduced the expected farm profit from $1,627/ha to $629/ha, a drop of over 60%. The return on assets dropped from 5.3% to 2.0%.

The self-contained farm model has had to reduce its labour but it has surplus pasture available for alternative landuses, and therefore its adaptability might increase overall. Nitrogen conversion efficiency has increased to 66% and so it can be expected to be more sustainable in its use of natural resources. However, its profitability is not enough to support the level of debt found on many farms in this region. The return on assets is insufficient to attract off-farm investment, should that be required for future improvements. Unless farms like this have less than half the amount of debt as the model farm, they will not survive the changes required to address Table 14.2 .

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Low-intensity dairy farm

The low-intensity dairy farm is very common in the Tararua District and in the region generally. In this model there are more cows and they have greater production than the self-contained farm. On this farm there is more supplementary feed (260 tonnes DM) brought onto the farm and greater use is made of cropping in both winter and summer. Over the whole farm more than 100 kgN/ha is applied, mainly to lengthen the grass growing season in spring and autumn.

To meet Table 14.2 in the One Plan, the farm has to reduce the number of cows from 400 to 250 animals. They will also need to reduce nitrogen fertiliser applications toan average of 5 kgN/ha/yr and stop importing supplementary feed and growing a winter crop. The summer crop remains, and 443 tonnes of DM are conserved. Three quarters of the conserved feed is sold off the farm to maintain pasture quality.

The farm started with leaching 42 kgN/ha and was modified to be leaching only 17 kgN/ha, a drop of 60%. These changes reduced the expected farm profit from $1,848/ha to $1,064/ha, a drop of over 40%. The return on assets dropped from 6.4% to 3.7%.

The low intensity farm model has not reduced its labour and it has surplus pasture available for alternative landuses. It's adaptability might increase overall. Nitrogen conversion efficiency has increased to 56% and so it can be expected to be more sustainable in its use of natural resources. However, its profitability is not enough to pay tax and support the level of debt found on many farms in this region. The return on assets is insufficient to attract off-farm investment, should that be required for future improvements. Unless farms like this can reduce the amount of debt below that of the model farm they will not survive the changes required to address Table 14.2 .

Moderate-intensity dairy farm

This farm has 600 cows and achieves high production. The farm imports 757 tonnes DM, grows winter and summer crops and applies an annual application of over 150 kgN/ha.

To achieve Table 14.2 in the One Plan this farm has a covered barn installed for all the cows so that they can be housed all year. Although inside for much of the time, the cows are grazed outside for fixed periods throughout the year – 8 hours per day while lactating and 2 hours per day over winter. The farm imports the same amount of supplementary feed as it did previously and harvests another 38 tonne of supplements to maintain production. Dairy effluent is applied across the whole of the milking platform and nitrogen fertiliser applications reduced to 50 kgN/ha.

The farm started with leaching 54 kgN/ha and was modified to be leaching only 17 kgN/ha, a drop of almost 70%. These changes reduced the expected farm profit from $2,283 /ha to $1,745/ha, a drop of almost 25%. The return on assets dropped from 7.0% to 5.0%.

The moderate intensity farm model has not reduced its labour but it has had to increase its overall pasture utilisation. Its adaptability might therefore decrease overall. Nitrogen conversion efficiency only increases slightly to 27% and so there is not much improvement expected in the sustainable use of natural resources. However, the profitability of this farm is sufficient to support its expected level of debt and it has sufficient return on assets to provide financial security for its owners.

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Irrigated high-intensity farm

The irrigated high intensity dairy farm in the base model has 640 cows and has a centre pivot irrigator and a feed pad. The farm imports 757 tones DM per year as a supplement or 1,180 kgDM/cow. It uses 187 kgN/ha of nitrogen a year.

To meet the requirements of Table 14.2 in the One Plan this farm has built housing for the cows so that they can be kept inside all year. The farm already had a feed pad and so the effluent system for housing the animals was already in place. While they are lactating, the cows are grazed outside for up to 8 hours per day. The amount of imported supplements on this farm is increased to 1,170 tonnes DM and 22 tonnes of supplements are made on the farm.

The farm started with leaching 64 kgN/ha and was modified to be leaching only 17 kgN/ha, a drop of over 70%. These changes reduced the expected farm profit from $2,456/ha to $1,850/ha, a drop of 25%. The return on assets dropped from 6.8% to 4.8%.

The irrigated high intensity farm model has not reduced its labour but it has had to increase its overall pasture utilisation. Its adaptability might therefore decrease overall. Nitrogen conversion efficiency only increases slightly to 28% and so there is not much improvement expected in the sustainable use of natural resources. However, the profitability of this farm is sufficient to support its expected level of debt and it has sufficient return on assets to provide financial security for its owners.

Arable farm with livestock

Both the arable farms are larger than the typical farms to be found in the Manawatu. Making them larger makes it easier to compare these farms with the dairy farms that have a similar size. This farm specialises in grain production over summer. It has been able to do that without irrigation. Half of the farm is used for growing barley and in winter it has been growing ryegrass for finishing livestock. The farm finishes lambs and heavy cattle over a 12 month period. Over the year 150 kgN/ha is applied to the cropping area or an average of 60 kgN/ha across the whole farm.

The changes required to meet Table 14.2 in the One Plan are to dispose of all the livestock and harvest as silage and hay the permanent pasture and ryegrass green crop. The area in barley had to be reduced from 100ha to 70 ha. Over a whole year 1,399 tonnes of pasture dry matter was made and exported from the farm.

The farm started with leaching 39 kgN/ha and was modified to be leaching only 24 kgN/ha, a drop of almost 40%. These changes decreased the expected farm profit from $915/ha to $477/ha, a decrease of 47%. The return on assets dropped from 2.6% to 1.3%.

The arable with livestock farm model has not reduced its labour but it has become dependent on the supplementary feed market. Its adaptability might therefore decrease overall. Nitrogen conversion efficiency has increased to 89% and so natural resource sustainability has also increased. The profitability of this arable farm is insufficient to support its expected level of debt and it has insufficient return on assets to provide much financial security for its owners.

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Arable farm with potatoes

This model farm was again large for a cropping farm. This time there were no livestock and instead two different rotations were modelled. The second rotation of potatoes and brussels sprouts required a total application of 428 kgN/ha over a year. The other rotation of maize silage and winter oats for forage only needed 110 kgN/ha. Irrigation was used over summer on the potato crop and 500mm/yr was used.

The changes required for meeting Table 14.2 in the One Plan included reducing the amount of nitrogen fertiliser going on to the potato rotation (332 kgN/ha) and better timing fertiliser applications to align with crop requirements. A new rotation growing barley for grain was introduced to replace some of the area originally in a high nitrogen feeding crop (potatoes). To reduce drainage from excess irrigation a moisture probe was installed and a water budget put in place. This reduced the amount of water needed to 380mm/yr.

