Your reference: App-20171209
14 August 2017

The General Manager
Environment Southland
Private Bag 90116
INVERCARGILL

Attention: Ms E Allan

Dear Emily

RE: Application for Expanded Dairy Farm, Renewal of Discharge and Water Permits and Land Use for Dairy Effluent Storage Pond – South Dairy Ltd

Please find below our response to your request for further information on the recent application.

This covers your points raised in your letter on 21 June under section 92(1) of the RMA.

Each of your queries have been addressed in turn.

1. Overseer and Application Details

> - Confirmation that all 750 cows and other stock will be wintered off farm.
>   - Alternatively, if the applicant is intending to winter on farm please explain the amount of stock/stock type and crop area/type and if this has been modelled in Overseer.

All 750 cows and other stock will be wintered off the farm. This is the mitigation measure we have recently agreed with Environment Southland as one of the consent conditions to reduce the losses from the farm.

> - Confirmation that the proposed number of cows will be 750, not 780 which has been modelled in Overseer.

Yes, the proposed number of cows will be 750.

> - Electronic Overseer files for the scenarios modelled in the application. I require this information to be able to consider the nutrient budgets provided with the application. This is also to ensure that the budgets have been completed in accordance with the relevant guidelines.

Overseer files have been attached.

> - An explanation for the nitrogen attenuation figure used in the application on page 28 as 97% seems very high. This is important for understanding the effects of the activity.

There are a number of methods for estimating the nitrogen and phosphorous attenuation, and subsequent losses to the environment. In the application we have referred to three and we have adopted the (most) conservative figures for the purposes of estimating the attenuation in this application. These are summarised below.

Method	Attenuation		Reference
	Nitrogen	Phosphorous	
Houlbrooke	93%		Houlbrooke, D., Longhurst, B., Laurenson, S and Wilson, T. (2014). *Benchmarking N and P loss from dairy effluent derived nutrient sources*
Wilson	97%	65%	Wilson, K (2016). *Technical Water Assessments*

We have chosen the most conservative figures – 93% and 65% for nitrogen and phosphorous attenuation respectively. If Environment Southland have a method and details of the amount of attenuation that they use internally and would prefer we use for this application, please advise us.

2. Good Management Practices

> With regards to the mitigations, please identify why these are going above good management practice and assess the effectiveness of these mitigation measures.

There is no definitive guide or reference of GMPs and mitigation measures for the Southland region so in the application we classify the measures for the South Dairy Farm into GMPs and mitigations based on the Canterbury Matrix of Good Management (MGM). The appropriateness of this benchmark for use in Southland has been suggested in an independent report by Irricon consultants in May 2017.

> *"… The MGM Project was a collaboration between several Primary Industry partners and Environment Canterbury to define what GMP looks like on farm in relation to water quality. Prior to this project there were no commonly agreed definitions of GMP… …Although the MGM Project was designed for Canterbury, the GMP's outlined in the report are applicable to most areas within New Zealand." Phillips (2017)*[1]

> ➢ While I can see that you have included some general good management practices (GMP's) on page 20 and page 36 of the application, further details are required. Could you please provide clarification for what you are proposing as GMP's and what you are proposing as mitigations.

As described above, we have used the MGM as a reference for GMPs and mitigation measures. These are listed again below with further details relating to each management practice and mitigation measure.

[1] Philips N., Johnston, K. (2017) *Overseer Modelling Report for Environment Southland.* Irricon resource solutions

Good Management Practices

This coming season and ongoing we will implement all of the following good management practices (GMPs).

