



BARRHILL CHERTSEY IRRIGATION
LIMITED – 2020 ANNUAL REPORT
CRC162882

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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 2,849¹ 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 resource consent CRC162882 (CRC184159, CRC211510 and CRC211511) and are operating under a Section 124 continuance provisions until a decision on the application is made.

Currently BCI is consented to take up to 17 m³/s of water from the Rakaia River, of which up to 3 m³/s is provided to AFIC, east of Rakaia. Only 13.15 m³/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:

- V6.3.4 OVERSEER Nitrogen Discharge Allowance, updated by PDP
- 2020 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 232 properties through the BCI and AFIC irrigation schemes located between the Rakaia and Rangitata Rivers (Figure 1).

In total only 41% of the water available to BCI and AFIC properties is provided by BCI or AFIC, with 54% 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 6.3.4

FIGURE 1: BCI AND ACTON IRRIGATED PROPERTIES

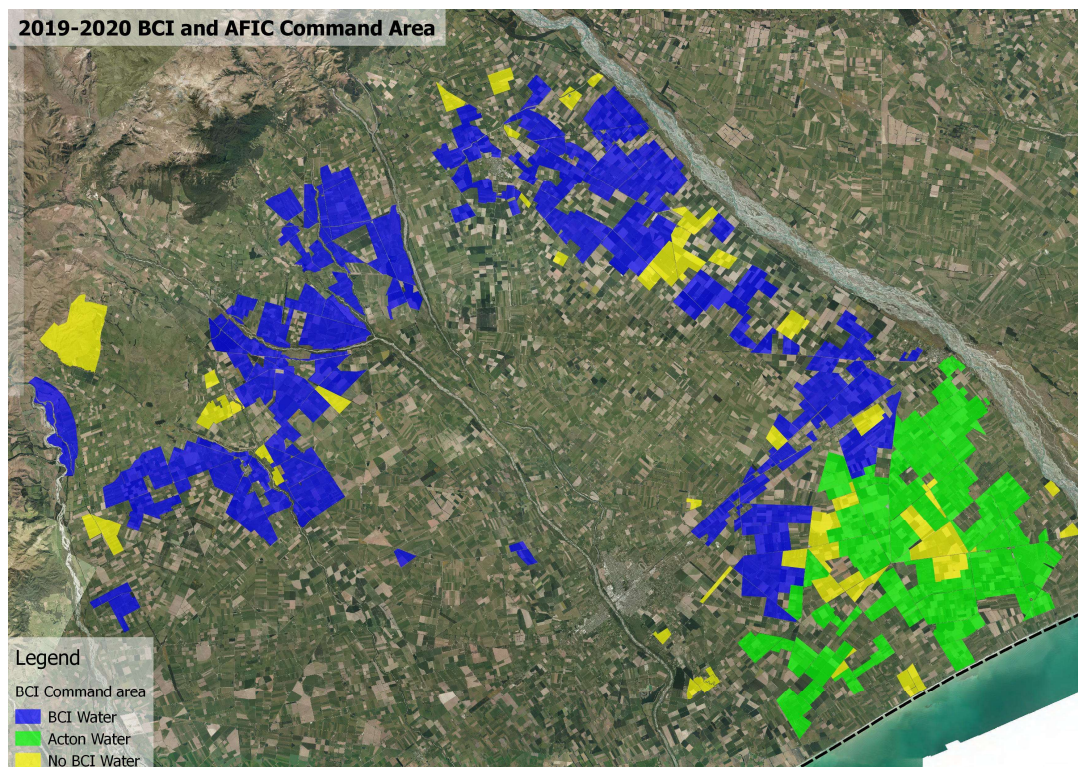
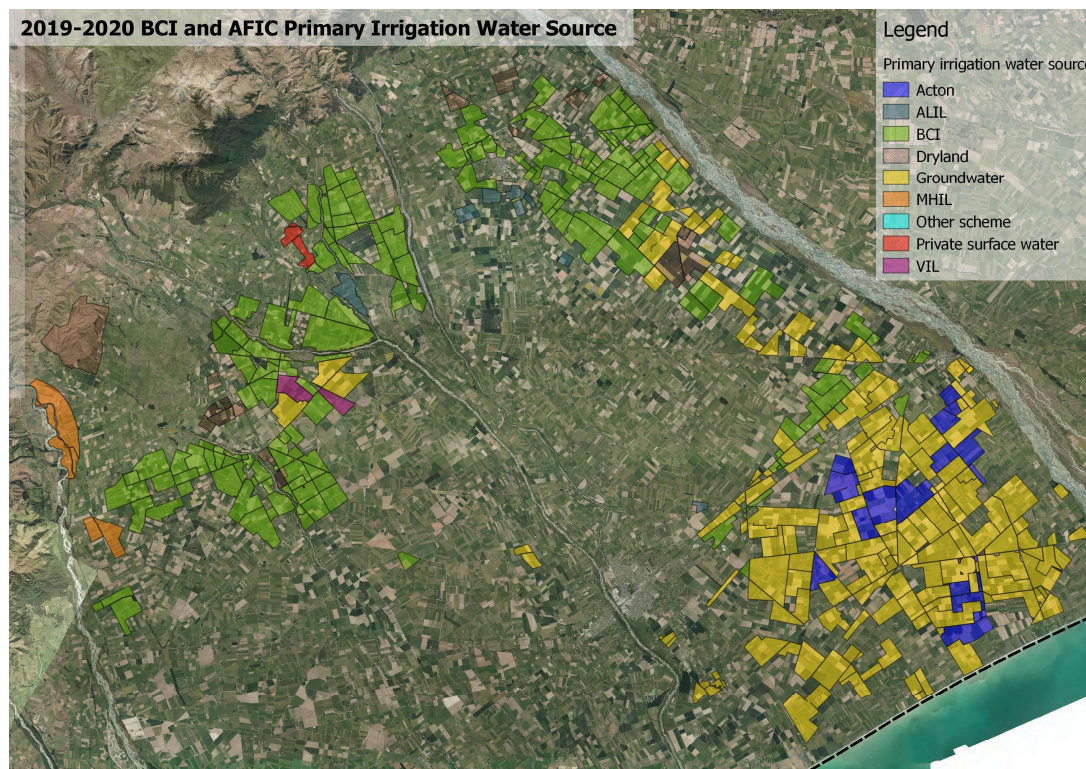


