BARRHILL CHERTSEY IRRIGATION LIMITED – 2019 ANNUAL REPORT CRC162882

NOVEMBER 2019

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1. INTRODUCTION

Barrhill Chertsey Irrigation Limited (BCI) hold resource consent CRC162882 to permit BCI and Acton Farmers Irrigation Co-Operative (AFIC) shareholders to discharge up to 3,036[1] tonnes N/year to groundwater from 40,000 ha of farming activities within the Ashburton District. BCI are currently in the process of applying to renew this resource consent (CRC184159) and are utilising Section 124 continue provisions to operate under CRC162882 until a decision on the application is made.

Currently BCI is consented to take up to 17 m^3/s of water from the Rakaia River, of which up to 3 m^3/s is provided to AFIC, east of Rakaia. Only 13.1 m^3/s of water was allocated to BCI and AFIC shareholders, with further development of the scheme planned in the future.

All existing shareholders from both schemes were required to complete individual Farm Environment Plans (FEP) by 10 September 2015 and were audited within 2 years. New shareholders need to complete an FEP prior to using water and are audited within 12 months of using water.

This annual report is due 30 November each year to provide a summary of compliance with resource consent CRC162882 and includes:

- V6.3.2 OVERSEER Nitrogen Discharge Allowance, updated by PDP
- 2019 Scheme Management Plan Review Report prepared by Irricon

2. CONDITIONS SUMMARY

CONDITION 1

This consent authorises:

a. *the use of land for farming; and*
b. *the discharge of nutrients to water arising from the use of farming authorised in clause a.*

No comment required.

CONDITION 2

The use of land and discharge specified in condition 1. shall only occur within a maximum of 40,000 hectares on:

a. *the areas marked as Areas 1-8 on attached plan CRC141388, which forms part of this consent; and*
b. *any land located between the Rakaia and Rangitata Rivers covered by a separate consent to use water that has been taken under CRC132861 or any subsequent variation thereof.*

BCI water is irrigated onto 227 properties through the BCI and AFIC irrigation schemes located between the Rakaia and Rangitata Rivers (Figure 1).

In total only 43% of the water available to BCI and AFIC properties is provided by BCI or AFIC, with 52% of BCI or AFIC properties using an alternate source of water (Figure 2). Therefore the total irrigated area within BCI or AFIC shareholder properties is significantly greater than if these properties were only supplied water by the schemes.

The scope of this consent specifically relates to the area of land irrigated by BCI, which we define as the “BCI Irrigated Area”.