The farm started with leaching 60 kgN/ha and was modified to be leaching only 25 kgN/ha, a drop of almost 60%. These changes reduced the expected farm profit from $3,192/ha to $1,152/ha, a drop of over 64%. The return on assets dropped from 8.2% to 3.0%.

The arable with potato farm model has some reduction in casual labour and it has had to increase the range of crops being grown. Its adaptability might therefore increase overall. Nitrogen conversion efficiency has increased to 94%, a big improvement in the sustainable use of its natural resources. However, the profitability of this farm is insufficient to support its expected level of debt and it has insufficient return on assets to provide financial security for its owners.

Future farming systems

It is likely that the farming systems described here will be greatly modified after their first few years under consented conditions. It is likely that dairy farms with cows grazing outside all year will develop contracts for supplying surplus supplementary feed to other farmers with their cows housed indoors. The housed cow farmers are likely to expand the size of their operations until constrained by the efficiency of their effluent systems and the maximum loading of effluent that they are able to apply to land.

Some farmers may choose to winter some dairy cows on what would otherwise be arable farms growing grain. These farmers will need to use well designed stand-off pads to minimise the leaching of nitrogen over the winter months.

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Consent Applications

The model farms above have been developed to show how these farms could be adapted to meet the nitrogen caps in Table 14.2 of the One Plan. They may need a number of years to put all the identified mitigations in place, in which case they will need to apply for a restricted consent to enable them to operate outside Table 14.2 over a transition period.

10. Assumptions, Limitations and Further Work

I have written this report in a style that is without references. The conclusions are evidenced based from a number of sources, using the information contained within the reported material, the client information held in company databases owned by KapAg Ltd, BakerAg Ltd and RD Consulting and the experience of the author. In addition, some of the costs used in this report were sourced from Dairy Base a national database of dairy farm physical and financial performance.

Further information about the author's experience is contained on the KaAg website listed under further reading.

At the time of preparing this report the costs of the consenting process were drawn from those associated with the processing of existing consents and estimates based on possible future requirements. A process for making an Assessment of Environmental Effects (AEE) had not been suggested by staff at Horizons. For this study it was assumed that the AEE could be carried out by a suitably qualified farm consultant that had received additional training from NIWA to be able to use the extended Stream Health Monitoring and Assessment Kit – ESHMAK. If there was a surface waterway available, the most significant of these on each property would be measured at two points along it. The results of the waterway assessment would be included in the AEE describing the effects of the farming activities on Table B1 values and Table E2 targets. These results in the AEE would be conveyed in narrative farm using numeric scores from the ESHMAK where these were available.

The nutrient budgeting software – Overseer, is currently available 'free' to registered users. In this report a cost is assumed. The Farmax ® charging policy has been used, that is: $200 per farm and unlimited scenarios per farm. If a farm system has significant changes made a new charge would be generated and three 'farms' have been used in the costing section of this report.

This report has not considered all the combinations of farm systems and nitrogen loss rates in the region but the results should still be indicative of the likely ranges of these. While the author has made full use of the information available at the time, this report can undoubtedly be enhanced by further input from industry experts.

Annex O

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11. Further Reading

Dairybase web site: https://www.dairynz.co.nz/business/dairybase/

DairyNZ 2010. Facts and Figures: For New Zealand dairy farmers

Denzin NK (Ed), 2009. Sociological Methods: A Sourcebook. Transaction Publishers, New Jersey.

Denzin NK and Giardina MD (Eds), 2008. Qualitative Inquiry and the Politics of Evidence. Left Coast Press Incorporated, California.

Farmax web site: http://www.farmax.co.nz/

KapAg Ltd web site: http://kapag.nz/

Overseer web site: https://www.overseer.org.nz/

Parminter TG, 2013. Of my own free will: voluntary approaches to environmental policy. LAP Lambert Academic Publishing, Germany.

Parminter TG and Grinter J 2016. Farm-scale Modelling Report: Ruamāhanga Whaitua Collaborative Modelling Project. Ministry for Primary Industries, Wellington, New Zealand.

Waikato Regional Council. Menus of practices to improve water quality: https://www.waikatoregion.govt.nz/community/your-community/for-farmers/healthy-farms/farm-menus

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12. Appendix A. Glossary

Table 14.2 sets the nitrogen caps for farmers and growers operating in the Manawatu Wanganui Region.

Nitrogen caps for intensively farmed land, from Section 14.3 of the One Plan

Period (from the year that the rule has legal effect)	LUC I	LUC II	LUC III	LUC IV	LUC V	LUC VI	LUC VII	LUC VIII
Year 1	30	27	24	18	16	15	8	2
Year 5	27	25	21	16	13	10	6	2
Year 10	26	22	19	14	13	10	6	2
Year 20	25	21	18	13	12	10	6	2

Model Farm: Self-contained farm. The farm is described as self-contained although to start with there is some feed imported and some cows are grazed off the farm for two months over winter. Milk production in this model is not dependent on imported feed. Although clearly a system II farm, it approaches the type 1 system defined by the industry.

Model Farm: Low intensity. This farm is described as low intensity because it has a low level of imported feed. It fits a system II farm although it does support the lactation over summer and autumn with supplements and a summer crop.

Model Farm: Moderate intensity. This farm imports feed to support lactating cows and grazes dry cows off during the winter. The farm was considered to be a system IV farm.

Model Farm: High intensity. This farm feeds supplements to the cows through most of the year.

Annex O

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13. Appendix B. Project Brief

The following are abridged selections from the project brief supplied by email on the 6th June 2017. "Horizons Policy and Regulatory teams are undertaking a review of the policy and rule framework for nutrient management and intensive landuse provisions.

This work is required to address the need for applications to contain fuller assessments of environmental effects, including cumulative effects which consider impacts on the wider catchment. Consideration must also be given to all of the relevant objectives and policies in the One Plan, as well as, the capacity to maintain or enhance Schedule B values and Schedule E targets.

Additionally, the consent must contain an assessment against the objectives and policies of the National Policy Statement for Freshwater Management, ... section 105 of the RMA, and the National Environmental Standard for Sources of Human Drinking Water.

It is important for Council to understand all issues of cost and practicability in respect of consenting requirements for intensive land use activities. To this end, Council wishes to obtain advice through assessing the on-farm economic impacts on future consent applicants to compile, lodge and implement a land use consent for intensive agriculture or horticulture in the target catchments which fully address effects , and fully addresses the relevant objectives, policies, rules, schedules of the One Plan and the provisions of other relevant legislation.

The purpose of this study is to calculate the costs associated with applications for intensive farming land use activities and the economic impact of mitigations to reduce nitrogen leaching likely to be incurred as a result of the recommended improvements to the consenting process."

