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ESTIMATING FUTURE NITROGEN LOSS FOR A NEW COMMUNITY IRRIGATION SCHEME WITH OVERSEER

Brian Ellwood[a] and B Paton[a]

[a]Lowe Environmental Impact, 14 Lowe Street, Addington, Christchurch

Email: brian@lei.co.nz

Abstract:
The establishment of a new community irrigation scheme comes with a complex set of regulatory challenges. The main challenge stems from planning and the uncertainty that many dryland farms have with their exact level of development and future farm system once irrigation commences. This makes it complicated to estimate future nutrient losses, and the associated potential environmental impacts of the irrigation scheme. Adding to the uncertainty is the need for a resource consent to change land use, or to use water from an irrigation scheme, which requires a full assessment of environmental effects, often for a system that has some uncertainty over the sought term of consent.

A proposed irrigation scheme near the Waiau River, North Canterbury which could supply water to approximately 40 farms, used a unique approach to deal with these issues. For this scheme, OVERSEER® was used at a whole scheme level (24,544 ha) to give a prediction of nutrient loss from future potential land use changes. Rather than creating individual budgets for every farm's predicted future with irrigation, reference farm nutrient budgets for four different farm types (dairy, dairy support, cropping, sheep and beef) across the range of soil types in the area, were established.

The average catchment load for nitrogen (N) and Phosphorus (P) loss was calculated based on the percent of each soil type and the overall expected percent change in land use/farm type across the scheme command area. This allowed a total scheme nutrient load to be estimated for potential land use change within the scheme area and provided a nutrient loss estimate from which potential environmental impacts could then be assessed during the pre-feasibility phase of scheme development. A resource consent for the scheme nutrient load could then be applied for.

In the future, farms associated with the scheme will be managed based on this scheme nutrient load. This method permits flexibility for farmers and certainty for regulators and stakeholders. It also means farmers do not have to lock in their future farm system and potential N losses before scheme costs and water supply reliability are known.

Introduction:

The development of a new method to estimate future nitrogen and phosphorus losses from community irrigation schemes was a result of a consent application process for a scheme in North Canterbury. Within the scheme command area there was 4,500 ha of existing irrigation and a further 8,000 ha that could be irrigated. Figure 1 shows the scheme command area, with both existing irrigation areas and potential irrigation areas. An extra 3,500 ha of new irrigation was being proposed on land within the potentially irrigatable area. This land is intended to be supplied water via a single pipeline through the middle of the command area.

