



## Fact Sheet 4 – Nutrient Management

### 1. Background

The BCI Scheme was issued a land use consent (CRC141388, now replaced with CRC147697) on 9 September 2013, allowing the scheme to continue to expand without breaching land use change rules under the proposed Land and Water Regional Plan notified by Environment Canterbury in August 2012. The consent duration is five years, after which it is expected that a generic region-wide Regional Council policy will be in place, in addition to the more locally based sub-regional rules being prepared by the local zone committee.

The land use consent issued provides for a maximum loss of nitrogen to ground water from farming activities (Nitrogen Cap) of 1,232 tonnes per year (calculated using Overseer nutrient model) over the 40,000 ha consented irrigated area. It is expected that the full 40,000 ha of irrigation should be achieved by 2023.

### 2. How the 1232 tonnes was calculated

In the application for the land use consent an assessment of current and future loss of nitrogen to ground water from farming was made using model data developed by Macfarlane Rural Business.

The Macfarlane Rural Business model data was developed for Environment Canterbury to estimate nitrogen losses from various farming systems in the Hinds plain area (as part of a sub regional planning process) and assumed the following farming practices for good management practice and advanced mitigation (AM);

#### Good Management Practice

- Reduction in fertiliser in crops following large winter depositions of nitrogen.
- Dairy to install 30+ days effluent storage and greater reduction in N use on effluent applied land.

#### AM1

- Installation of soil moisture monitoring gear and VRI on existing centre pivots *where appropriate*
- No May urea applications *unless conditions allow*
- Adjust cropping fertiliser rates and types to best suit plant requirements and timings
- Use of yield maps to define an assumed 10% of the paddock which only yields half of the paddock average *where appropriate*
- Use variable rate fertiliser technology *where appropriate*
- Limit each urea application to <140 kg/ha *unless fast growing crop*
- Gibberellic acid to substitute some Spring and Autumn nitrogen on pastures

- Mixed pasture sward
- Optimise stocking rates

## AM2

- Modify 90% of irrigated area to include centre pivots/laterals fitted with variable rate irrigation technology *where appropriate*
- Employ NDVI sensing technology and consequent variable rate applications of liquid urea *where appropriate*
- Dairy farms to install covered feed pads and required effluent systems *where appropriate*.

The BCI Scheme used the Macfarlane model data for a set of farming systems, soil types and level of environmental performance within the scheme to estimate loss of nitrogen to ground water for the scheme, considering current land uses and an expected mix of future land uses over the BCI scheme area. Current users of BCI Scheme water were assumed to be performing at 'good management practice' and new users were expected to perform at a higher level, or at 'advanced mitigation level'.

The following chart shows the calculation of the overall Nitrogen Cap.

	Area (ha)	Tonnage N	Average loss per ha
Current BCI Scheme	12,450	534	43 kg
Current Acton Scheme	5,150	139	27 kg
Future allocation	22,400	559	25 kg
Total	40,000	1,232	30.8 kg

Chart one

The future allocation was based on the following proportions of land use and soil types;

	Very Light Soil	Light Soil	Medium Heavy Soil
Dairy	5%	30%	15%
30% wintering cows	1%	6%	3%
70% wintering cows	2%	12%	6%
Arable with process	1%	6%	3%
Arable with small seed	1%	6%	3%

Chart two

It is recognised that the calculation of nitrogen leaching values is uncertain and the numbers may change as the Overseer model evolves. The consent allows for such changes and the key control is the types of land use and the level of environmental performance they must achieve.

### 3. How the future allocation is to be made

Although all new users of BCI water are required to operate with nitrogen losses to ground water of 25kg per hectare per year the scheme accepts that different farming systems and farms with different soil types have varied ability to meet that performance. For example an arable farm on very heavy soils could easily operate at that level, whereas a wintering farm on light soils would find it very challenging. BCI therefore

developed an allocation model to allocate the remaining nitrogen cap on a basis that was seen to be fair to all future users, effectively making the task equally challenging for all farming systems and farms of each soil type.