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14. Appendix C. Farming practices introduced to the Livestock Farms

Remove winter applications of nitrogen (May to July inclusive)

Farmers apply nitrogen fertiliser in winter (typically May or late July) if they have insufficient feed and if conditions are suitable. Only the high intensity farm with irrigation applied nitrogen during this time and these applications have been removed as a mitigation.

Reduce nitrogen to a maximum of 100kg/ha/yr

Although the extra feed grown may be needed to support a farming system, reducing the amount of nitrogen fertiliser applied through a year reduces the amount of nitrogen leached. This was applied across all farms as a mitigation. As nitrogen fertiliser is decreased, so is the amount of pasture grown which requires either a decrease in stocking rate or a decrease in per cow performance.

Aggressive summer culling of cows

Removing cull cows in Autumn (around March) when the non-pregnant (empty cows) are known, reduces feed demand during a time when feed may be limiting. The reduced numbers also reduces nitrogen leaching. This was applied across all farms.

Replace high protein feed with a low protein feed

Replacing high protein feeds (nitrogen boosted pasture, high quality grass silage) with a low protein feed (starch based grains, maize silage) reduces urinary nitrogen and therefore decreases nitrogen leaching. The low protein feeds have to be 'imported' onto farms to replace the 'homegrown' feeds and they generally cost more to purchase. This change was applied to the moderate intensity and the high intensity with irrigation farms as a mitigation.

Spread effluent to reduce rates to 100kgN/ha

Reducing effluent nitrogen loadings from the consented 150 kgN/ha towards 100 kgN/ha application generally leads to a reduction to nitrogen leaching. This was applied to the self-contained farm and the low intensity farm. However, this was unable to be implemented on the other two farms because they had insufficient area available. This is due to the high effluent loading created with cows in a barn and higher rates of effluent nitrogen applied over the farms. On the two more intensive farms the effluent areas had to be increased to 85% of the farm to meet the consented 150kgN/ha N limit.

Remove all nitrogen fertiliser and export surplus feed

Reducing or eliminating nitrogen fertiliser reduces nitrogen leaching. However, as discussed, it also reduces grass growth and therefore stocking rate has to be reduced accordingly. This was applied as a mitigation to the self-contained and low intensity farms.

Export surplus feed

Where farms are forced to reduce stocking rate to meet nitrogen leaching limits, pasture demand is also reduced. Uneaten surplus pasture can lead to a decline in pasture quality and pasture species. To maintain pasture quality, silage or hay is made which can either be stored on farm, or sold off farm. In this report, unwanted surplus feed is sold off farm. This strategy was applied over the self-contained and low intensity farms.

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Optimise Irrigation

Optimising water efficiency and therefore minimising drainage through the soil profile reduces nitrogen leaching. This mitigation was only applicable and applied to the high intensity farm with irrigation and the arable farm with potatoes.

Winter cows off the farm

Grazing dry cows off the farm during winter is a significant nitrogen mitigation, assuming that cows are grazed outside catchment. This mitigation was applied to the self-contained and low intensity farms.

Reduce cow numbers and bring grazed off heifer's home to replace cows

Reducing lactating cow numbers and replacing them with heifers reduces stocking rates and the cost of off-farm grazing. This is a nitrogen leaching mitigation was applied to the self-contained and low intensity farms.

Reduce Overall Stocking Rate

Reducing overall stocking rate is a significant nitrogen mitigation. This was implemented on the self-contained and low intensity farms to a major degree. Farmers with housed cows are able to adjust their effective stocking rate through controlling the duration of time that their cows are grazing outside. Because of this there was only a minor decrease required in stocking rate on the moderate intensity and high intensity with irrigation farms.

Use a standoff pad in wet winter weather

This mitigation enables cows to be held off paddocks for significant time during the winter and when it is wet. This prevents pugging and captures urinary nitrogen for treatment through a farm effluent system. This mitigation was applied to the moderate intensity and high intensity with irrigation farms.

Build a covered feed pad/ area

This mitigation enables supplementary feeds to be fed to cows when off paddocks. Feed pads are typically made of concrete. They are suitable to feed cows on, but are not suitable for stand cows on for long periods of time. This mitigation was applied to the rate on the moderate intensity and high intensity with irrigation farms.

Housed cows with duration controlled grazing

This mitigation allows cows to graze on pasture for short periods and then be kept in a barn with a soft litter area during the times of the year when the risks of urinary nitrogen leaching are high. During this time they may also have access to supplements fed on a concrete apron. In the modelled farm systems they grazed on pastures for eight hours per day in February, March, April and May, two hours in June and July and twelve hours in August. As a purpose-built barn it combines the "use a standoff pad in wet weather" and "a covered feed pad" during lactation.

Effluent from the housed cows is captured and along with bedding material is applied to paddocks during low risk periods of nitrogen leaching. This mitigation has been applied to the moderate intensity and high intensity with irrigation farms.

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15. Appendix D. Farming Practices on Arable Farms

Minimal tillage

Minimal tillage and direct drilling are used to reduce the amount of cultivation applied between crops. The reduced cultivation reduces farm costs and nitrogen leaching from organic matter breakdown in the soil. In the arable models conventional tillage was used to cultivate pasture in both the base and modified models and minimal tillage between crops.

Minimal nitrogen applications

Nitrogen applications can be reduced to replace the amount of nitrogen being removed in produce and losses incurred during crop growing. There was limited ability to reduce applications in the model base farms although some reduction was applied to the arable with potatoes model.

Nitrogen fertiliser applied in side dressings

Nitrogen fertiliser can be applied to horticultural crops as side-dressings near the plant roots to improve uptake efficiency. This was not possible to model in Overseer but was assumed to be applicable on the arable farm with potatoes.

Spread nitrogen applications

Instead of applying nitrogen fertiliser in one dressing at heavy rates (over 45 kgN/ha) leaching will be reduced if the same amount of fertiliser is spread over a number of weeks or even months. There is limited ability to model this in Overseer, but both arable farms had large applications split over more than one month.

Bunding to capture runoff

There are advantages on bare ground of capturing stormwater to hold back sediment, nutrients and pathogens. On both arable farms bunds were assumed to be put in place, reducing the cultivatable area for cropping.

Active water management

To reduce annual water use on the modelled arable-with-potatoes farm a moisture probe was introduced to monitor soil moisture and establish a water budget. Using a water budget reduces water use to calculated deficits and reduces nutrient losses.

Reduce fallow

Fallow periods of bare soil increase nitrogen leaching. By using a cover crop, when the land is next cultivated, surplus nitrogen is captured and returned to the soil in organic matter.

Remove livestock

Livestock on arable farms concentrate nitrogen when they urinate in patches. Removing livestock reduces this source of nitrogen leaching.

Export green crops

Harvesting green crops captures the nitrogen they contain and enables surplus to be exported off the farm. It is better than grazing with livestock if the intention is to reduce nitrogen leaching.