Table 1 South Dairy Good management practices this coming season and ongoing

Activity	Relationship to risks with physiographic zones	Additional detail
Nutrient management plans	Limit the use of artificial fertiliser to reduce the amount of nutrient leaching to groundwater in porous zones, or surface water where waterlogging is higher risk.	
Optimum soil test P	Information that helps farm manager optimize use of fertilisers and supplements to reduce the amount of nutrient leaching to groundwater or surface water, and maintain health of cows. Each paddock tested every year.	This was started in 2017 and is now part of the farm management plan going forward.
Stock exclusion from streams and wetlands	Ensure there is no nutrient discharge from the herd directly into waterways, so there isn't faecal contamination, or nitrogen or phosphorous directly into the water.	All waterways are fenced and have been for many years.
Tracks and lane site away from water	Limit faecal contamination or phosphorous run-off into the waterways, and limit sediment and erosion effects from stock.	There are no lanes adjacent to waterways
Limited N fertiliser use	Limit the use of artificial fertiliser to reduce the amount of nutrient leaching to groundwater in porous zones, or surface water where waterlogging is higher risk	As per the nutrient budget, there will be no fertiliser spread between March and August.
Grass buffers	Limit faecal contamination or phosphorous run-off into the waterways, and limit sediment and erosion effects from stock. Grass helps with uptake of any discharge and nutrients in the root zone.	All of the waterways are fenced, with mature grasses and plantings.
Restricted grazing of cropland, some still planted for pasture renewal	Limit high density and concentration of effluent that can flow overland where waterlogging is a risk, or through to groundwater where the zone is more porous. Also maintains soil structure where pasture may be prone to pugging and compaction.	There will be no grazing in winter. Previously there has been winter grazing on the farm and the new block of land.
Pugged soil resown	Ensure high ability of soil to use available nutrients and productive capacity.	Pugged soils are resown as soon as practical.

Mitigation Measures

We have considered the following mitigation measures for implementing on farm. The proposal includes all of the dairy cows being wintered off the farm.

Table 2 South Dairy – Appropriate mitigation measures

Activity	Relationship to risks with physiographic zones	Additional detail
Restricted grazing in autumn	Using high carbohydrate feeds with less pasture or silage.	Instead of putting nitrogen on to boost pasture, silage or fodder beet is used to provide energy for the cows.
Using low N feeds	The use of fodder crop to maintain energy level with low N feed.	Yes this will be implemented
Winter off stock	Reduces the risk of nutrient leaching in porous soil, phosphorous and sediment loss via overland flow during wet periods, and soil compaction.	There will be no stock in paddocks during winter.
Restricted grazing of pasture	The use of stand-off/feed/calving pad when soil conditions are wet.	Standoff feedpads are being constructed to hold stock.
No till pasture where possible (direct drilling)	Reduces the risk of soil and sediment loss. Direct drilling of grass to grass where possible.	Some climatic situations during some seasons mean that this may sometimes not be practical, but is the preferred method of sowing wherever possible.
Fertiliser in split dressings	Reduce the risk of nutrients being lost past root zone if concentrations are too high to be absorbed by pasture and crops. Also when heavy rainfall follows the dressings, the split dressings reduces the nutrients loss to ground or surface water. Nitrogen is split over seven or eight dressings.	This will be introduced as an on-farm practice in 2017.
Feed / standoff pads to keep cows of wet ground	Control the damage to pasture, and when effluent is applied to land through use of storage.	These will be constructed in 2017/18.
Calving pad rather than calving on swedes	Limit high density and concentration of effluent that can flow overland where waterlogging is a risk, or through to groundwater where the zone is more porous. Also maintains soil structure where pasture may be prone to pugging and compaction.	This will be the same feed/standoff pad.
Low rate effluent	Reduce the risk of nutrients being lost past root zone if concentrations are too high to be absorbed by pasture and crops. Also when heavy rainfall follows the dressings, the split reduces the nutrients loss to ground or surface water.	This will be put into place in 2017/18.

Assessment of Effects

> - Identify the effects of the application when comparing the current activity with GMP's to the proposed scenario. This is necessary to establish the existing environment for the site.

The application is based on the GMP's being already in place, and the mitigation measures are being implemented in the first season of the new consent.

> - An assessment of the effects with regards to sediment loss, microbial loss and the total nutrient loss from using the land for dairy farming, not just the aerial load from the collected effluent, on water quality and soil health in the receiving environment and the values associated with it (including Iwi values and values included in Policy 31C of the Regional Water Plan – RWP).
>   - I require this information in order to understand what the effects of the activity are likely to be on the receiving environment. Whilst Overseer presents a scenario, the effect on the values of the receiving environment of the 'losses' need to be assessed.