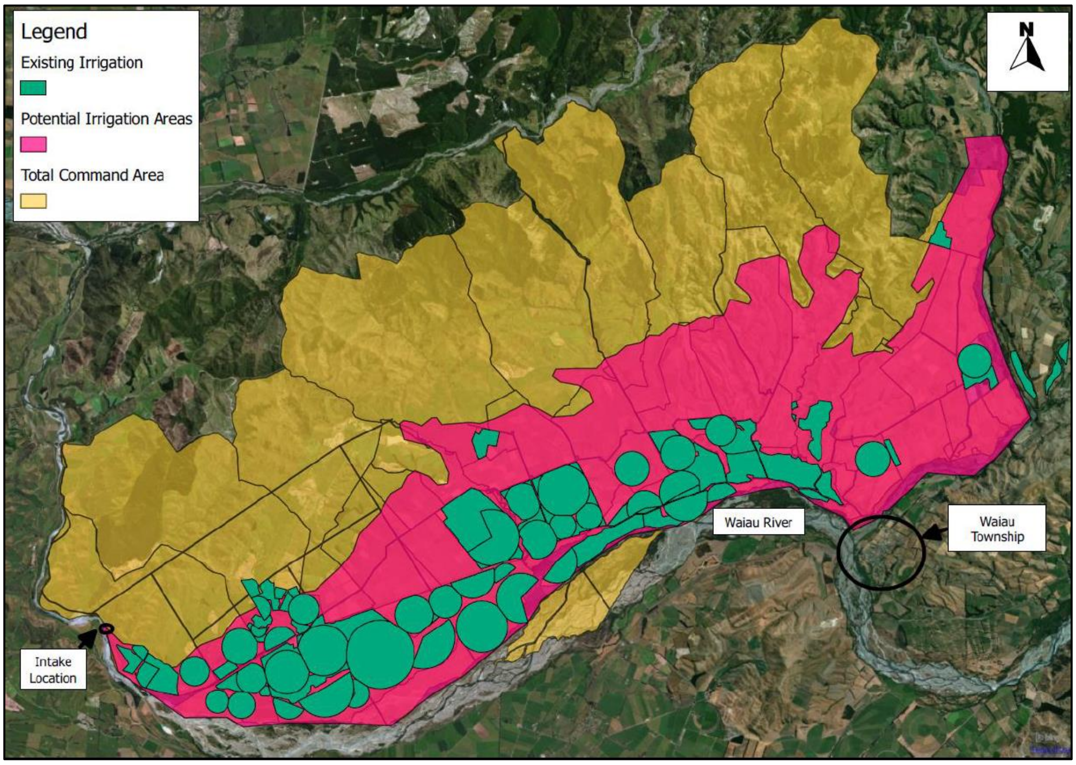

Figure 1: Command Area, Existing Irrigation Area and Potentially Irrigated Areas for Scheme near Waiau, North Canterbury.

Resource consents are required for both the water take from the Waiau River and for a change in farming land use. The farming land use consent is required as a result of the likely intensification of farming systems during the conversion from dryland to irrigated land.

All land use consent applications must assess the impact of the proposed activity compared to the existing environment. There is a regulatory requirement to produce OVERSEER® nutrient budgets which give an estimate of expected nitrogen leaching for both existing and proposed scenarios on each farm. This can be challenging when consenting a community irrigation scheme, due to the number of farms within a scheme and the diversity of farming systems.

To calculate the schemes existing baseline, OVERSEER® budgets for all 40 farms were completed and added together to give the total existing scheme N load. The baseline period for defining the existing farm scenario in Canterbury is from 2009 – 2013. Under the current system, the baseline nitrogen leaching and phosphorus loss estimated over the Existing scheme area is 663,290 kg N/yr and 19,316 kg P/yr,

When establishing the scheme's existing N loss using OVERSEER® there is a challenge around updating existing OVERSEER® files from farms within the scheme. Many farms will already have existing baseline files but many of these files are not up to regulatory standards. These files may not accurately represent the current farming system and could be underestimating losses. It is important to get these as accurate as possible during the scheme consenting phase, as these files will set the baseline on which the schemes future nutrient loss will be accessed against. Also, if a farm makes an environmental improvement and its losses were underestimated at the beginning, then the improvements may not necessarily be accurately represented or captured within OVERSEER®. It is important to have an accurate understanding of the root zone N losses from whole scheme catchment.

When trying to establish the future scheme scenarios and the OVERSEER® files for each farm, the main challenge is establishing the unknown future farming system. This uncertainly may be a result of a lack of experience with irrigation, a lack of urgency as consenting is the first phase before water maybe delivered several years in the future, or it might be that they require more certainty around economics, relatability and nutrients. Farm system modelling can give an indication of potential growth, but many farmers may not know what to do with this extra growth and don't want to lock in a future farm system. As a result, it is difficult to set future N loads for each individual farm which fully represent the future losses.

A method has been developed which allows an estimate of what the future nutrient loss from the scheme could be, without the need to get individual farm owners fixing the exact details of the farming system they would like to operate in the future. The method provides a basis from which the management of nutrients at a catchment scale can be achieved, whilst also allowing farmers the flexibility to follow the market and convert to the profitable system that suits them.

Method:
To estimate the future nutrient loss, a future landuse mix approach has been applied across the proposed 3,500 ha of future irrigation. The approach proposed closely replicates the method used to estimate the load for other irrigation schemes, such as the Barrhill Chertsey Irrigation Ltd Scheme and Rangitata Diversion Race Management Ltd Scheme, and has been applied in the South Canterbury Plan Change 3 process for the Land and Water Regional Plan.