Reduce the area of heavy nitrogen feeding crops

Crops that have a high proportion of their biomass harvested have a high requirement for nitrogen fertiliser and so increased nitrogen losses. Replacing heavy nitrogen feeders with grain crops

reduces nitrogen requirements and nitrogen losses. The arable-with-potato farm had a proportion of potatoes replaced with barley.

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16. Appendix E. A summary of Commodity and Service Prices

These are listed in no particular order

Dairy	Amount	Notes
Milk solids payout (kg MS)	$6.00	
Dividend	$0.40	Assumes fully shared up Fonterra suppliers
Management fee	$75,000 pa	Owners wage of management
Senior farm staff	$60 - $75,000 pa	2IC – farm manager
Farm hand	$50,000 pa	
Fertiliser Phosphate	$3.70 / kgP	High analysis fertiliser on arable farms used cost price
Fertiliser potash	$1.50 / kgK	As above
Fertiliser Nitrogen (Urea)	$700 / T incl spreading	As above
Off farm grazing - weaners	$5 / head / week	
Off farm grazing – Rising 1yr May to May	$8.50 / head / week	
Off farm grazing – winter mixed age cows	$27 / head / week incl transport	
Feed Prices – PKE	$280 / T delivered	
Pasture Silage Imported	$250 / TDM	
Maize Silage Imported	$320 / TDM	
Barley Grain	$400 / TDM	
Hay	$85 / bale delivered	
Sale Price of Exported Pasture Silage	$150 / TDM	
Arable Farms	Sale Price / T	Crop Cost $ / ha
Barley price	$333 / T	$1,344 / ha
Pasture silage	$150 / TDM	NA
Oat Silage	$150 / TDM	$500 / ha
Maize silage	$240 / TDM	$2,400 / ha
Potatoes	$300 / T	$9,519 / ha
Brussel Sprouts	$385.70	$3,456 / ha
	Sale Price	Purchase Price
Finished lambs (average)	$6.60 / kg cw	$2.87 kg lw
Store cattle (average)	$2.87 / kg LW	$3.71 / kg lw

Annex O

KapAg

Finished cattle (average)	$5.73 / kg cw	$3.71 / kg lw
Other		
Farm consultants	$150/hr	
Technical specialists	$250/hr	
Council staff	$100/hr	
Interest rate on annuity for additional capital requirements	7%	

Report No.	17-144
Information Only - No Decision Required	

MARINE AND COASTAL AREA ACT (TAKUTAI MOANA) ACT 2011

1. EXECUTIVE SUMMARY

1.1. The **Marine and Coastal Area (Takutai Moana) Act 2011 (MACA)** provided Māori (until the deadline of 3 April 2017) with a course to seek recognition of customary marine title and protected customary rights within the common marine coastal area. There have been 24 applications lodged with the High Court, or via direct engagement with the Crown, for coastal areas that fall within the Horizons' region.

1.2. With immediate effect from the lodging of those applications, anyone now seeking resource consent for an activity within the common marine coastal area must notify, and seek the views of the applicant group, prior to applying for consent. Horizons Consents staff are aware of this obligation.

1.3. Successful MACA applicants will be conferred with rights, while councils will have obligations placed on them. Our lawyer has provided advice on those rights, obligations and the implications.

2. RECOMMENDATION

That the Committee recommends that Council:

a. receives the information contained in Report No. 17-144

b. receives the information contained in the memo 'Statutory implications of the Marine and Coastal Area (Takutai Moana) Act 2011'.

3. BACKGROUND

3.1. MACA replaced The Foreshore and Seabed Act 2004. The new Act acknowledges the importance of the marine and coastal area and, with limited exceptions, implements a no-ownership regime. It provides for the recognition of the customary interests of iwi, hapū and whānau in the common marine and coastal area while guaranteeing public access to all New Zealanders. Two distinct areas are referred to within:

- Marine and coastal area; the area between the mean high water springs and the outer limits of the territorial sea, 12 nautical miles from shore.
- **Common marine and coastal area (CMCA)**; those parts of the marine and coastal area that are not in private ownership or part of a conservation area. The CMCA is not, nor can it ever be, owned.

3.2. Iwi, hapū and whānau had until 3 April 2017 to lodge an application for recognition of customary interests, either via the High Court, or through direct engagement with the Crown. Applicants were able to apply under both processes. The Act provides for recognition of two types of customary interests:

- **Customary marine title (CMT);** this is similar to, but is not ownership. Recognition of CMT confers a number of rights, including:
  a. resource management agreement permission rights;
  b. conservation permission rights;

c. the right to be notified and consulted when other groups apply for marine mammal watching permits in the area;

d. the right to be consulted about changes to Coastal Policy Statements;

e. a wāhi tapu protection right which lets the group seek recognition of a wāhi tapu and restrict access to the area if this is needed to protect the wāhi tapu;

f. the ownership of minerals other than petroleum, gold, silver and uranium which are found in the area;

g. the interim ownership of taonga tūturu found in the area;

h. the ability to prepare a planning document which sets out the group's objectives and policies for the management of resources in the area.

- **Protected customary rights (PCR);** these rights can be granted for a customary activity like collecting hāngi stones or launching waka in the common marine and coastal area. Holders of PCR do not need resource consent to carry out that activity and local authorities can't grant resource consents for other activities that would have an adverse effect on that PCR.

3.3. The tests for achieving CMT and PCR are set out in the Act. CMT applicants will need to prove that they currently *hold the area* in accordance with tikanga, and that they have used and occupied the area without substantial interruption since 1840.

3.4. PCR applicants will need to prove that they *have exercised the activity* in accordance with tikanga from 1840 through until today.

4. Current Situation

4.1. A total of 186 MACA applications were lodged with the High Court, many just prior to the cut off date. The number of applications has caused some difficulty for all; the Court, Crown Law, applicants and interested parties. Not all interested parties (e.g. councils) were notified by applicants as required. There was also some confusion as to where the applicant areas were; this has been rectified with most applications having been mapped by the Crown Law Office.

4.2. Attorney-General records indicate that 17 High Court applications lie within the Horizons' region, some of these are also seeking direct engagement with the Crown. There are a further twelve applicants who have filed via direct engagement with the Crown. All coastal areas of the region have been claimed by two or more applicants. Most applicants have sought CMT, with the majority seeking both CMT and PCR. Only one applicant is seeking just PCR.

4.3. Crown Law has proposed that, with effect 30 June 2017, all interested parties and applicants have six weeks to obtain copies of applications in which they may have interest. They then have a further four weeks to file memoranda listing applications in which they wish to appear. Upon completion the Attorney General will have a further eight weeks to file and serve an amended notice of appearance for each application.

4.4. Horizons will join court hearings as an interested party. Buddle Finlay has been engaged to act on our behalf, to watch and listen and ensure that any rulings made by the Court are workable for Horizons. The lawyers have advised that it is unlikely that any case management conferences will be held this year.