[1] Updated to Overseer version 6.3.2

FIGURE 1: BCI AND ACTON IRRIGATED PROPERTIES

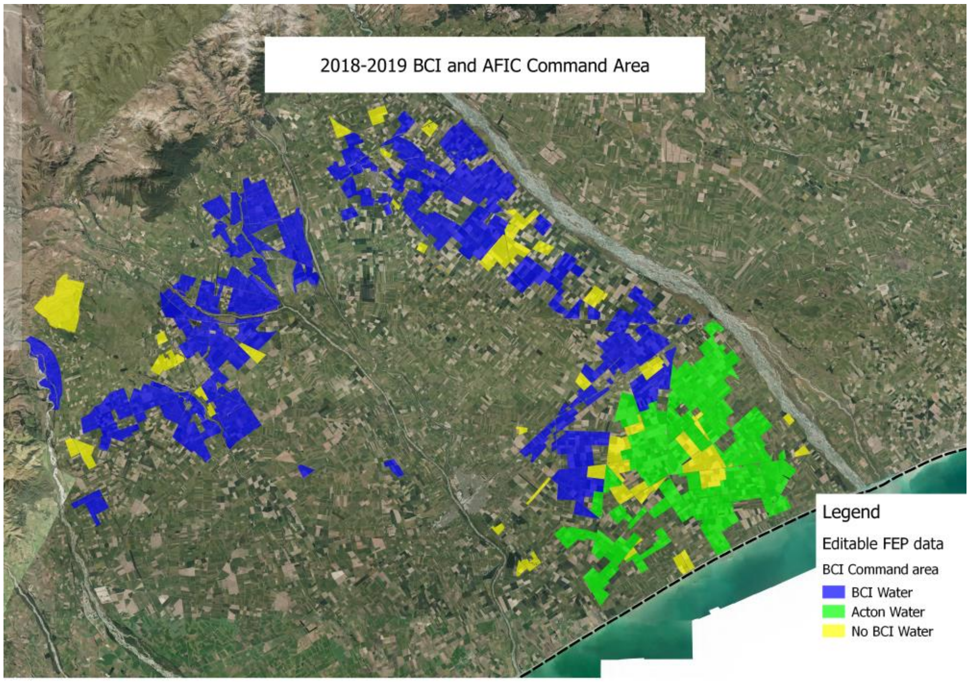
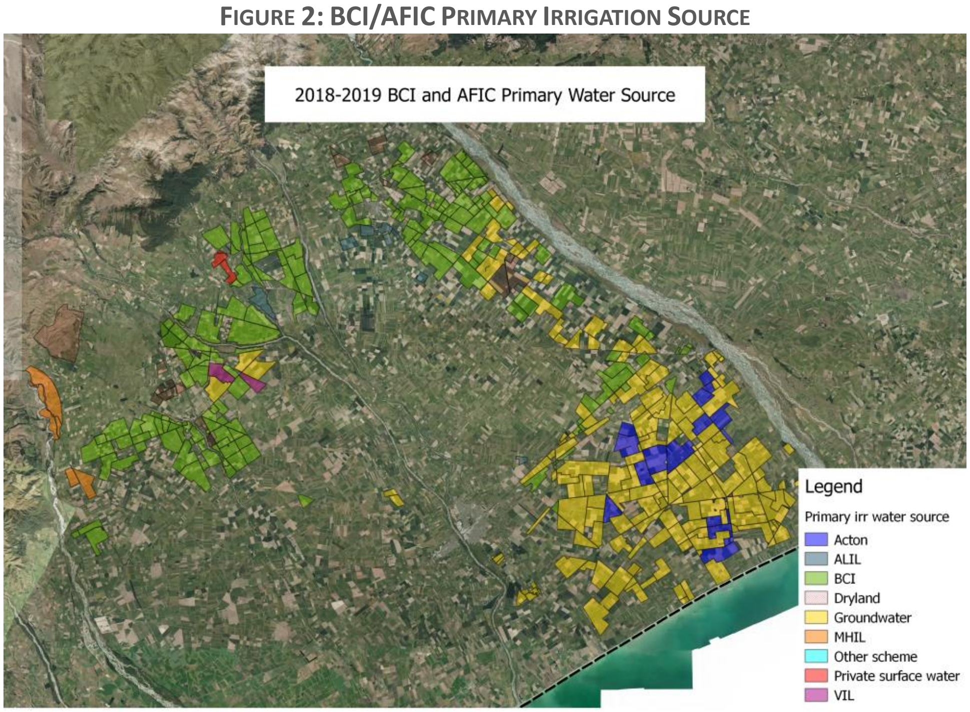


FIGURE 2: BCI/AFIC PRIMARY IRRIGATION SOURCE



To determine compliance with this condition, the "BCI Irrigated Area" is calculated from the total irrigated area using one of two methods:

1. Where BCI water was used to irrigate a particular area; the actual area irrigated by BCI was used.
2. Where BCI water was mixed with other sources of water; the BCI irrigated area was calculated using the relative proportion of water by flow rate. E.g. if 50 l/s comes from BCI and 25 l/s from groundwater, then 2/3rd of the total irrigated area is attributed to BCI.

Using the above method, the BCI Irrigated area for the 2018-19 season was calculated to be **24,210 ha.** No new shares have been issued to start irrigating in the 2019-20 season. A summary of areas managed under the BCI ASM programme is listed in Table 1.