There are four different farming systems that broadly represent what could be farmed under irrigation within the North Canterbury scheme. These include:

- Dairy;
- Dairy Support;
- Sheep/ beef intensification and finishing; and
- Mixed arable.

These four proposed farm systems have been modelled in OVERSEER® to estimate the total nutrient loading over the scheme due to this change in land use (Nitrogen = kg N/ha/yr, Phosphorus = kg P/ha/yr).

The proportion of farming systems for calculating the future nutrient loss is estimated to be:

- 35% Dairy;
- 35% Dairy support;
- 20 % Sheep and Beef; and
- 10% Mixed Arable.

A typical scenario for each of the fours farming systems was modelled in OVERSEER®.

Outline details of the farm systems are as follows:

Dairy
A typical dairy farm on the flats (<15° slope gradient) under irrigation has been modelled as:

- 210 ha
- Irrigated with Centre Pivot
- 630 peak cows wintered on
- 3.0 cows/ha
- 430 kg MS/cow/yr, 1,300 kg MS/ha
- Pasture production approximately 19 t DM/ha/yr

- 4.5 mm/day application of irrigation modelled
- Self-contained unit
- Annual rainfall = 850 mm
- Annual PET = 793 mm
- 218 kg N/ha/yr in the form of urea on non-effluent (6 application of 60 kg/ha urea from September – February + 2 applications of 55 kg/ha of urea (August and March)
- 304 kg N/ha in the form of urea and effluent on the effluent block (6 applications of 30 kg/ha of urea = 84 kg N/ha + 220 kg N/ha as effluent)
- 950 kg/ha of supplement imported (silage and straw)
- Silage made on pastoral blocks

Sheep and Beef
A typical sheep and beef property has been modelled to be:

- 500 ha
- Partially irrigated with Centre Pivot (on flats)
- 195 ha of irrigated pasture (on flats)
- 75 ha of irrigated crops (rape, kale and fodder beet)
- 45 ha dryland crop (rape and kale)
- Stock numbers shown in Table 7
- 16.9 SU/ha
- Pasture production approximately 11.9 t DM/ha/yr under the pivot, 10.2 t DM/ha/yr for the dryland Lucerne, and 8.5 t DM/ha/yr for the rolling dryland pasture
- 4.5 mm/day application of irrigation modelled
- Self-contained unit
- Annual rainfall = 850 - 900 mm
- Annual PET = 793 mm
- Fertiliser: 115 kg N/ha on irrigated pastoral flats (5 x urea applications @ 50 kg/ha), 28 kg N/ha on rolling dryland (1 application of 60 kg/ha of urea)
- Baleage made on Lucerne and irrigated flat pastoral blocks

Mixed Arable
A typical mixed arable property has been modelled to be:

- 350 ha
- 50 ha pasture, the remainder of the property in crop rotation
- 4 years in pasture average over the 10-year period
- Irrigated with Centre Pivot
- Stock numbers shown in Table 10
- 21.8 SU/ha on pasture
- Pasture production approximately 12.2 t DM/ha/yr
- 4.5 mm/day application of irrigation modelled
- Self-contained unit
- Annual rainfall = 850 mm
- Annual PET (mm) = 793 mm
- Fertiliser: 115 kg N/ha on irrigated pastoral flats (5 x urea applications @ 50 kg/ha)

Dairy Support

A typical dairy support property on the flats under irrigation has been modelled to be:

- 260 ha
- Irrigated with Centre Pivot
- Stock numbers shown in Table 4
- 26.7 SU/ha
- Pasture production approximately 12.2 t DM/ha/yr.
- 4.5 mm/day application of irrigation modelled
- Self-contained unit
- Annual rainfall = 850 mm
- Annual PET (mm) = 793 mm
- 115 kg N/ha/yr in the form of urea on the pastoral block (50 kg x 5 applications of urea/ year = 115 kg N/ha)
- 900 kg/ha of supplement imported (straw)
- Silage made on pastoral blocks

Assessment of farming systems against soil type

From available SMap (Landcare Research 2016) data the scheme command area's soil type has been assessed and grouped across each of the member properties as shown in Figure 2 below.

