BARRHILL CHERTSEY IRRIGATION LIMITED – 2018 ANNUAL REPORT CRC162882

NOVEMBER 2018

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326 BURNETT STREET, ASHBURTON

CONTENTS

1. INTRODUCTION

Barrhill Chertsey Irrigation Limited (BCI) hold resource consent CRC162882 to permit shareholders from BCI and Acton Farmers Irrigation Co-Operative (AFIC) to collectively discharge up to 3,002[1] tonnes N/year to groundwater from 40,000 ha of farming activities within the Ashburton District until 10 September 2018.

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:

- V6.3.0 OVERSEER Nitrogen Discharge Allowance, updated by PDP
- 2018 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 226 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 51% 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 6.3.0

FIGURE 1: BCI AND ACTON IRRIGATED PROPERTIES

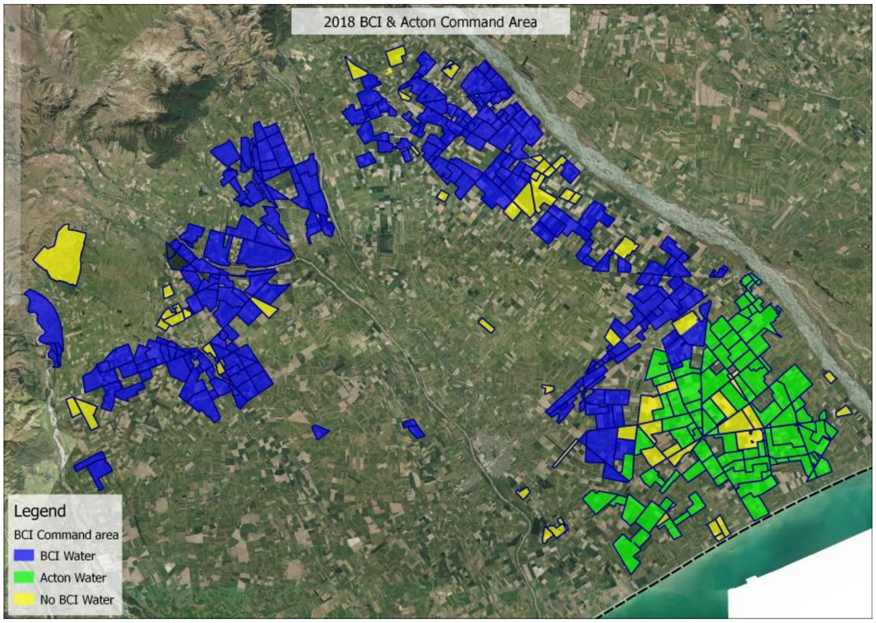
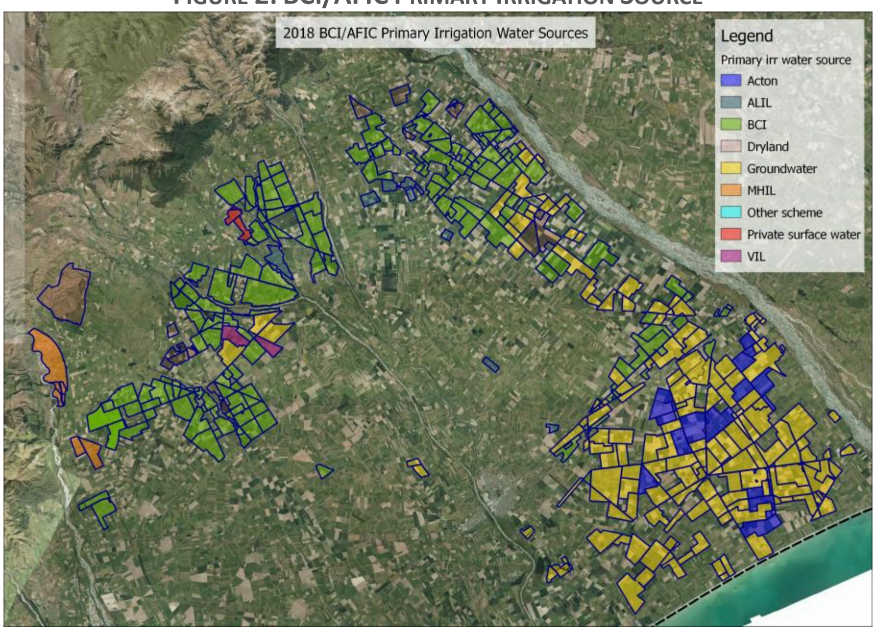


FIGURE 2: BCI/AFIC PRIMARY IRRIGATION SOURCE



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 2017-18 season was calculated to be **23,389 ha.** A further 800 ha of irrigated shares have been issued to start irrigating in the 2018-19 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)	2017-2018 Irrigated Area (ha)
Total FEP Managed Area	53,699	59,102
Total Irrigated Area	44,655	49,434
Total Effective Dryland	7,107	7,103
BCI Scheme Irrigated Area	18,586	18,680
AFIC Scheme Irrigated Area	4,820	4,550
Total BCI Irrigated Area	**23,406**	**23,389**

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. This plan incorporated the Objectives and Targets of the proposed Schedule 7 of the Plan Change 5 version of the Land and Water Regional Plan. Other key changes included more detail to trend intensification by shareholders and a greater emphasis of the Good Management Practices described in the *Industry Agreed Good Management Practice Relating to Water Quality* booklet issued in September 2015.