Assessing the effects of the proposed change in activity we looked for new and pre-existing critical source areas on the farm where nutrients may enter groundwater through deep drainage or other waterways through artificial drainage or overland flow. The sources assessed were:

- direct (from cows),
- indirect (collected agricultural effluent) being applied as fertiliser, and
- other fertilisers.

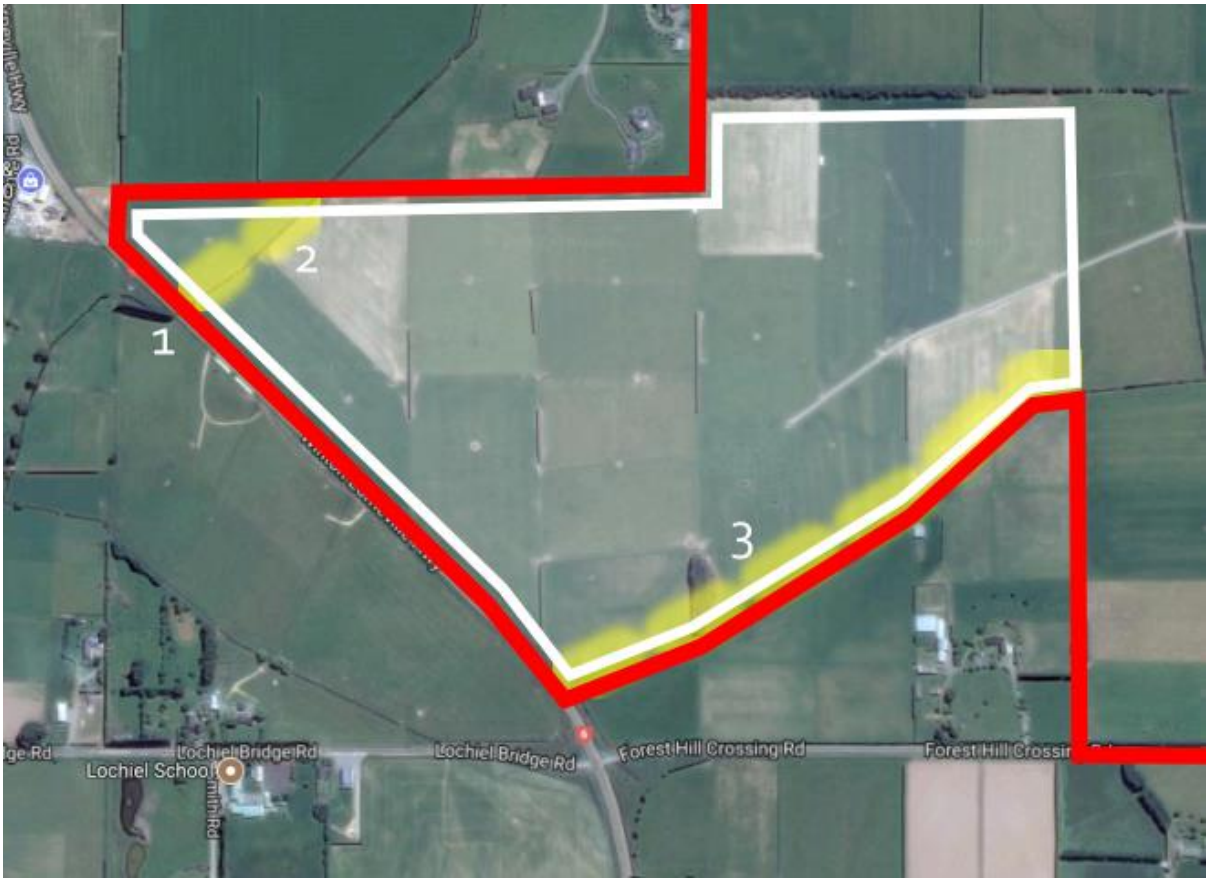
The risks from accidents or other emergencies are considered to be covered in the farm's existing CAEMP. The losses of nutrients (in particular N and P) from each of these sources to the environment have been modelled in Overseer, and additional mitigations have been modelled and discussed extensively in the application that has been submitted. The sediment and microbes have not been discussed in detail and so are discussed in more detail below.