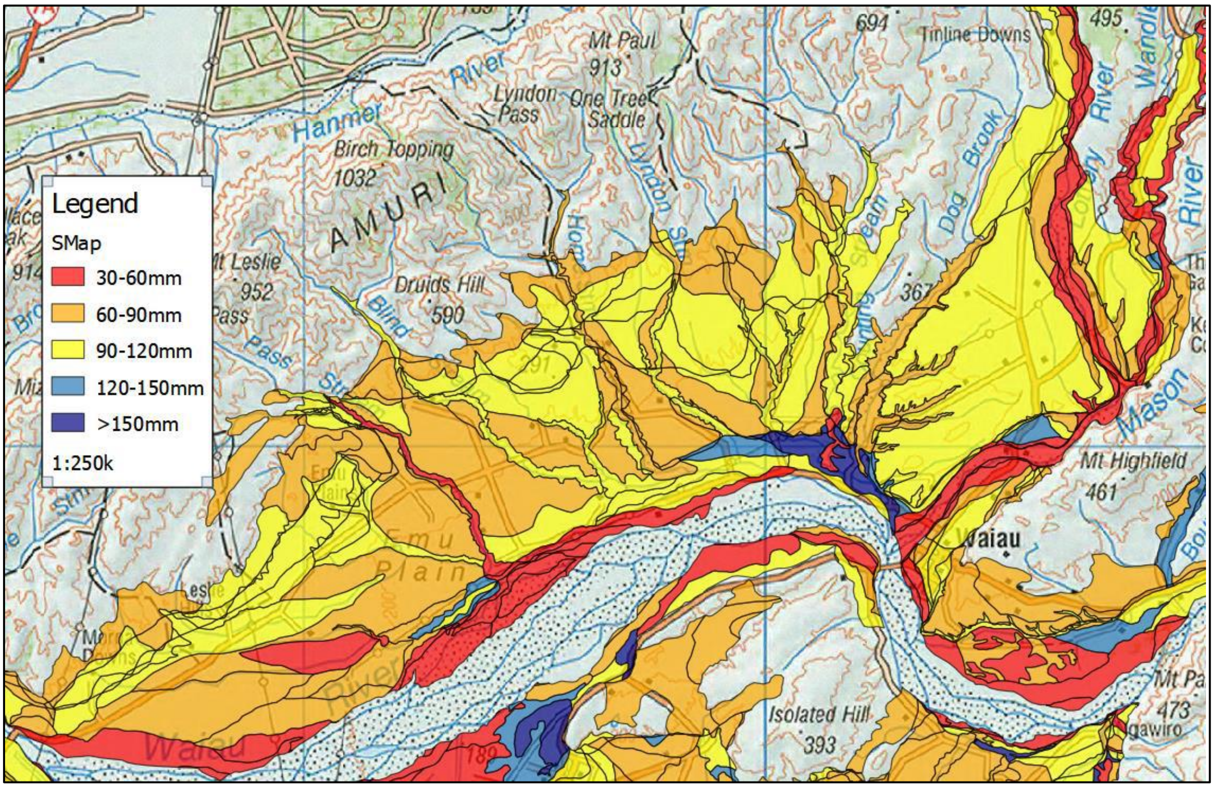

Figure 2. SMap Water Holding Capacity (mm) Within the Scheme Vicinity (Landcare Research, 2016).

By applying each soil type to each of the four farming system scenarios for the scheme in OVERSEER®, a nutrient loss output (kg N/ha/yr and kg P/ha/yr) for each soil is obtained. This was undertaken for each SMap soil with a total area over 50 ha in the scheme command area or area greater than 0.5%. The nutrient losses from each soil for each of the four farming scenarios is presented below in Tables 1-4.