FIGURE 2: BCI/AFIC PRIMARY IRRIGATION SOURCE



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 2019-20 season was calculated to be **24,149 ha**. No new shares have been issued to start irrigating in the 2020-21 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)	2019-20 Irrigated Area (ha)
Total FEP Managed Area	53,699	59,968
Total Irrigated Area	44,655	50,541
Total Effective Dryland	7,107	7,448
BCI Scheme Irrigated Area	18,586	19,559
AFIC Scheme Irrigated Area	4,820	4,590
Total BCI Irrigated Area	23,406	24,149

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.

FEP's for BCI and AFIC shareholders have now been updated to meet Schedule 7 requirements, using the ECan approved Irrigo FEP template.

In total, 190 FEPs have been prepared between both BCI and AFIC schemes, covering a total of 290 properties over 59,968 ha.

Approximately 58 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. Jackson Holmes Contracting limiting uses BCI water for fire-fighting purposes. A new BCI water user, Methven Hot Pools are proposing to use BCI water for irrigation of their landscaping area. Use for water for these activities is now authorised by CRC205082.

Due to the nature of these activities, it is not feasible to prepare FEPs or nutrient budgets for these properties. Use of water for these activities are now authorised under resource consent CRC205082, which was granted in October 2020.

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 2020. 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 (May 2020) processes were followed.

The full report is attached as Appendix 1: BCI IRRIGATION SCHEME SMP REVIEW 2020.

The overall summary of the ASM programme review states:

“This is the fifth 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 five years later.

Procedures for improvement have been documented and are being implemented, reviewed and updated. A replacement consent for CRC162882 is still in process with ECan. The final requirements of this consent are not yet known, and the timeframe for issue of the replacement consent is also not known (it has been in process now for some time). This means that the scheme finds itself in a state of limbo. The main outcome of this audit is that the EMS should be reviewed in its entirety once the new consent is granted.”