<u>Losses of sediment and microbes to the environment.</u>

In particular sediment carries a high level of risk because microbes and insoluble phosphorous attach to the particles and this can be transferred to the surface water by overland flow. The source of sediment and microbes can be soil or effluent particularly during wet weather and periods of high rainfall.

The farm is flat and the dairy farm has high levels of grass cover at 1,400kg/ha minimum and up to 2,600kg / ha in the buffer zones which restricts any run-off.

The potential risk areas have been highlighted below.



The potential risk areas are described briefly and followed by the assessment of effects. These are:

1) The bridge that crosses a tributary to the Oreti River (shown in Figure 1) that may be a source of sediment and direct effluent. This may contain microbes and soil that could enter the surface waterway during periods of high rainfall through overland flow.

Figure 1 Drain looking north east from Winton Lorneville Highway (Google Earth, 2017)

2) The tributary runs between the two paddocks.

3) The drain runs along the southern boundary of the new lease block

Figure 2 Drain facing north east from Winton Lorneville Highway with South Dairy farm on left-handside of stream (Google Earth, 2017)

While these are the areas of highest risk, because the fences are established and grass buffers are mature, the effects of losses of sediment and microbes to the proximate waterways are considered to be less than minor. This is supported by findings that grass buffer strips of ~5m can reduce 53% of the Phosphorus (Parkyn, 2004) and 74% of incoming solids and 54% N (Dillaha et al, 1989 as cited in Parkyn, 2004)[2].

[2] Parkyn, S. 2004. *Review of Riparian Buffer Zone Effectiveness* MAF Technical Paper 2004/2005.

Activity: Add 50ha lease block with 150 cows to dairy farm platform			
Status quo The current land use over the past six years has been as a run-off block, for winter grazing, raising young stock and cows at various times. The area is 49 hectares and it is being leased. The intensity of land use has been: a. 170 calves. b. 140 heifers that are going to calve. c. 8.7 ha or 17.8% winter crop (average from last five years). d. 200 cows grazed on the winter on fodder crop (68 days).		**Proposed changes** Add 150 cows to the 50ha of land, with a stocking rate of 3.0 cows per hectare.	
Identify possible permanent effects: visual effects, loss of trees and vegetation, shading neighbouring property, soil stability, privacy, stormwater/sewer capacity, traffic generation, landscape changes, effects on water quality/quantity, cultural/spiritual values on iwi, effects on heritage sites/buildings/structures/objects, pollution, loss of recreational values of land etc.			
Environmental effect	**Ranking of effect**	**Avoid/remedy/mitigate effect**	**AEE action**
Increase losses of N and P to environment	Significant	Mitigate effect - investigate necessary measures	Document and action
Losses of sediment at bridge crossing on lease block	None		
Losses of microbes at bridge crossing on lease block	None		
Losses of sediment and microbes to stream on lease block	None	Stream is fenced with mature grasses forming a 3m buffer between the fence and stream. This will ensure that microbes and sediment are trapped and not reach the waterway.	None
Losses of sediment and microbes to stream on southern boundary of lease block	None	Stream is fenced with mature grasses forming a 3m buffer between the fence and stream. This will ensure that microbes and sediment are trapped and not reach the waterway.	None
Losses of sediment and microbes to groundwater from FDE	None		None

- In the application (page 28) a table has been included with regards to Oreti Catchment Nitrogen Load using a number of modelling tools. Could you please assess the effect of the proposed activity on the cumulative losses represented in this table. How does this relate to objectives 2, 8 and 9C of the RWP.

For brevity and to avoid repeating the whole section within the application in Figure 3 that follows, we have cross-referenced the specific policies that we have outlined in the application, to the objectives in the RWP.

Further detail can be provided on specific objectives if required.