Table 1. Nutrient Losses for Each Soil Under a Typical Dairy Property

Soil Type	Hectares	Soil proportion of command area (%)	N Leaching (kg N/ha/yr)	P run-off (kg P/ha/yr)
Clar_2.1	80	<1%	38	1.5
Culv_2.1	75	<1%	79	1.1
Darn_1.1	1,604	12%	63	1.1
Darn_7.1	858	7%	96	1
Dumg_2.1	77	<1%	45	1.1
Eyre_1.1	413	3%	51	1
Eyre_1.2	98	<1%	56	1
Eyre_3.1	621	5%	72	1.1
Kaia_1.1	113	<1%	42	1.2
Kaia_2.1	116	<1%	42	1.2
Kaur_2.1	77	<1%	51	1.1
Lism_1.1	404	3%	64	0.7
Mair_2.1	4,074	32%	37	1.5
Paha_31.1	301	2%	37	1.2
Paha_37.1	145	1%	36	1.2
Paha_9.1	110	<1%	38	1.2
Raka_2.1	456	4%	91	1.1
Rang_18.1	181	1%	122	0.9
Rang_21.1	103	<1%	73	1.1
Rang_32.2	489	4%	94	1.1
Rive_1.1	115	<1%	30	0.6
Shald_6.1	153	1%	111	1
Tait_21.1	149	1%	26	1.1
Tipa_2.1	1336	10%	44	1
Toka_1.1	175	1%	32	0.7
Waim_40.2	104	<1%	51	1.1
Waip_2.1	121	1%	34	1.2
Waka_10.1	80	<1%	34	1.2
Total	**12,911**	**100%**	**Average = 54**	**Average = 1.2**

Table 2. Nutrient Loss for Each Soil Under a Typical Sheep and Beef Property

Soil Type	Hectares	Soil proportion of command area (%)	N Leaching (kg N/ha)	P run-off (kg P/ha)
Clar_2.1	80	<1%	39	0.7
Culv_2.1	75	<1%	52	0.5
Darn_1.1	1,604	12%	43	0.5
Darn_7.1	858	7%	61	0.5
Dumg_2.1	77	<1%	32	0.5
Eyre_1.1	413	3%	35	0.4
Eyre_1.2	98	<1%	38	0.4
Eyre_3.1	621	5%	48	0.5
Kaia_1.1	113	<1%	29	0.6
Kaia_2.1	116	<1%	29	0.6

Soil Type	Hectares	Soil proportion of command area (%)	N Leaching (kg N/ha)	P run-off (kg P/ha)
Kaur_2.1	77	<1%	41	0.6
Lism_1.1	404	3%	44	0.2
Mair_2.1	4,074	32%	40	0.7
Paha_31.1	301	2%	40	0.6
Paha_37.1	145	1%	39	0.6
Paha_9.1	110	<1%	39	0.6
Raka_2.1	456	4%	57	0.4
Rang_18.1	181	<1%	69	0.3
Rang_21.1	103	<1%	49	0.4
Rang_32.2	489	4%	58	0.3
Rive_1.1	115	<1%	28	0.2
Shald_6.1	153	1%	69	0.5
Tait_21.1	149	1%	24	0.5
Tipa_2.1	1,336	10%	40	0.5
Toka_1.1	175	1%	37	0.2
Waim_40.2	104	<1%	34	0.4
Waip_2.1	121	1%	39	0.6
Waka_10.1	80	<1%	36	0.6
Total	12,911	100%	Average = 43.3	Average = 0.5

Table 3. Nutrient Losses for Each Soil Under a Typical Mixed Arable Property

Soil Type	Hectares	Soil proportion of command area(%)	N Leaching (kg N/ha)	P run-off (kg P/ha)
Clar_2.1	80	<1%	76	0.6
Culv_2.1	75	<1%	91	0.5
Darn_1.1	1,604	12%	80	0.6
Darn_7.1	858	7%	103	0.6
Dumg_2.1	77	<1%	59	0.6
Eyre_1.1	413	3%	68	0.6
Eyre_1.2	98	<1%	68	0.4
Eyre_3.1	621	5%	85	0.5
Kaia_1.1	113	1%	56	0.6
Kaia_2.1	116	<1%	56	0.6
Kaur_2.1	77	<1%	76	0.7
Lism_1.1	404	3%	77	0.2
Mair_2.1	4,074	32%	83	0.6
Paha_31.1	301	2%	78	0.7
Paha_37.1	145	1%	78	0.7
Paha_9.1	110	<1%	78	0.7
Raka_2.1	456	4%	99	0.4
Rang_18.1	181	1%	112	0.2
Rang_21.1	103	<1%	86	0.4
Rang_32.2	489	4%	101	0.3
Rive_1.1	115	<1%	57	0.1