Part (b) – SMP Updates

The BCI Scheme Management Plan (SMP) has not been updated for use against this consent. Feedback from reviews are included

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) – 2019-20 Season FEP Audit Summary

A summary of who completed FEP Audits and how many in the 2019-20 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 2019-20 SEASON

Auditor	Organisation	Accredited FEP Auditor? Y/N	Number of Audits Completed
Ali Van Polanen	EnviroPlan	Y	23
Leah Gorman	EnviroPlan	Y	9
Dave Lucock	The Agribusiness Group	Y	23
Sam Mander	The Agribusiness Group	Y	14
Amelia Wood	The Agribusiness Group	Y	14
Charlotte Irving	The Agribusiness Group	Y	10
Lead with Pride	Synlait	N	9
Total			102

The 102 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. Audits were also brought forward 12 months as they had not installed an irrigation scheduling tool. A breakdown of the reasons for an audit is in Table 3.

TABLE 3: REASONS FOR AUDITS

Reason for Audit	Number
Change in Management	2
New Property in FEP	0
New Shareholder	5
FAVA	0
"D" Grade Previous Audit	0
"C" Grade Previous Audit	1
"B" Grade Previous Audit	57
"A" Grade Previous Audit	4
Irrigation Scheduling	24
Moved from External Quality Assurance Programme	0
LWP	9
Total	102

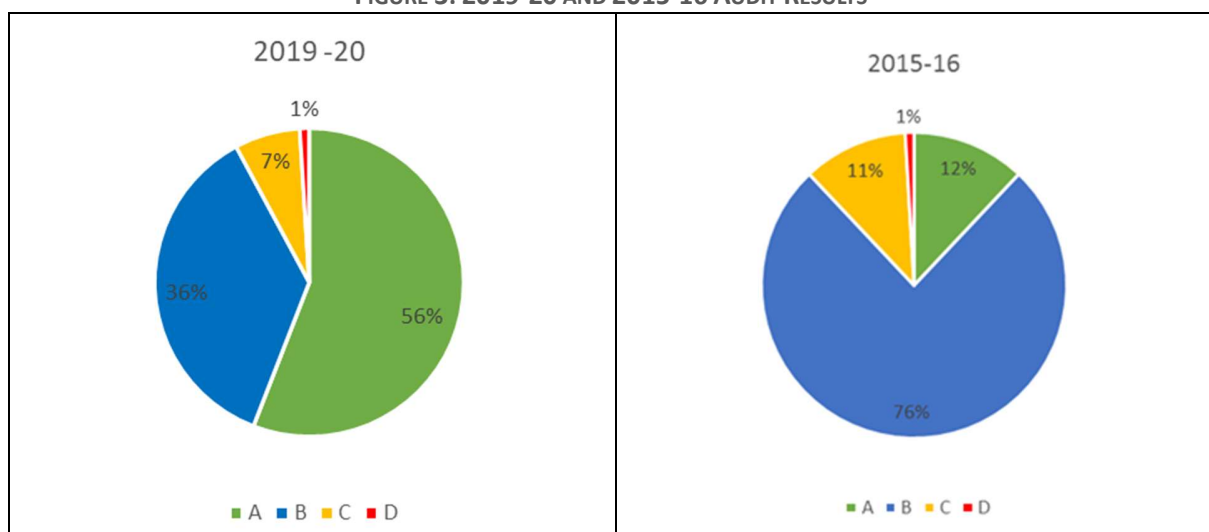
A summary of the FEP Audit grades for the 2019-20 season is described in Table 4.

TABLE 4: SUMMARY OF 2019-20 AUDIT GRADE RESULTS

	BCI	AFIC	Total	
	#	#	#	%
A	35	22	57	56
B	29	8	37	36
C	2	5	7	7
D	1	0	1	1
Total	67	35	102	

The results show that when split by scheme, the percentage of 'A' grades awarded for AFIC was proportionally much higher than for the BCI audits and significantly better than previous seasons audits.