4.5. To facilitate the management of applications the Attorney-General has proposed grouping those that may be heard together, (generally by regional and district council boundary) and is now awaiting feedback from all parties. The current proposition will see applicants within the Horizons' region being assembled into two groups; namely the west and east coast.

5. Immediate Obligations

5.1. The majority of obligations under MACA apply only after the rights are formally recognised. That is the date on which the High Court order is sealed, or in the case of an agreement, the date on which the agreement is brought into effect.

5.2. A notable exception relates to anyone who is applying for a resource consent, a permit, or an approval in relation to an area of the CMCA, that is the subject of a CMT application. These people must notify and seek the CMT applicant group(s) views on the resource consent application prior to lodging.

5.3. As stated earlier, all of Horizons coastal areas have MACA applications pending, therefore anyone currently considering applying for a consent in the CMCA will need to notify, and seek the views of the applicant group(s). Horizons' senior planners are aware of this obligation and a map (offering more detail than the map produced by Crown Law) indicating applicants and their CMT areas is being produced to assist all.

6. Post Determination Obligations

6.1. Recognition of CMT and PCR confers a number of rights on the successful applicants and places obligations on councils; the attached memo provides detail on these. The memo also provides details on activities that are exempt from the effects of CMT and PCR.

6.2. With the duration that the decision process is likely to take, particularly given the added complexity of overlapping claims, we have time to ensure that our processes will align to meet the requirements of the Act. Further advice will be provided to council as appropriate.

7. SIGNIFICANCE

7.1. This is not a significant decision according to the Council's Policy on Significance and Engagement.

Jerald Twomey
SENIOR POLICY ANALYST IWI

Tom Bowen
POLICY & STRATEGY MANAGER

ANNEXES

A Statutory implications of the Marine and Coastal Area (Takutai Moana) Act 2011

B Map of Marine and Coastal Area Applications for Horizons Region

Annex A

BUDDLEFINDLAY
NEW ZEALAND LAWYERS

Memo

10 July 2017

To: Local Authorities

From: Paul Beverley
Annie O'Connor
Alanna Garland Duignan

Statutory implications of the Marine and Coastal Area (Takutai Moana) Act 2011

Introduction

1. This Memorandum provides an overview of some of the key implications arising from the Marine and Coastal Area (Takutai Moana) Act 2011 ("**MACA**") that we have identified as being of interest to local authorities.

2. There are a number of complexities in the MACA regime, including in terms of how it interacts with other statutes such as the RMA, and so this Memorandum provides only an overview (rather than a detailed analysis) of the implications of MACA.

3. This Memorandum addresses:

   (a) **Part A**: Background information;

   (b) **Part B**: Immediate obligations under MACA;

   (c) **Part C**: Obligations once rights are formally recognised:

      (i) Protected Customary Rights;

      (ii) Customary Marine Title;

   (d) **Part D**: Exemptions; and

   (e) **Part E**: Conclusion.

Part A: Background information

4. MACA came into force in 2011 and replaced the Foreshore and Seabed Act 2004. The new Act implemented a 'no-ownership' regime over the marine and coastal area (with some limited exceptions) and introduced mechanisms to recognise Māori customary rights in that area.

5. Those mechanisms include:

   (a) participation rights in certain conservation processes (for example, in relation to conservation protected areas such as reserves, marine reserves or marine mammal sanctuaries);

   (b) 'protected customary rights' ("**PCRs**") (allowing certain traditional practices to be exercised without undue regulatory constraint); and

   (c) customary marine title ("**CMT**") (a mechanism similar to (but not) ownership).

6. This document focuses primarily on PCRs and CMT, although local authorities should be aware of the conservation processes that also apply to reserves that exist below the line of mean high water springs.

7. Applications for PCRs or CMT can be made under MACA by one or more iwi, hapū or whanaū group, and can be made by a legal entity or natural person appointed as representative of one or more of those groups.

8. PCRs or CMT can be recognised through either:

   (a) a recognition agreement negotiated directly with the Crown ("**direct engagement**"); or

   (b) a recognition order issued by the High Court ("**High Court proceedings**").

9. An applicant may, and many have, applied under both processes.

10. As you are aware, there have been numerous applications for PCRs and/or CMT made since MACA came into force, the majority of these being lodged in the weeks preceding the close of the statutory application period on 3 April 2017.

11. The tests for achieving PCRs and CMT are set out in MACA. It is early days in terms of processing these applications, and it is currently not clear how the Crown and the High Court will apply those statutory tests, or how many PCRs and CMT applications will be recognised.

Part B: Immediate obligations under MACA

12. The majority of obligations under MACA apply only after the rights are formally recognised, which is the date on which the High Court order is sealed, or in the case of an agreement, the date on which the agreement is brought into effect.

13. One key exception, which relates to applications for CMT, is the obligation on resource consent applicants under section 62 of MACA as follows:

> *(2) Subsection (3) applies if a person applies for a resource consent, a permit, or an approval in relation to a part of the common marine and coastal area in respect of which—*
>
> *(a) no customary marine title order or agreement applies; but*
>
> *(b) either—*
>
> *(i) an applicant group has applied to the Court under section 100 for recognition of customary marine title and notice has been given in accordance with section 103; or*
>
> *(ii) an applicant group has applied to enter negotiations under section 95.*
>
> *(3) Before a person may lodge an application that relates to a right conferred by a customary marine title order or agreement, that person must—*
>
> *(a) **notify** the applicant group about the application; and*
>
> *(b) **seek the views** of the group on the application.*
>
> (emphasis added)

14. This obligation requires an applicant for resource consent to notify and seek the views of an applicant for CMT, before the resource consent application is lodged.

15. Importantly, this obligation arises now - i.e as soon as a CMT application for direct engagement is lodged with the Crown or an application for High Court proceedings is lodged with the Court.

16. That obligation applies "*before a person may lodge*" an application for resource consent, and presumably a local authority should not accept an application without evidence of compliance with section 62(3) of MACA. The exact nature of local authorities' obligations in this regard is not clear. Having looked into the Departmental Report on the Marine and Coastal Area Bill, it is apparent that this specific ambiguity was raised as a concern, however this did not translate into an RMA amendment to clarify local authorities' obligations when processing applications.

17. Further, it is not entirely clear what *"an application that relates to a right conferred by a customary marine title order or agreement"* means and whether that is also intended to apply to resource consent applications outside of (but 'relating to') CMT areas.

Part C: Obligations once rights are formally recognised

Protected Customary Rights

18. Under the RMA, the protection of PCRs is a matter of national importance that must be "recognised and provided for" in accordance with section 6 of that Act.