In total, 183 FEPs have been prepared between both BCI and AFIC schemes, covering a total of 286 properties over 60,513 ha[2]. Of these, 8 were for new shareholders starting irrigation in the 2018-19 season.

Approximately 52 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 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 Shareholdings

We request the following 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

[2] Note FEPs include properties to be irrigated in the 2018-19 season.

All four 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

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 in November 2018. 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 2018.

The overall summary of the ASM programme review states:

"The overall impression of the reviewers is that the Scheme Management Plan is well organised and record keeping is excellent. The actions from the 2017 audit have been given careful consideration and the majority have already been implemented. Three outstanding actions have been included as corrective actions for this audit. There is generally a good approach to the environmental management system with flexibility to adapt and adjust processes to meet requirements. The review has identified some key aspects of an environmental management system which should be included in the SMP, however the SMP was found to meet the requirements of an Audited Self-Management Plan under resource consent number CRC162882".

Part (b) – SMP Updates

The BCI Scheme Management Plan (SMP) was reviewed in 2018 in preparation for the renewal of this resource consent, but is not intended to be implemented until the renewed consent is granted. A copy of the draft SMP submitted for the renewed consent application is available upon request. Another review of the draft SMP has been scheduled for February 2019 to include the following information:

- Updated to reflect new conditions of consent
- Recommendations arising from the Irricon BCI SMP review
- Incorporate recommendations from shareholders and the BCI and AFIC boards
- Review all policies and procedures to ensure:
  a) They remain relevant and up to date
  b) They cover all essential processes

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

Part (c) – 2017-18 Season 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) – 2017-18 Season FEP Audit Summary
A summary of who completed FEP Audits and how many in the 2017-18 season is in Table 2.

All FEP Auditors have completed the Advance Sustainable Nutrient Management Course from Massey University and had been registered as accredited FEP Auditors by 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 2017-18 SEASON

Auditor	Organisation	Accredited FEP Auditor? Y/N	Number of Audits Completed
Megan Hands	Land Savvy Limited	Y	62
Ali Van Polanen	EnviroPlan	Y	14
Nicole Matheson	Irrigo Centre Limited	Y	14
Lead with Pride	Synlait	N	1
Total			91

The 90 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

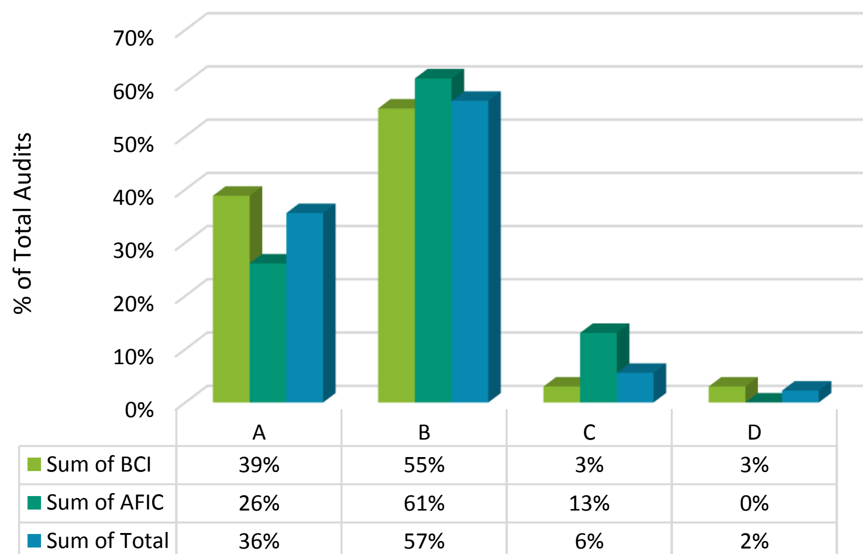
Reason for Audit	Number
Change in Management	9
New Property in FEP	0
New Shareholder	2
FAVA	1
"D" Grade Previous Audit	2
"C" Grade Previous Audit	5
"B" Grade Previous Audit	70
Moved from External Quality Assurance Programme	1
Total	90

A summary of the FEP Audit grades for the 2017-18 season is described in Table 4 and Figure 3.