Soil Type	Hectares	Soil proportion of command area(%)	N Leaching (kg N/ha)	P run-off (kg P/ha)
Shald_6.1	153	1%	112	0.5
Tait_21.1	149	1%	50	0.5
Tipa_2.1	1,336	10%	78	0.5
Toka_1.1	175	1%	74	0.2
Waim_40.2	104	<1%	63	0.4
Waip_2.1	121	1%	76	0.6
Waka_10.1	80	<1%	70	0.6
Total	12,911	100%	Average = 81.0	Average = 0.5

Table 4. Nutrient losses for Each Soil Under a Typical Dairy Support Property

Soil Type	Hectares	Soil proportion of command area(%)	N Leaching (kg N/ha)	P run-off (kg P/ha)
Clar_2.1	80	<1%	43	0.7
Culv_2.1	75	<1%	68	0.6
Darn_1.1	1,604	12%	57	0.7
Darn_7.1	858	7%	79	0.6
Dumg_2.1	77	<1%	42	0.6
Eyre_1.1	413	3%	47	0.5
Eyre_1.2	98	<1%	51	0.5
Eyre_3.1	621	5%	63	0.6
Kaia_1.1	113	<1%	38	0.6
Kaia_2.1	116	<1%	38	0.6
Kaur_2.1	77	<1%	50	0.7
Lism_1.1	404	3%	57	0.2
Mair_2.1	4,074	32%	44	0.8
Paha_31.1	301	2%	43	0.8
Paha_37.1	145	1%	42	0.8
Paha_9.1	110	<1%	43	0.8
Raka_2.1	456	4%	74	0.5
Rang_18.1	181	1%	90	0.3
Rang_21.1	103	<1%	64	0.5
Rang_32.2	489	4%	78	0.4
Rive_1.1	115	<1%	33	0.2
Shald_6.1	153	1%	90	0.5
Tait_21.1	149	1%	29	0.5
Tipa_2.1	1,336	10%	47	0.6
Toka_1.1	175	1%	40	0.3
Waim_2.1	6	0%	-	-
Waim_40.2	104	<1%	47	0.5
Waip_2.1	121	1%	41	0.7
Waka_10.1	80	<1%	39	0.7
Total	**12,911**	**100%**	**Average = 52**	**Average = 0.6**

After taking into consideration the proportion of each SMap soils within the scheme command area the average nutrient loss for the total 12,911 ha has been calculated by using the following methodology:

• Multiplying the nutrient loss output for each soil by the soil area (ha) to account for the weighting of each soil;
• Summing the weighted values to give a total load over scheme SMAP area; and
• Divide the soil weighting values by the total hectares over the scheme.

The area weighted average estimates for each of the four farm systems were:

Table 5: Area Weighted Average N and P Loss from Four Typical Farming Systems.

Farm System	Kg N/ha	Kg P/ha
Dairy	54	1.2
Sheep and Beef	43.3	0.5
Mixed Arable	81	0.5
Dairy Support	52	0.63

SMap soils covered 12,911 ha of the 24,544 ha within the command area. Non SMap soils were excluded from the future farming system under irrigation calculations as these soils are associated with the steeper land and are not proposed to be irrigated.

Calculations

Average Nitrogen Load Across the Four Farming Systems

After considering the proportion of each farming system that could be undertaken on the scheme future irrigation area, the average nitrogen leaching can be estimated as shown in Table 6 below.