FIGURE 3: 2019-20 AND 2015-16 AUDIT RESULTS



Reasons for “C” or “D” grades and follow up

There was a significant increase in the proportion of “C” grades issued this year compared to last year. This was expected with the new directive from ECan to grade properties as a “C” when previous audit actions have not been implemented. The majority of the “C” grades issued were due to a lack of evidence of use of an objective irrigation scheduling tool. All those who were awarded “C” grades have been provided one on one support and are all on track with improving their grade for the 2020-21 season.

The “D” grade was issued due to an increase in irrigated area without scheme approval. Since the “D” grade was awarded, a Farm Activity Variation Application (FAVA) has been approved and the shareholder is now on track with improving their grade for the 2020-21 season.

The common reasons for the “C” and “D” grades awarded are shown in Table 5.

TABLE 5: SUMMARY OF REASONS FOR SEASON “C” OR “D” GRADES FROM 2019-20 SEASON

Area	Reasons for C and D grades
Effluent	Lack of adequate storage
Irrigation	Unable to demonstrate effective irrigation scheduling or maintenance
	Lack of irrigation calibration or irrigation training records
Nutrients	Increase in irrigated area without a FAVA and scheme approval
Waterbodies	Evidence of stock in waterbodies

Follow up of 2018-19 Season “C” or “D” Audit Grades

One “C” audit grade was issued in the 2018-19 season. The FEP was re-audited in the 2019/20 season as a “B” grade. A summary of the progress made with each property is seen in Table .

TABLE 6: RESULTS FROM 2018-19 SEASON "C" OR "D" GRADE PROPERTIES

Property	Follow Up Action Taken	2018-19 Grade	Most recent Grade
A	Provided on-going one on one support	C	B

Scheme Performance with Objectives and Targets

Grades given for each objective and target assessed in the 2015-16 and 2019-20 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

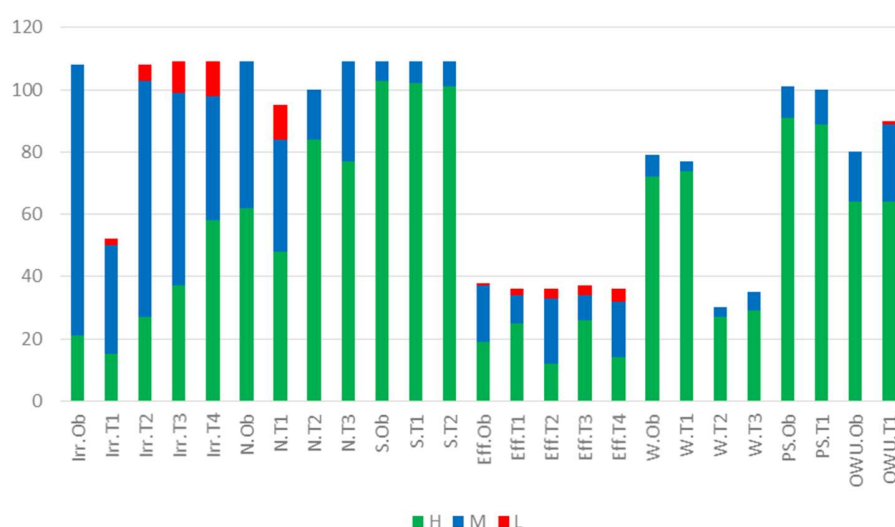
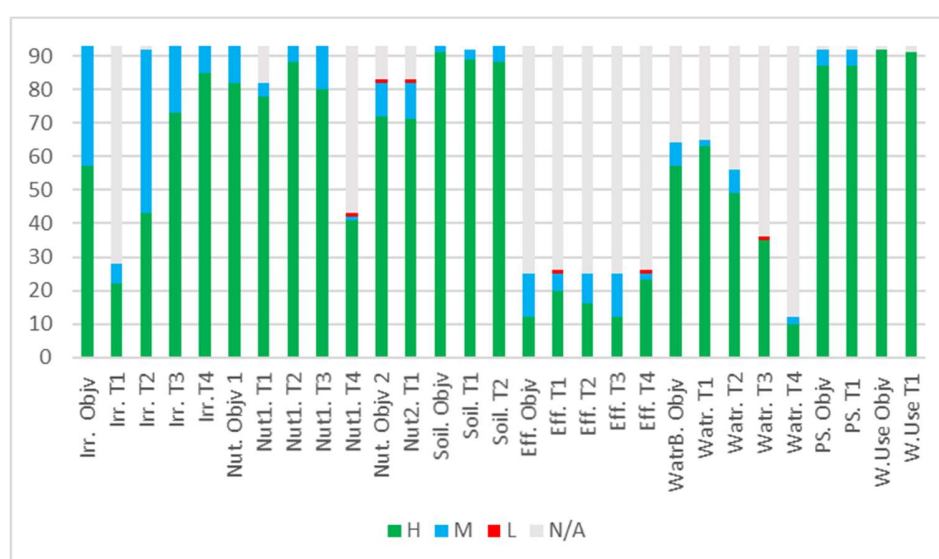