19. Section 55 of MACA sets out the effect of PCR on resource consent applications lodged after the date on which a PCRs take effect. Of particular note is subsection 2 which states;

> *(2) A consent authority must not grant a resource consent for an activity (including a controlled activity) to be carried out in a protected customary rights area if the activity will, or is likely to, have adverse effects that are more than minor on the exercise of a protected customary right, unless—*
>
> *(a) the relevant protected customary rights group gives its written approval for the proposed activity; or*
>
> *(b) the activity is one to which subsection (3) applies.*
>
> (...)

20. Section 87A(2)(a) of the RMA cross-refers to section 55 of MACA as an additional exception to the general requirement upon a consent authority to grant consent for controlled activities.

21. Under section 104 of the RMA, when considering an application for resource consent, a consent authority must not grant a resource consent contrary to section 55 of MACA.

22. Together these provisions mean that in the absence of written approval from the relevant PCRs group, applications for resource consent (including those that are controlled activities) that will, or are likely to, have adverse effects that are more than minor on the exercise of a PCR must not be granted.

23. Depending on the nature of the PCR recognised through a Court order or agreement, section 55(2) could have significant implications for resource consent processes. The current PCR applications are in many cases broad-ranging (both in area and in the description of the rights sought). If the PCRs are recognised in that form, many resource consent applications may not be able to be granted without the approval of the PCR holder. It will be necessary for the consent authority to apply a 'more than minor' effects test, which could be challenging if the PCRs are too broadly framed.

24. Section 55(3) identifies a range of matters that are not affected by a PCR, including (by way of summary):

    (a) coastal permits for existing aquaculture activities;

    (b) a resource consent for emergency activities;

    (c) a resource consent for 'existing accommodated infrastructure' (section 63 of MACA); and

    (d) a resource consent for a 'deemed accommodated activity' (section 65 of MACA).

25. Some of these exemptions are discussed below in relation to CMT.

Notification of resource consent applications

26. If a consent authority does not publicly notify an application for resource consent, it must decide whether there are any affected PCR groups in relation to the activity.

27. Section 95F states that a consent authority must decide that a PCR group is an affected PCR group in relation to an activity in the PCR area, if the activity 'may have adverse effects' on a PCR and the PCR group has not given written approval (or has withdrawn approval before a decision has been made).

28. The consent authority must give limited notification of the application to an affected PCR group, even if a rule or national environmental standard precludes public or limited notification of the application.

Information keeping

29. Section 35(2)(e) of the RMA states that a regional council must monitor the exercise of PCRs in its region, including any controls imposed on the exercise of that right and take appropriate action (having regard to the methods available to it under this Act) where this is shown to be necessary.

30. Section 35(5)(jb) of the RMA identifies the information that a regional council must keep which includes records of every protected customary rights order or agreement relating to a part of the common marine and coastal area within its region.

Planning

31. Significantly, section 85A of the RMA states that a plan or proposed plan must not include a rule that describes an activity as a permitted activity if that activity will, or is likely to, have an adverse effect that is more than minor on a PCR.

31.1 Where a PCR group considers that a rule in a plan or proposed plan does not comply with section 85A, the holder may make a submission on a proposed plan to the local authority concerned, request a change to the plan, or apply to the Environment Court for a change to a rule in the plan or proposed plan. There are particular criteria to be applied under section 85B.

Customary Marine Title

32. A CMT confers a number of rights on the CMT group, including:

    (a) an RMA permission right;

    (b) a conservation permission right;

(c) a wāhi tapu protection right; and

(d) the right to create a planning document.

RMA permission right

33. A significant implication of CMT is that an RMA permission right is created. This means under section 68 of MACA that, despite a grant of resource consent, the consented activity may not be commenced in the CMT area without permission of the CMT group:

> ***68 Effect of RMA permission right***
>
> *(1) The holder of a resource consent for an activity in a customary marine title area to which an RMA permission right applies must not commence the activity to which the consent applied unless—*
>
> *(a) permission has been given by the relevant customary marine title group under section 66(2) for that activity; and*
>
> *(b) the permission covers the activity to which the resource consent applies.*
>
> *(2) To avoid doubt, a decision of a customary marine title group to give or to decline permission for an activity is not subject to—*
>
> *(a) a right of appeal; or*
>
> *(b) a right of objection under section 357 or 357A of the Resource Management Act 1991.*

(emphasis added)

34. A decision of a CMT group to give or to decline permission for an activity is not subject to appeal or objection.

35. Sections 66 and 67 of MACA provide further guidance on the scope and procedure of an RMA permission right:

(a) the right applies to activities that are to be carried out under a resource consent, including for a controlled activity, to the extent that the resource consent is for an activity to be carried out within a CMT area;

(b) the right does not apply to the grant or exercise of a resource consent for an *"accommodated activity"*, as discussed in the exemptions section of this Memorandum;

(c) an applicant must make a request for permission by notice to the relevant CMT group and may do so at any time before the relevant resource consent commences;

(d) the CMT group must notify in writing its decision on a request for permission to the applicant and the relevant consent authority;

(e) a CMT group may give or decline permission on any grounds and the decision cannot be revoked;

(f) a CMT group must notify the applicant of its decision within 40 working days after receiving notice from the applicant that they have been granted consent, after this time the CMT group will be treated as having given permission; and

(g) it is an offence to commence the activity in the relevant CMT area without the permission.

36. Section 116 of the RMA which relates to the commencement of a resource consent, is consequentially amended to give effect to the RMA permission right.

Conservation permission right

37. A 'conservation permission right' operates in a similar way to the RMA permission right, enabling a CMT group to give or decline permission to the establishment of, for example, reserves, marine reserves or other conservation protected areas. This is a matter that will be relevant to local authorities in relation to the establishment of reserves below the line of mean high water springs.

Wāhi tapu protection right

38. In accordance with section 78, a CMT group may seek to include recognition of a wāhi tapu or a wāhi tapu area in a CMT order or agreement. A wāhi tapu protection right may be recognised if there is evidence to establish the connection of the group with the wāhi tapu or wāhi tapu area in accordance with tikanga and that to protect the area the group requires access prohibitions or restrictions.

39. If CMT is recognised, the CMT order or agreement must set out the wāhi tapu conditions that apply in accordance with section 79:

    (a) the location of the boundaries of the wāhi tapu or wāhi tapu area that is the subject of the order;

    (b) the prohibitions or restrictions that are to apply, and the reasons for them; and

    (c) any exemption for specified individuals to carry out a PCR in relation to, or in the vicinity of, the protected wāhi tapu or wāhi tapu area, and any conditions applying to the exercise of the exemption.

40. Section 104 of the RMA was amended so that a consent authority must not grant a resource consent contrary to wāhi tapu conditions included in a CMT order or agreement.

Planning document

41. Section 85 of MACA provides a CMT group with the right to prepare a planning document in accordance with its tikanga. The purposes of the planning document are to identify issues relevant to the regulation and management of the CMT area, to set out the regulatory and management objectives of the group for its CMT area and to set out policies for achieving those objectives.