Table 6. Average Estimated Nitrogen Loss (kg N/ha/yr) as a Weighted Proportion of Four Typical Farming Systems for proposed scheme.

Farm system	**Area weighted Nitrogen leaching kg N/ha/yr**	**Proportion of future irrigation area**	**Proposal load kg N/ha/yr**
Dairy	53.8	35%	18.8
Dairy Support	52.0	35%	18.2
Sheep and Beef	42.5	20%	8.5
Mixed Arable	81.0	10%	8.1
Total			**53.6**

Average Phosphorus Load Across the Four Farming Systems

After considering the proportion of each farming system that could be undertaken on the proposed scheme future irrigation area, the average phosphorus run-off can be estimated as shown in Table 7 below.

Table 7. Average estimated phosphorus loss (kg P/ha/yr) as a weighted proportion of each farming system for proposed scheme.

Farm system	Area weighted phosphorus run-off kg P/ha/yr	Proportion of future irrigation area	Proposal load kg P/ha/yr
Dairy	1.2	35%	0.42
Dairy Support	0.6	35%	0.21
Sheep and Beef	0.5	20%	0.1
Mixed Arable	0.5	10%	0.05
Total			**0.78**

Current N and P Loads

Under the current system, the baseline nitrogen leaching, and phosphorus loss estimated over the Existing scheme area is **663,290 kg N/yr** and **19,316 kg P/yr**, which equates to an average nitrogen loss of 27 kg and an average phosphorus loss of 0.78 kg over the 24,544 ha.

Of this area, 12,602 ha is associated with existing irrigated properties (irrigated and dryland), which has a load of 501,574 kg N and 11,894 kg P, giving an average load of 40 kg N/ha/yr and 0.94 kg P/ha/yr. The new irrigation load (which is currently dryland), has an average nitrogen load of 161,716 kg nitrogen and 7,422kg P over 11,942 ha. This equates to an average nitrogen load of 14 kg N/ha/yr and an average phosphorus load of 0.6 kg P/ha/yr.

Table 8. Current Nitrogen and Phosphorus Losses.

Current systems	Area	N loss kg	N loss kg/ha	P Loss kg	P Loss Kg/ha
Existing area loss	24,544	663,290	27	19,316	0.79
Existing irrigation	12,602	501,574	40	11,894	0.94
New irrigation	11,942	161,716	14	7,422	0.62

Proposed N and P Loads

The proposed future load is 809,903 kg of nitrogen and 21,380 kg of phosphorus (Table 9).

Table 9. Proposed Scheme Nitrogen and Phosphorus Losses

Proposed load	Area	N loss kg/ha	Additional N load	N loss kg/ha	P Loss kg	P Loss kg/ha
Total scheme	24,544	809,903	146,613	33	21,609	0.88
Existing irrigation with 10 % intensification	12,602	536,204	34,630	43	12,667	0.99
New irrigation	11,942	273,699	111,983	23	8,942	0.75

The proposed nitrogen load is calculated below:

Existing Properties with Irrigation

The existing irrigation area load under the proposed Irrigation scheme is calculated as:

- Existing irrigation properties operating above their Baseline with a consented load = 155,274 kg N and 4,162 kg P over 2,908.5 ha = average load of 53.4 kg N/ha/yr and 0.7 kg P/ha/yr.

- Existing irrigated properties operating within their baseline and no increased intensification = 346,300 kg N and 7,732 kg P over 9,694 ha = average load of 35.7 kg N/ha/yr and 0.8 kg P/ha/yr.

This gives a total load of 501,574 kg N and 11,894 kg P for the existing irrigated properties area.

Under the HWRRP, the properties can increase nutrient loss over the baseline loss by 10 % as a permitted activity. There is 9,693 ha's with an estimated baseline nitrogen loss estimate of 346,300 kg N which has the potential to intensify with the current water allocation. A 10 % increase from those properties that are not yet intensified above the baseline equates to a load of 34,630 kg N and 773 kg P.