TABLE 1: SUMMARY OF AREAS MANAGED UNDER CONSENT

	2015-2016 Irrigated Area (ha)	2018-19 Irrigated Area (ha)
Total FEP Managed Area	53,699	60,207
Total Irrigated Area	44,655	50,419
Total Effective Dryland	7,107	7,364
BCI Scheme Irrigated Area	18,586	19,620
AFIC Scheme Irrigated Area	4,820	4,590
Total BCI Irrigated Area	**23,406**	**24,210**

CONDITION 3

A Farm Environment Plan (FEP) shall be prepared:

a. *by 10 September 2015 for any properties that had existing water supply agreements with the consent holder that were in place prior to July 2013; and*
b. *for any properties with agreements subsequent to those specified in clause a., prior to the delivery of water to that property.*

The FEP shall be prepared in accordance with Schedule One, which forms part of this consent. The FEP shall be updated as necessary and on farm practice shall be in accordance with the FEP.

All BCI and AFIC shareholders have completed FEPs using the Schedule 7 approved Irrigo Centre Limited template. We are in the process of updating all FEPs to meet the requirements of Schedule 7 of the operative Plan Change 5 of the Land and Water Regional Plan with all shareholders audited to these standards from the 2019-20 season onwards.

In total, 193 FEPs have been prepared between both BCI and AFIC schemes, covering a total of 282 properties over 60,207 ha.

Approximately 55 properties within our FEP/ASM programme are not irrigated by either BCI or AFIC, but form part of a farming enterprise, owned by a shareholder. These properties are required to comply with the BCI Scheme Management Plan (SMP), which includes providing annual nutrient budgets, updating the FEP annually, being subject to FEP audits and limiting their nutrient losses on the property.

Exempt Water Users

We request the following water users for non-farming activities are exempt from the nutrient management and FEP requirements of this consent:

- Methven Rugby Club
- SPS Seeds
- Methven Trotting Club
- AG Wright

- Jackson Holmes Contracting

All five properties use less than 5 l/s of water and meet the permitted activity land use of the Land and Water Regional Plan. Methven Rugby Club uses BCI water to irrigate the Methven Rugby Club sports field. SPS seeds use the water to irrigate seed trial plots, over an area of less than 1 ha. Methven Trotting Club use BCI water to dampen the horse racing track, while AG Wright uses 1 l/s to irrigate Oak trees to inoculate with truffle fungi. A new BCI water user, Jackson Holmes Contracting limiting is proposing to use BCI water for fire-fighting purposes.

Due to the nature of these activities, it is not feasible to prepare FEPs or nutrient budgets for these properties.

Dry Shareholders

BCI and AFIC have one shareholder each where they own shares, but are not currently irrigated by either scheme. Both properties have chosen to join our nutrient management programme and have completed their FEPs and nutrient budgeting requirements.

Note for FEP Managed Area

Many shareholders use multiple sources of water on their property through a single irrigation system and therefore it was impractical to exclude these areas from the Farm Environment Plan. Shareholders were also encouraged to assess their enterprise as a whole and permitted to include properties not irrigated by BCI within their FEP. For these reasons, the FEP areas managed and audited far exceed the BCI Irrigated Area.

CONDITION 4

Audited Self Management Programme

a. *Prior to 1 July 2016, the consent holder shall implement and adhere to an audited self-management programme (ASM), which is developed by a suitably qualified person and approved by the Canterbury Regional Council. The ASM document shall include, but is not limited to:*
    i. *Environmental Targets and Objectives for the scheme and its shareholders;*
    ii. *The proposed monitoring and reporting regime including but not limited to a description of the:*
        a. *Farm Environment Plan (FEP) audit process and the frequency used to assess individual on-farm progress with the content of any FEP and Schedule One;*
        b. *Methods used to follow up with shareholders who are not achieving the environmental objectives of Schedule One as identified during individual farm audits;*
        c. *The proposed data to be collected and reported to the Canterbury Regional Council;*
        d. *Independent annual review of the FEP audit process;*
        e. *How nutrients from all land subject to the scheme or principal water supplier will be accounted for;*
b. *Any significant changes to the ASM document shall be implemented only after approval confirmed in writing by the Monitoring and Compliance Manager, Canterbury Regional Council.*
c. *FEP Audits shall be undertaken by a suitably qualified person at a frequency determined in accordance with Schedule Two, with the exception of the first audit, which shall be completed in accordance with the conditions 4(c)(i) and 4(c)(ii);*