42. A planning document may include any matter that can be regulated under the specified enactments in section 85(5) of MACA including matters that are relevant to promoting the sustainable management of the natural and physical resources of the CMT title area, and the protection of the cultural identity and historic heritage of the group.

43. The planning document is of no effect until lodged with the relevant regional council, other specified agencies, and the chief executive of Land Information New Zealand. In accordance with section 86 of MACA, the document is deemed to be registered on the day that is 20 working days after it is first lodged with an agency.

Annex A

44. Under section 88 of MACA, local authorities that have statutory functions in the district or region where the CMT area is located, on and after the date that a planning document is registered, must take the planning document into account when making any decision under the Local Government Act 2002 in relation to the CMT area.

45. Section 93 of MACA introduces the following obligations on the relevant regional council(s) in relation to a CMT planning document:

(a) within 20 working days after lodgement of the CMT planning document ('**registration date**'), a regional council must identify the matters in the planning document that relate to resource management issues within its functions under the RMA, to the extent that those matters are relevant within the CMT area to which the planning document relates, and any parts of the common marine and coastal area to which the planning document relates (other than the CMT area);

(b) after registration date, a regional council must initiate a process to determine whether to alter its RPS or regional plans, if and to the extent that any alteration would achieve the purpose of the RMA and either 'recognise and provide for' or 'take into account' the matters identified in (a) above (depending upon whether the planning document is referring to matters within or outside of the CMT area). That process must commence no later than the first proposed plan change, variation or review of the RPS or regional plan; and

(c) until regional planning document alterations in accordance with this section become operative or a timeframe has passed after notification that alterations will not be made, a regional council must:

(i) attach the planning document(s) to copies of its relevant RMA documents; and

(ii) when considering a resource consent application for an activity that would, if the consent were granted, directly affect, wholly or in part, the area to which the planning document applies, have regard to any matters identified in (a) above.

46. The planning document is also referred to in the provisions of the RMA set out below:

> ***61 Matters to be considered by regional council (policy statements)***
>
> *(…)*
>
> *(2A) When a regional council is preparing or changing a regional policy statement, it must deal with the following documents, if they are lodged with the council, in the manner specified, to the extent that their content has a bearing on the resource management issues of the region:*
>
> *(a) the council must take into account any relevant planning document recognised by an iwi authority; and*
>
> *(b) in relation to a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, the council must, in accordance with section 93 of that Act,—*
>
> *(i) recognise and provide for the matters in that document, to the extent that they relate to the relevant customary marine title area; and*
>
> *(ii) take into account the matters in that document, to the extent that they relate to a part of the common marine and coastal area outside the customary marine title area of the relevant group.*
>
> *(…)*

> ***66 Matters to be considered by regional council (plans)***
>
> *(…)*
>
> *(2A) When a regional council is preparing or changing a regional plan, it must deal with the following documents, if they are lodged with the council, in the manner specified, to the extent that their content has a bearing on the resource management issues of the region:*
>
> *(a) the council must take into account any relevant planning document recognised by an iwi authority; and*
>
> *(b) in relation to a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, the council must, in accordance with section 93 of that Act,—*
>
> *(i) recognise and provide for the matters in that document, to the extent that they relate to the relevant customary marine title area; and*
>
> *(ii) take into account the matters in that document, to the extent that they relate to a part of the common marine and coastal area outside the customary marine title area of the relevant group.*
>
> …
>
> ***104 Consideration of applications***
>
> *(…)*
>
> *(2B) When considering a resource consent application for an activity in an area within the scope of a planning document prepared by a customary marine title group under section 85 of the Marine and Coastal Area (Takutai Moana) Act 2011, a consent authority must have regard to any resource management matters set out in that planning document.*
>
> *(2C) Subsection (2B) applies until such time as the regional council, in the case of a consent authority that is a regional council, has completed its obligations in relation to its regional planning documents under section 93 of the Marine and Coastal Area (Takutai Moana) Act 2011.*

47. There have also been a number of obligations included in Schedule 1 of the RMA in relation to CMT groups.

Notification of resource consent applications

48. If a consent authority does not publicly notify an application for resource consent, it must decide whether there are any affected CMT groups in relation to applications for accommodated activities.

49. Section 95G states that a consent authority must decide that a CMT group is affected in relation to an activity in the CMT area, if the activity 'may have adverse effects' on the exercise of rights applying to a CMT group and the CMT group has not given written approval (or has withdrawn approval before a decision has been made).

50. The consent authority must give limited notification of the application to an affected CMT group or even if a rule or national environmental standard precludes public or limited notification of the application.

Annex A

Part D: Exemptions

51. There are a number of provisions set out in MACA to exempt certain activities from the operation of PCRs and CMT and, for example, the RMA permission right.

52. By way of summary, MACA approaches this through a complex set of definitions with references to concepts such as:

    (a) 'accommodated activities'[1] and 'accommodated infrastructure' - which include existing lawfully established infrastructure that meets specified thresholds including in relation to national or regional significance; and

    (b) 'deemed accommodated activities'[2] - which includes the proposed construction of infrastructure where the Minister of Land Information classifies the proposal as a 'deemed accommodated activity' so that it is exempt from CMT and the RMA permission right.

53. There is some uncertainty as to how the exemption provisions will be interpreted. For example, it is not clear what proposed infrastructure would meet the test of being "essential for the social or economic wellbeing of the region" so as to meet the threshold for a deemed accommodated activity. As noted, the exemption definitions are complex and a careful assessment will be required in the individual circumstances of each activity. This is relevant to local authorities both from a regulatory and an infrastructure perspective.

Conclusion

54. Clearly, local authorities will need to work through the implications of MACA for their region or district. This will be particularly important for RMA planning and consenting processes, and for consenting of proposed infrastructure. It will take some time to understand the type of orders that may be issued by the Court, and equally the type of agreements that may be entered into by the Crown. It will also be important to understand how the exemptions in MACA are interpreted. Those outcomes will have a significant bearing on the ultimate implications of MACA for local authorities.