By adding the current load for the properties with existing irrigated area (501,574 kg N and 11,894 kg P) and the 10 % additional load (34,630 kg N and 773 kg P), the total future load is 536,204 kg N and 12,667 kg P, which is an average load of 43 kg N/ha/yr and 0.99 kg P/ha/yr over 12,602 ha.

New Irrigation Area Load Estimate
The new irrigation properties load estimate under the proposed Irrigation scheme was calculated as:

- Current load is 161,716 kg N and 7,422 kg P over 11,942 ha which equates to an average load of 14 kg N/ha/yr and 0.6 kg P/ha/yr.

Additional Load
Each dryland property that has shares in the proposed Irrigation Scheme has a future nitrogen and phosphorus load based on that properties baseline leaching rate and the future landuse mix. The future land use mix is based on the four farming system estimates that were calculated in OVERSEER®. The average N and P leaching estimate for the four farming systems calculated is 53.6 kg N/ha/yr and 0.78 kg P/ha/yr. The sum of all these farms future nitrogen load is 227,255 kg N and 8,024 kg P.

For the additional irrigation area that has not been allocated to a specific property (1,177 ha), the predicted future load is 46,443 kg N and 918 kg P, based on 1,177 ha leaching at the future landuse mix nitrogen leaching estimate for the four farming systems of 53.6 kg N/ha/yr and 0.78 kg P/ha/yr less the average current load across the dryland properties of 14 kg N/ha/yr and 0.6 kg P/ha/yr.

Therefore, the proposed future nitrogen load of dryland farms converting to irrigation is 273,699 kg N and 8,942 kg P based on allocated load (227,255 kg N and 8,024 kg P) plus the N and P load of the non-allocated load (46,443 kg N and 918 kg N).

New total additional load over scheme area.
Existing irrigation's future load (536,204 kg N and 12,667 kg P) plus New irrigation load (273,699 kg N and 8,942 kg P) equates to 809,903 kg N and 21,609 kg P

The additional proposed load equates to 146,613 kg N and 2,293 kg P calculated as the new additional scheme load (809,903 kg N and 21,609) less the current baseline scheme load (663,290 kg N and 19,316 kg P).

Summary:

Based on a proportional land change from 70 % Sheep and Beef, 20 % Dairy and 10 % Dairy support to 35 % Dairy, 35 % Dairy support, 20 % Sheep and Beef and 10 % Mixed Arable due to 3,500 ha of new irrigation (7,500 ha total), the calculated proposed additional nutrient loads for the new scheme are:

- 146,613 kg of nitrogen per year
- 2,293 kg of phosphorus per year

The future N loads can then be assigned to catchment of tributaries and the mainstem, which allows a basis for an assessment of environmental effect. The N load values can be used in association with catchment data such as water flows and quality, to give a prediction of the environmental change which may be assessed against the relevant policies and plans.

Conclusions:

This method addresses the main issues with the development of community irrigation schemes, which is the uncertainty from farmers around future land use under irrigation. The method allows a total scheme nutrient load to be estimated for potential land use change within the scheme area and provides a value upon which environmental impacts can be assessed and consented.

In the future, farms associated with the scheme area are proposed to be managed based on this estimated load. The future farming system mix does not have to be exactly 35 % Dairy, 35 % Dairy Support, 20 % Sheep and Beef or 10 % Mixed Arable provided the total load for the future farming systems is less that the consented scheme load. This provides flexibility with respect to the farm system intensity while providing certainty for environmental management. The proposed system seeks to manage outputs rather than inputs, allowing farmers to change, adapt and follow the market, whilst providing certainty for stakeholders and regulatory bodies. Farms don’t have to lock in their future farm system before scheme costs and water supply reliability are known.

This method could also be used by regional councils to do an early prediction of potential N loss from a catchment if water allocation or different landuse control were put in place. This catchment N loss estimate could be used prior to consent applications or plan hearings to work out the feasibility of the future regime and if the environment can assimilate the changed nutrient loss from the future landuse mix.

References:

Landcare Research (2016) Soil Moisture layer in S-map – a new soil spatial information system for New Zealand. Retrieved from https://smap.landcareresearch.co.nz/.