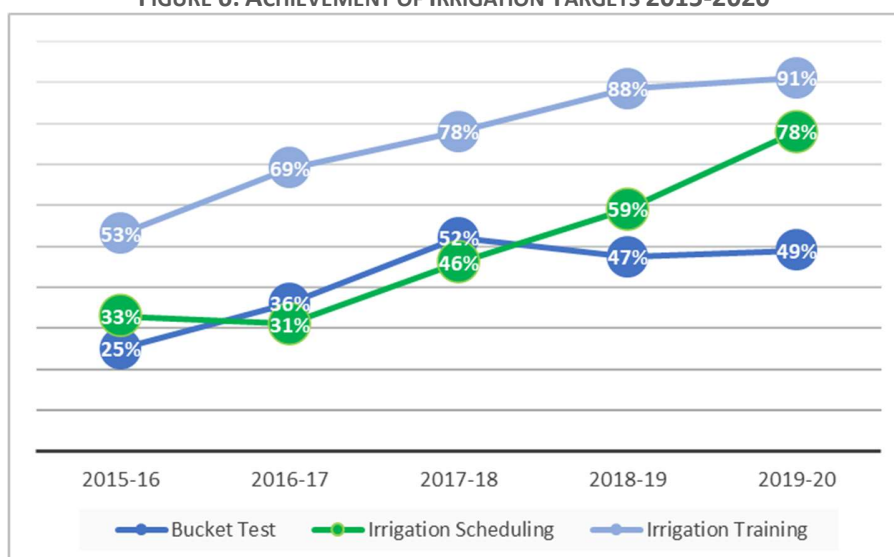
FIGURE 5: SUMMARY OF AUDIT GRADES FOR OBJECTIVES AND TARGETS 2019-20



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. 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.

BCI have also implemented a policy to make it compulsory to implement an objective soil moisture monitoring tool from October 2019 in the PC5 area and this October within the PC2 area as well as hosted an industry tradeshow to showcase soil moisture monitoring options available. These initiatives have resulted in significant uptake of soil moisture monitoring scheduling tools last season as shown in Figure 6.

FIGURE 6: ACHIEVEMENT OF IRRIGATION TARGETS 2015-2020



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.

In the 2019/20 one property left the Scheme and no longer receives BCI Irrigation Water, it is now fully managed under the ALIL/MHV ASM program, the location of the property is shown in Figure 7 below.

FIGURE 7: LOCATION OF PROPERTY THAT LEFT THE SCHEME



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 November 2020 to update the background files and recalculate the nitrogen discharge allowance (NDA) using Overseer v6.3.4. A copy of the PDP report is attached.

The recalculated NDA was **2,849 tonnes N/year**, assuming 1,580 tonnes N/year from existing shareholders and 1,269 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 2019-20 Season Scheme N loss

A total of 210 2019-20 year-end nutrient budgets were provided to determine compliance with the scheme load. All nutrient budgets were completed using v6.3.4 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.

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 30 different consultants to generate the nitrogen loss calculations for this consent. A “workaround” in order to run the Overseer model was required for 22% of nutrient budgets, 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/defoliation months where multiple events occurred in same month

Using the above method, the calculated N loss for the BCI Irrigated Area in the 2019-20 season was **1,681 tonnes N/year**, which is 59% of the NDA limit for version 6.3.4 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 2020

APPENDIX 2: REVISED N LOAD CALCULATION – V6.3.4 OVERSEER