55. We trust this Memorandum is of assistance in providing an overview of those implications.

Ngā mihi, nui

Paul Beverley
Partner

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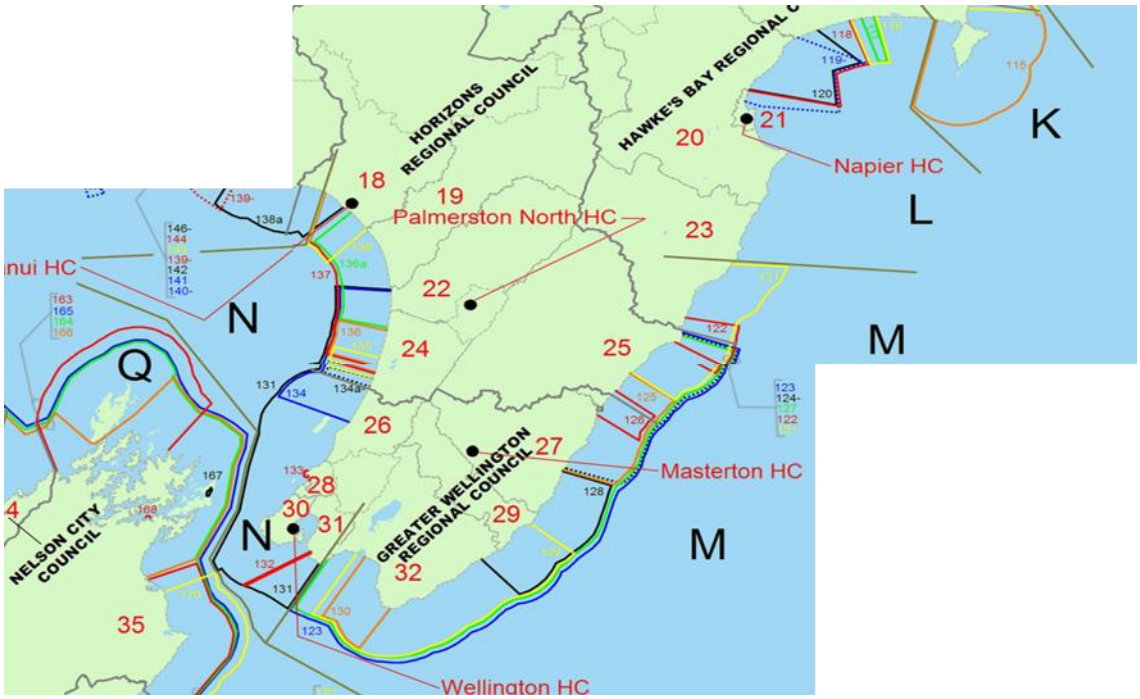
[1] Section 64 of MACA.
[2] Section 65 of MACA.

Marine and Coastal Area Applications Map for Horizons Region



No	Applicant	Colour	Area	Type of App
121	CIV-2017-485-193 Ngati Kere MACA Working Party for an order recognising Customary Marine Title and Protected Customary Rights for Ngāti Kere hapū	Yellow	Southern Hawkes Bay	CMT/PCR
122	CIV-2011-485-789 Ketepunga Kaylene Clarkson and Eriha Whanau of Ngāti Kere/Ngāti Kahungunu	Red	Southern Hawkes Bay	Unknown
123	Trustees of Rangitāne Tū Mai Ra Trust, on behalf of Rangitāne o Wairarapa and Rangitāne o Tamaki nui-a-Rua	Blue	Turakirae Head to southern Hawkes Bay	CMT/PCR
124	CIV-2017-404-481 Anita Broughton of Masterton (Te Hika a Pāpāuma)	Black Dash	Wairarapa	CMT/PCR
125	CIV-2017-485-226 Rebecca Harper, on behalf of Te Hika o Pāpāuma,	Orange	Akitio River to Whareama River	CMT/PCR
126	CIV-2017-485-220 Trustees of Papauma Marae on behalf of the original owners of Mataikona 1, 2 and 3 Blocks and their descendants	Red	Northern Wairarapa	Unknown
127	CIV-2017-485-221 Trustees of the Ngāti Kahungunu ki Wairarapa Tamaki nui-a-Rua Settlement Trust, on behalf of the applicant group Ngati Kahungunu ki Wairarapa Tamaki nui-a-Rua	Green	Whareama River to Pahaoa River	CMT/PCR
131	CIV-2017-485-261 Muaupoko represented by the Muaupoko Tribal Authority incorporated	Black	Rangitikei River to Turakirae Head	CMT/PCR
134	CIV-2017-485-229 Rachael Ann Selby (Ngāti Raukawa)	Blue	Tangimoana to Peka Peka	CMT/PCR
134a	CIV-2017-485-273 Patrick Seymour on behalf of Te Whānau Tima (Seymour) and Te Hapū o Te Mateawa	Black dash	Ohau River to Waikawa River	CMT/PCR
135	CIV-2017-485-214 Margaret Morgan-Allen (Ngāti Hikitanga)	Yellow	Hokio to Ohau	PCR
136	CIV-2017-485-160 William James Taueki on behalf of Muaupoko iwi	Orange	Foxton to south of Hokio	CMT
136a	CIV-2017-485-511 Chris Shenton (Ngāti Apa)	Green	Foxton to Whanganui	CMT/PCR
137	CIV-2017-485-254 Te Patutokotoko represented by Christopher Henare Tahana, Edward (Fred) Clark,Hayden Turoa, and Novena McGuckin	Red	Kai Iwi south to Hokio	CMT/PCR

138	CIV-2017-485-301 Gerrard Paul Albert and Te Kenehi Robert Mair for and on behalf of Te Awa Tupua and Ngā Hapū me Ngā Uri o Te Iwi o Whanganui	Yellow	Kai Iwi River to Whangaehu River	CMT/PCR
138a	CIV-2017-485-183 Te Kaahui o Rauru Trust	Black	Patea River to Whanganui River	CMT/PCR

This map and listings were provided by Crown law Office, accurate as at 30 June 2017.

Annex B

Public Excluded Section

RECOMMENDATION

That the public be excluded from the remainder of the Council meeting as the general subject matter to be considered while the public is excluded, the reason for passing this resolution in relation to each matter, and the specific grounds under section 48 (1) of the Local Government Official Information and Meetings Act 1987 for the passing of this resolution follows.

This resolution is made in reliance on section 48(1)(a) of the Local Government Official Information and Meetings Act 1987 and the particular interest or interests protected by section 6 or section 7 of that Act which would be prejudiced by the holding of the whole or relevant part of the proceedings of the meeting in public, as follows:

General subject of each matter to be considered	Reason for passing this resolution	Ground(s) under section 48(1) for the passing of this resolution
PX1 Confirmation of Public Excluded Meeting held on 7 June 2017	s7(2)(g) - the withholding of the information is necessary to maintain legal professional privilege.	s48(1)(a) The public conduct of the part of the meeting would be likely to result in the disclosure of information for which good reason for withholding exists under section 7.
PX2 Freshwater Improvement Fund Update	s7(2)(a) - the withholding of the information is necessary to protect the privacy of natural persons, including that of a deceased person. The Freshwater Improvement Fund decisions will be announced by the Minister and this item is to brief Council without publicly sharing knowledge of the outcomes of funding decisions.	s48(1)(a) The public conduct of the part of the meeting would be likely to result in the disclosure of information for which good reason for withholding exists under section 7.
PX3 Council / Committee to consider whether any item in the Public Excluded minutes can be moved into the public domain and define the extent of the release		
PX4 Members' Questions		