i. *50% of all FEPs prepared prior to 10 September 2015 shall be audited by 10 September 2016*
ii. *50% of all FEPs prepared prior to 10 September 2015 shall be audited by 10 September 2017*
iii. *All FEPs prepared after 10 September 2015 shall be audited within 12 months of being completed.*

d. *The consent holder shall prepare an annual report describing the results of the ASM programme and the audits that have been conducted each year, The report shall include:*
   i. *The name of the FEP auditor(s);*
   ii. *A summary of the audit performance grading;*
   iii. *A summary of the reasons for any farm receiving a C or D grade;*
   iv. *A summary of farms that have repeatedly received a C or D grade;*
   v. *The progress achieved for previously identified issues, if applicable;*
   vi. *The total annual loss of nitrogen from all properties within the Irrigation Scheme or Principal Water Supplier over the reported year.*
   vii. *The performance of the scheme in meeting its environmental targets and objectives.*
e. *A copy of the annual report shall be provided to the Monitoring and Compliance Manager, Canterbury Regional Council, by 30 November each year;*
f. *The FEP Audit records for each property undertaken in accordance with condition (4) shall be kept and made available for the Canterbury Regional Council to inspect, upon request.*
g. *The consent holder shall notify the Monitoring and Compliance Manager, Canterbury Regional Council within 20 working days of any exclusion of a shareholder (s) from the ASM programme.*

Part (a) – Audited Self Management Programme

The BCI Audited Self Management (ASM) Programme was reviewed by Irricon Resource Solutions and Allegrow Limited in November 2019. The review assessed:

- Scheme Management Plan (SMP) meets requirements of this consent, CRC162882
- Where improvements can be made to the SMP, particularly against ISO14000 system standards
- Whether the processes detailed in our SMP were being followed
- Whether audited nutrient budgets provided to determine compliance with the scheme load were robust and prepared to the Best Practice Inputs Standards
- Whether audited FEP Audit reports to ensure Canterbury Certified Farm Environment Plan (FEP) Auditor Manual (February 2016) processes were followed.

The full report is attached as Appendix 1: BCI IRRIGATION SCHEME SMP REVIEW 2019.

The overall summary of the ASM programme review states:

"This is the fourth year that this audit has been undertaken. The scale of change from the initial EMS audited and the audit actions from the first audit is outstanding. The EMS has evolved from having almost no resemblance to the ISO14001 standard to having all of the elements and a good alignment with the standard four years later.

Procedures for improvement have been documented and are being implemented, reviewed and updated.

The overall impression of the reviewers is that the Scheme Management Pan is well organised and record keeping is excellent (with a little bit of organisation required). There is generally a good approach to the environmental management system with flexibility to adapt and adjust processes to meet requirements."

Part (b) – SMP Updates

The BCI Scheme Management Plan (SMP) was reviewed in 2019 to take into consideration feedback from the consenting process and the 2018 SMP review. The updated draft EMS is not intended to be finalised until the renewed consent is granted.

We will ensure the updated SMP is submitted to Environment Canterbury for approval prior to implementation under the renewed consent conditions.

Part (c) – FEP Audits

Farm Environment Plans (FEPs) started to be audited in the 2015-16 irrigation season. FEP Audits for all new, existing and dry shareholders have now been completed.

Part (d) – 2018-19 Season FEP Audit Summary

A summary of who completed FEP Audits and how many in the 2018-19 season is in Table 2.

All FEP Auditors are accredited with Environment Canterbury. Shareholders who have Lead with Pride Accreditation were not audited under our programme, but their equivalent grades are reported here.

TABLE 2: SUMMARY OF AUDITORS 2018-19 SEASON

Auditor	Organisation	Accredited FEP Auditor? Y/N	Number of Audits Completed
Ali Van Polanen	EnviroPlan	Y	41
Dave Lucock	The Agribusiness Group	Y	32
Nicole Matheson	Irrigo Centre Limited	Y	3
Sam Mander	The Agribusiness Group	Y	1
Jane Mitchell	Independent	Y	1
Lead with Pride	Synlait	N	4
Total			82

The 78 FEPs audited by us were selected based on their previous audit grade, changes in management or land use, new shareholders or has moved from an external quality assurance programme to our own. A breakdown of the reasons for an audit is in Table 3.