The following chart includes the background data of the allocation model. The data is based on farming systems developed by Macfarlane Rural Business and assumes all new farms are operating at the high level of performance incorporating the advanced mitigation measures above.

Farm type	PDP Prediction		
	Irrigation Area (ha)	N Loss (kg/yr)	N Loss (kg/ha)
D1 Dairy 4 cows	5,599	127,525	23
- Very Light	560	17,469	31
- Light	3,359	78,612	23
- Medium Heavy	1,680	31,445	19
D2 Dairy 3.4 cows	5,599	176,574	32
- Very Light	560	24,188	43
- Light	3,359	108,847	32
- Medium Heavy	1,680	43,539	26
DS1 30% Wintering	2,240	64,744	29
- Very Light	224	8,869	40
- Light	1,344	39,910	30
- Medium Heavy	672	15,964	24
DS2 70% Wintering	4,479	120,511	27
- Very Light	448	16,663	37
- Light	2,688	74,177	28
- Medium Heavy	1,344	29,671	22
A1 Arable with Process	2,240	29,429	13
- Very Light	224	4,031	18
- Light	1,344	18,141	14
- Medium Heavy	672	7,256	11
A2 Arable with Small Seed	2,240	45,474	20
- Very Light	224	4,838	22
- Light	1,344	29,026	22
- Medium Heavy	672	11,610	17

Chart three

## 4. Principles of Nitrogen Cap Management

The following principles will be employed in the management of the Nitrogen Cap;

- Individual irrigators will not be allocated an equal share of the Nitrogen Cap and trading of Nitrogen Cap between individual irrigators will not be employed.
- Existing irrigators (contracted prior to July 2013) can continue to operate at individual base nitrogen losses (estimated in the consenting process) but there is an expectation that existing irrigators will improve environmental performance in line with enhancements in industry accepted good management practice.

- Existing irrigators can change their land use provided they remain at (or below) their base nitrogen losses (estimated in the consenting process). Some new farming systems may require advanced mitigation measures to remain at (or under) the base nitrogen loss for the property.
- New users will need to have a high level of environmental performance through operating advanced mitigation measures.
- New users should be allocated water provided they can show they will meet the scheme's expectation of nitrogen loss to ground water for their particular farming system and soil type. This will be assessed by new users providing approved Overseer® simulations of their proposed farming system.
- The scheme will not allocate more irrigation to a given farming system/soil type combination than the proportion outlined in Chart two, unless reduction of existing irrigators nitrogen loss is achieved and allows for increased nitrogen losses for new irrigators.
- New users, and existing users changing land use, should be given a reasonable time period to implement advanced mitigation measures which have a negative financial impact on the farming business. As a guide this is likely to be three to four years.
- Where irrigators have multiple sources of water the scheme's expectation of nitrogen loss to ground water will be based on the area irrigated by the BCI Scheme water only (either a specific area or an area based on the average application rate over the entire property from all sources of water).

## 5. Consent Compliance

BCI need to ensure the following measures are put in place for the scheme;

- The scheme must establish an accurate base load by 31 August 2015 by consolidating individual irrigator Overseer simulations.
- Each farm must prepare a Farm Environment Plan, which must pass an audit process through the scheme's Audited Self-Management system.
- Each Farm Environment Plan must be consistent with the Schedule attached to consent CRC141388.
- For farms with water supply agreements that were in place prior to July 2013 the Farm Environment Plan must be in place by 10 September 2015. For all other water supply agreements the Farm Environment Plan must be in place before water can be supplied to the property.
- As part of the Farm Environment Plan process each farm must maintain detailed records of fertiliser application rates, location and crop type (including winter feed/ forage crops), cultivation methods, stock units by reference to type and breed, and all other inputs to the Overseer nutrient budgeting model. These records must be provided to Environment Canterbury if they request them.