Objective	Policy																	
	A4 NPSFW	B7 NPSFW	1A Take iwi management plans into account	3 Allow no discharges to surface water bodies that will result in a reduction in water quality	7 Prefer discharge to land	13 Avoid the point source discharge of raw sewage, foul water and untreated agricultural efflu	21 Adverse effects arising from point and non-point source discharges	22 Require, where appropriate, the installation of water measuring devices on all new permits	25 Adverse effects arising from point and non-point source discharges	26 Avoid adverse effects on groundwater quality and quantity arising from bores and wells	28 Manage abstraction of groundwater to avoid significant adverse effects	30 Groundwater abstraction	31A Match the level of management that is required for discharges of contaminants onto or in	31C Manage discharge of contaminants onto land or into land to avoid, remedy or mitigate ad	42 Avoid adverse effects on water quality associated with the application of farm dairy effluen	43 Term of consent
2 - Maintain water quality			y	y	y	y			y				y	y		
8 - Drinking water standard			y	y						y			y	y		
9C - Habitats and ecosystems and other values			y	y									y	y	y	y

Figure 3 Relevant policies outlined in the South Dairy application. The regional water plan refers to related issues, policies and rules for each objective. Where we have referred to a policy in the application and the RWP notes that this policy relates to the objective, the area has been shaded in green above.

Policy Assessment

- An explanation for why the application is consistent or inconsistent with Policy 15 and Policy 16 of the proposed Southland Water and Land Plan (pSWLP). On page 10 of the application, it is stated that the application is consistent with these policies. However, I consider that a thorough assessment should be undertaken as this policy provides a strong direction on the granting of resource consents for additional dairy farming of cows. This assessment needs to identify and detail how the application is consistent with these policies with regards to the assessment of effects and the proposed mitigations. I am requiring this information because:
  - Schedule 4 of the RMA states that all applications must include an assessment of the activity against any relevant provisions of a document referred to in section 104(1)(b) and that the assessment under sub-clause (1)(g) must include an assessment of the activity against any relevant objectives, policies, or rules in a document including those in a proposed plan.

We agree the intent of the proposed Southland Water and Land Plan is to maintain the overall water quality in Southland (hold the line), and the provisions "strongly discourage" applications where activity has "effects … that cannot be avoided or fully mitigated". In recent discussions we have discussed amendments and made changes to the proposal with overall reductions in intensity, and modelled losses of a lower intensity – which we understand satisfies the intent of the proposed plan, and provides detail required by the RMA.

As requested by telephone, a more thorough assessment of effects has been attached.

Excerpt from S4 of RMA (1993) –

104 Consideration of applications

(1) When considering an application for a resource consent and any submissions received, the consent authority must, subject to Part 2, have regard to–

- (a) any actual and potential effects on the environment of allowing the activity; and
- (b) any relevant provisions of—
  - (i) a national environmental standard:
  - (ii) other regulations:
  - (iii) a national policy statement:
  - (iv) a New Zealand coastal policy statement:
  - (v) a regional policy statement or proposed regional policy statement:
  - (vi) a plan or proposed plan; and

Effluent System Details

- Confirmation of the proposed pond volume as multiple figures have been used in the application, is this 3,060 or 5,060 cubic metres?

The proposed pond volume is 5,565. The details in section 6 that refer to 3,060 were incorrect from a previous version of this application drafted in 2016.

- An explanation for how the effluent system will operate in the interim before the new effluent storage is constructed and is operational. What contingency measures are in place to mitigate any interim effects?

The farm has about 100m^3 of storage. This has been used for the past 10 years and with good management has provided reasonable level of control. Diligence will continue until the pond is completed prior to December 2017.

Dairy Effluent Storage Calculator

- An explanation for how the proposed storage volumes are consistent with deferred storage as determined by the Massey Pond Calculator.

The DESC states that the 90% probability storage volume is 5,522m^3. The total proposed storage volume is 5,565m^3.

The details in section 6 that refer to 3,060 were incorrect from a previous version of this application drafted in 2016.

- An explanation of the inputs into the Dairy Effluent Storage Calculator and adjustment to the inputs if required as follows:
  - The minimum effluent block has been put at 20ha rather than 60ha which is consistent with 8ha/100 cows as a best practice guide. Could you please provide a revised calculation which matches the value in Overseer needed to achieve 150kg/N/year or the best practice guide, or provide a suitable explanation for why 20ha is appropriate.

In the Massey pond calculator the low risk soil must be matched with an equal area of high risk soil and the balance of the discharge area is called "surplus area" in the report. All of the 200ha of discharge area is available all the time.

Please contact me if you have any questions.

Yours faithfully
Civil Tech Ltd

Murray Gardyne
Director