TABLE 3: REASONS FOR AUDITS

Reason for Audit	Number
Change in Management	9
New Property in FEP	0
New Shareholder	0
FAVA	0
"D" Grade Previous Audit	1
"C" Grade Previous Audit	4
"B" Grade Previous Audit	64

Moved from External Quality Assurance Programme	0
LWP	4
Total	82

A summary of the FEP Audit grades for the 2018-19 season is described in Table 4.

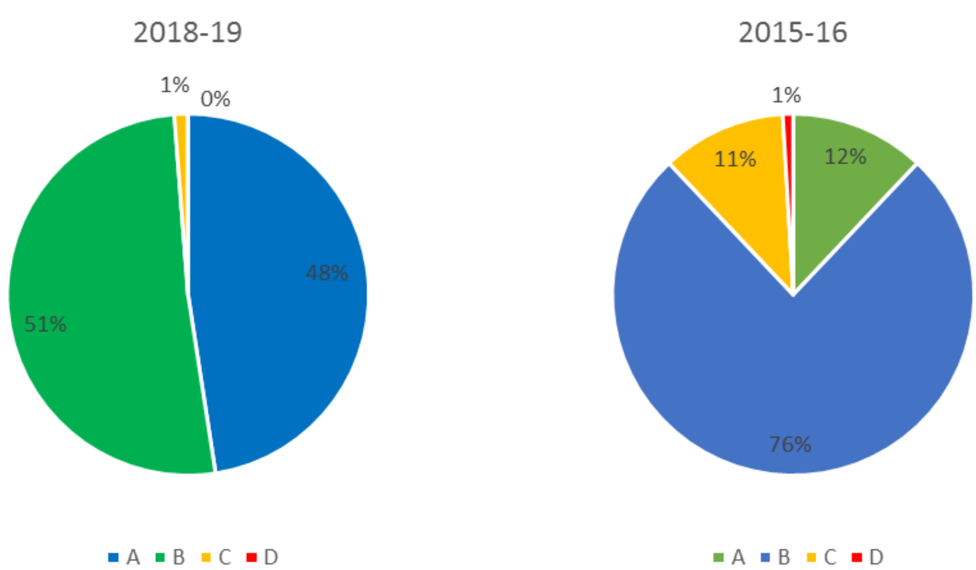
TABLE 4: SUMMARY OF 2018-19 AUDIT GRADE RESULTS

	BCI	AFIC	Total	
	#	#	#	%
A	30	9	39	48
B	26	16	42	51
C	1	0	1	1
D	0	0	0	0
Total	57	25	82	

Overall, 99% of audited properties achieved an "A" or "B" audit grade, which is a significant increase compared to the 2015-16 (91%) and the 2016-17 (92%) seasons. More importantly, we note the proportion of "A" audit grades has increased from an average of 12% between 2015-17 to 51% for the 2018-19 season (Figure 3). This improvement is due to a "B" graded properties making improvements in their farming practices between audits to achieve an "A" on their second audit.

We also note significant decreases in the proportion of "C" or "D" grades issued, with only 1% issued in the 2018-19 season compared to 12% in the 2015-16 season.

FIGURE 3: 2018-19 AND 2015-16 AUDIT RESULTS



Reasons for "C" or "D" grades and follow up

Only 1 “C” audit grade and no “D” grades were issued in the 2018-19 season. The “C” grade was issued for failing to comply with the conditions of a change of land use permit (FAVA) from the scheme. The shareholder was provided one on one support and is now on track with improving their grade for the 2019-20 season.

Follow up of 2017-18 Season “C” or “D” Audit Grades

A total of 7 “C” or “D” audit grades were issued in the 2017-18 season to six properties. Of these, 5 FEPs have been re-audited as a “B” grade and one as an “A”. One of the repeated “C” audit grades was a 15 ha lifestyle block, while the other was graded the first “C” for a late cancellation of their audit and has since been subdivided and part of the property has been sold. A summary of the progress made with each property is seen in Table 5.

Of note, the sole repeated “D” graded property has now been re-audited as a “B” as of November 2018. After the April 2018 “D” grade was issued, a Red Card 20 day cease water notice was issued and the BCI GM and Board Chairman visited the property to discuss their options. Since then, this property has received significant one on one support and training, invested in an upgraded effluent storage and distribution system and implemented standard operating procedures for irrigation and effluent management. Given the improvements in the systems and procedures since previous audits, the auditor was confident they were now on track with meeting Good Management Practice.

TABLE 5: RESULTS FROM 2017-18 SEASON "C" OR "D" GRADE PROPERTIES

Property	Follow Up Action Taken	2017-18 Grade	Most recent Grade
A	Provided on-going one on one support	C	A
B	Provided on-going one on one support	C	B
C	Provided intensive on-going one on one support. Property partially sold.	C	B
D	Property sold and now under new management.	C	B
E	15 ha lifestyle block, which meets PA rules. Provided on-going one on one support.	C	B
F	Provided intensive on-going one on one support. Effluent system upgraded in early 2018. Two cease water notices issued – one in January 2018 for 7 days and a second in September 2018 for 20 days.	D(x2)	B

Scheme Performance with Objectives and Targets

Grades given for each objective and target assessed in the 2015-16 and 2018-19 FEP Audits were collated and summarised in Figure 4 and Figure 5. Overall, we are seeing year on year improvements in the achievement of all Targets and Objectives, with fewer Low LOCs and more High LOCs granted in all areas. These improvements are reflected in overall grades.

FIGURE 4: SUMMARY OF AUDIT GRADES FOR OBJECTIVES AND TARGETS 2015-16

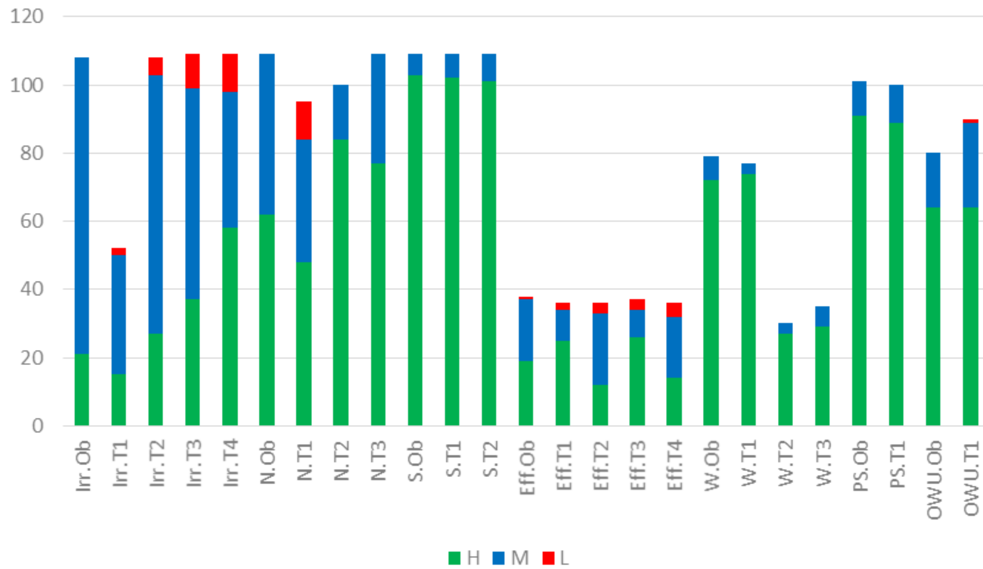
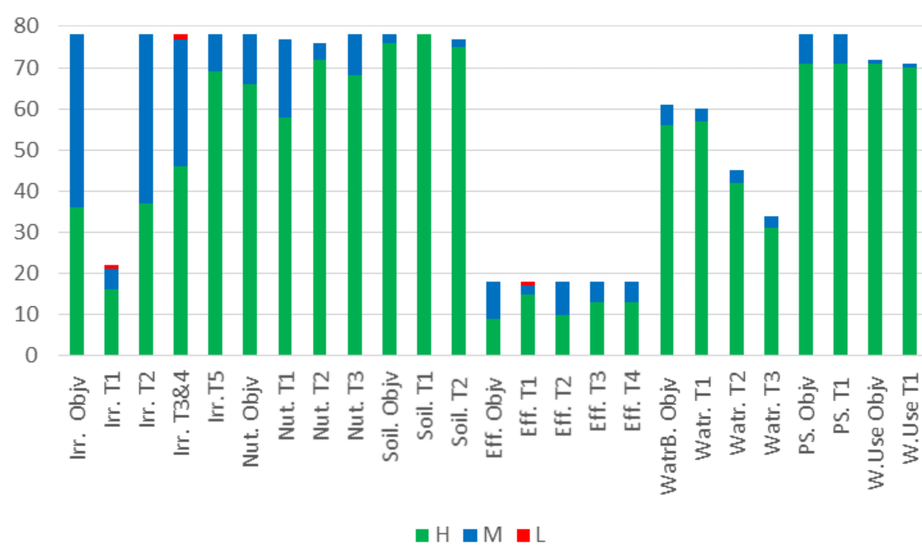


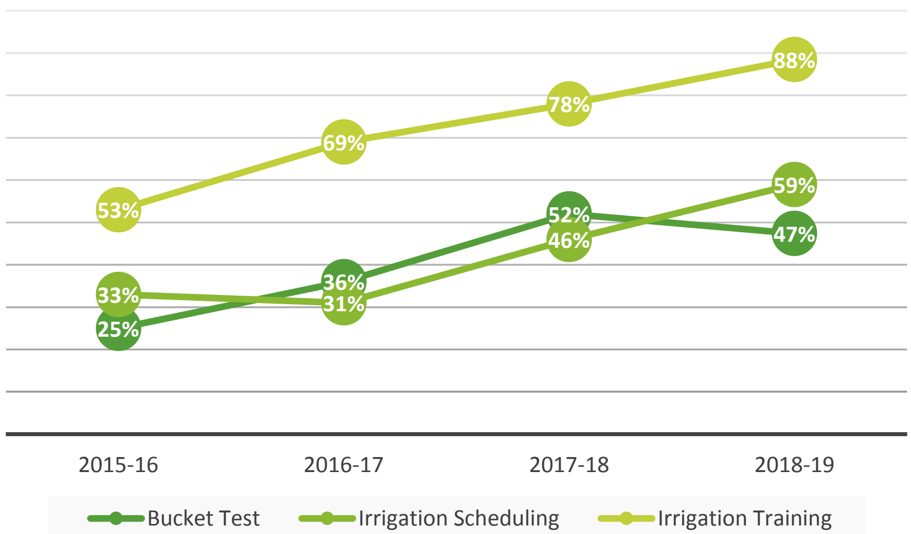
FIGURE 5: SUMMARY OF AUDIT GRADES FOR OBJECTIVES AND TARGETS 2018-19



Improvements in the overall audit grade results were largely due to shareholder achievement of the irrigation targets and objectives. BCI has supported our shareholders with these targets by running a series of workshops on irrigator maintenance, calibration and scheduling and promoting attendance of the IrrigationNZ Operator and Manager training day. In total, we have had over 200 shareholders and staff attend our own workshops, with approximately a further 50 attending the IrrigationNZ operator and manager training day. We have also supported shareholders with completing irrigator calibration checks by promoting the ECan programme in the 2016-17 season and offering the service ourselves from the 2017-18 season.

These programmes have shown a steady increase in understanding and training, as well as good uptake of bucket testing. We have also seen a significant uptake of soil moisture monitoring scheduling tools between first and second audits (Figure 6) from 33% in the first season to 59% last season.

FIGURE 6: ACHIEVEMENT OF IRRIGATION TARGETS 2015-2019



Parts (e), (f) and (g) – Other Requirements

This report meets the reporting requirements of resource consent CRC162882.

All FEP Audit records are kept on file, as assessed as part of the Irricon EMS review.

No shareholders or properties have been excluded or left the Scheme in the 2018-19 season.

CONDITION 5

The combined average annual amount of nitrogen lost to water as calculated from the individual Farm Environment Plans prepared in accordance with condition 3. shall not exceed a total of 1,232 tonnes if Overseer version 6.0.3 is used or X tonnes if a subsequent Overseer version, or equivalent model approved in writing by the Canterbury Regional Council RMA Compliance and Enforcement Manager is used. For the purposes of this condition, X equals the total average annual nitrogen loss calculated using the current version of Overseer, or equivalent model approved in writing by the Canterbury Regional Council RMA Compliance and Enforcement Manager, based on the following:

a. 17,604 hectares of land with irrigation supply agreements in place with the consent holder prior to July 2013; and
b. 22,396 hectares of subsequent irrigation areas;

Provided that the land uses and management practices modelled must be consistent with the activities described in the application.

Updated N load Limit
PDP were employed in October 2019 to update the background files and recalculate the nitrogen discharge allowance (NDA) using OVERSEER v6.3.2. A copy of the PDP report is attached.

The recalculated NDA was **3,036 tonnes N/year**, assuming 1,676 tonnes N/year from existing shareholders and 1,360 tonnes N/year for new shareholders. The N load limit assumed a BCI irrigated area of 40,000 ha, and the proportion of land uses remained the same as described in the resource consent application.

It is noted the use of land from shareholder properties on the non-scheme irrigated area is a permitted activity under rules 5.41 and 5.60 of the Land and Water Regional Plan.

Method used to Calculate 2018-19 Season Scheme N loss
A total of 221 2018-19 year-end nutrient budgets were provided to determine compliance with the scheme load. All nutrient budgets were completed using v6.3.2 OverseerFM and prepared (or reviewed) by a suitably qualified professional in accordance with the current version of the Best Practice Data Input Standards and our own consistency protocols.

Proxies were used for 6 nutrient budgets for reporting purposes this year. Four budgets were either highly modified or a previous year nutrient budget provided for properties impacted by M.Bovis. One nutrient budget for a 15 ha block was lost in OverseerFM with a change of staffing and one shareholder refused to provide a nutrient budget and has been issued a cease water notice. For the two completely missing budgets, the 2017-18 season nutrient budgets were updated in v6.3.2 and the nutrient losses used for our load calculation purposes.

All nutrient budgets were prepared for all land reported in the FEP. As mentioned in condition 2, many properties irrigated by BCI were also irrigated by other sources of water and many shareholders also chose to include non-scheme irrigated properties in their FEPs, therefore the nutrient load for the FEP area is significantly greater than that from the BCI Irrigated Area.

To calculate the nitrogen load for the BCI Irrigated Area, the total nutrient losses for the FEP area were apportioned according to the amount of water BCI or AFIC provided to the property. E.g. if BCI supplies 50% of water to the property, then 50% of the N load was added to the NDA. If BCI was the only source of water for the property, the nutrient loss for the whole property (including the effective dryland) was included. Any increase in nutrient losses from the non-Scheme irrigated area is therefore proportionately reflected in the BCI Irrigated Area nutrient load. The details of how these calculations are made is included in the SMP.

In total, over 200 nutrient budgets were prepared by over 40 different consultants to generate the nitrogen loss calculations for this consent. Of these 22% required a “workaround” in order to run the Overseer model, a notable reduction compared to previous years. The most common workarounds were required for arable properties. These included:

- Substitution of small seeds with ryegrass seed
- Moving harvesting/sowing months where multiple events occurred in same month

Using the above method, the calculated N loss for the BCI Irrigated Area in the 2018-19 season was **1,798 tonnes N/year**, which is 59% of the NDA limit for version 6.3.2 of Overseer.

CONDITION 6

The consent holder shall ensure that each farm that it supplies water to shall 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. The records shall be made available to the Canterbury Regional Council on request.

All shareholders are aware of the requirements to maintain records used to provide a nutrient budget annually.

CONDITION 7

The Canterbury Regional Council may, once per year, on any of the last five working days of May or November, serve notice of its intention to review the conditions of this consent for the purposes of dealing with any adverse effect on the environment which may arise from the exercise of the consent and which it is appropriate to deal with at a later stage.

No comment required.

APPENDIX 1: BCI IRRIGATION SCHEME SMP REVIEW 2019

APPENDIX 2: REVISED N LOAD CALCULATION – V6.3.2 OVERSEER