TABLE 4: SUMMARY OF 2017-18 AUDIT GRADE RESULTS

	BCI	AFIC	Total	
	#	#	#	%
A	27	6	33	36
B	37	14	51	57
C	2	3	5	9
D	2	0	2	2
Total	68	23	91	

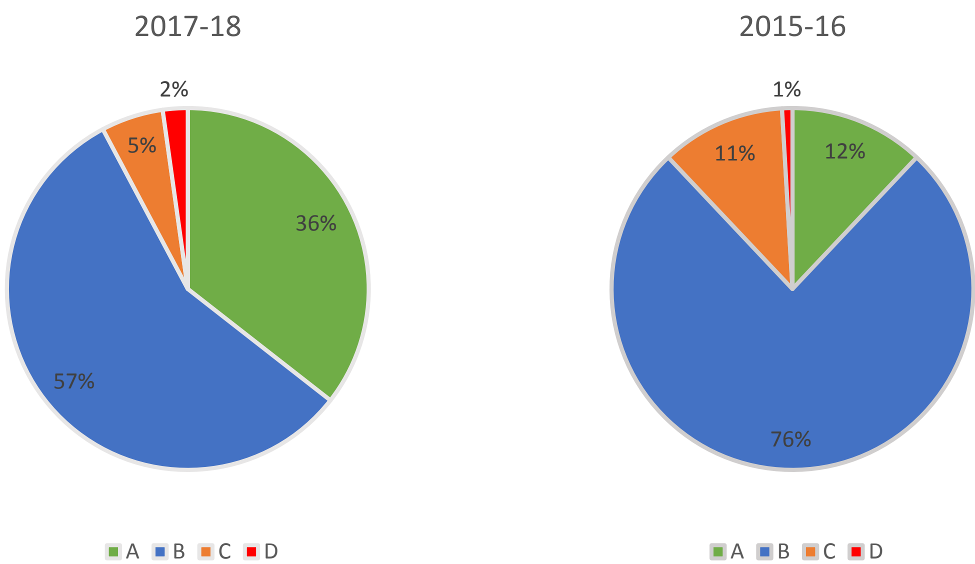
FIGURE 3: 2017-18 SEASON AUDIT GRADES



Overall, 93% of audited properties achieved an “A” or “B” audit grade, which is a slight increase compared to the 2015-16 (91%) and the 2016-17 (92%) seasons. However, we note the proportion of “A” audit grades has increased significantly from an average of 12% between 2015-17 to 36% for the 2017-18 season (Figure 4). This improvement is due to a significant number of “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 a total of 7% issued in the 2017-18 season compared to 12% in the 2015-16 season. This suggests the properties initially graded a “B” in the first season have made sufficient progress with implementing Good Management Practice to still be considered On Track.

FIGURE 4: 2017-18 AND 2015-16 AUDIT RESULTS



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

A total of 5 "C" audit grades and 2 "D" grades were issued in the 2017-18 season. The two "D" grades were issued to the same farm, and the "C" grades were issued to a mixture of properties.

Generally, the environmental effect of "C" grade farms was not significantly different from most "B" grade farms, with the majority of "C" grades issued for a general disengagement and a lack of records rather than for poor environmental practices. We have found it was common for these properties to have recently been sold, changed lease or planning to sell or change lease.

The list of reasons for "C" or "D" grades is given in Table 5. Most properties which received a "C" or "D" audit grade had multiple reasons for why the grade was given. Every property receiving a "C" or "D" grade has had a follow up visit and included the audit recommendations into their 2018 FEP Update.

TABLE 5: SUMMARY OF REASONS FOR "C" OR "D" GRADES 2017-18 SEASON

Reason for C or D grade	# Grades	Follow Up Action
Lack of progress from previous audit	4	Provide on-going assistance to resolve issues identified
Lack of engagement with the FEP process	2	Attempted to provide on-going assistance to resolve issues identified. One property was sold at time of audit.
Irrigation observed on unproductive land	2	Request issue rectified immediately.
Unable to demonstrate effective irrigation scheduling	2	Provide one on one assistance with collection of data
Unauthorised land use change	2	Request issue rectified immediately.
Non-compliance with effluent resource consent observed	3	Request issue rectified immediately.
Inefficient effluent storage	3	Provide advice on DESC
Unable to demonstrate effective effluent irrigation scheduling	3	Provide one on one assistance with collection of data

Follow up of 2016-17 Season “C” or “D” Audit Grades
A total of 7 “C” or “D” audit grades were issued in the 2016-17 season. Of these, 5 FEPs have since been re-audited as a “B” grade. 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 6.

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, fertiliser 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 6: RESULTS FROM 2016-17 SEASON "C" OR "D" GRADE PROPERTIES

Property	Follow Up Action Taken	2016-17 Grade	Most recent Grade
A	Provided on-going one on one support	C	B
B	Provided on-going one on one support	C	B
C	Grade issued for late cancellation. Normal support provided.	C	C
D	Provided on-going one on one support	C	B
E	15 ha lifestyle block, which meets PA rules. Provided on-going one on one support.	C	C
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	B
G	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 2017-18 FEP Audits were collated and summarised in Figure 5 and Figure 6. Overall, the largest proportion of Medium LOC grades were issued in irrigation management targets and objectives, with most shareholders doing well in fertiliser and soils management. This is a similar trend to previous seasons, though we have seen a significant improvement in the number of High LOCs granted for the irrigation maintenance, scheduling and training targets, as well as effluent scheduling and training targets in the 2017-18 season.

FIGURE 5: SUMMARY OF AUDIT GRADES FOR OBJECTIVES AND TARGETS 2015-16

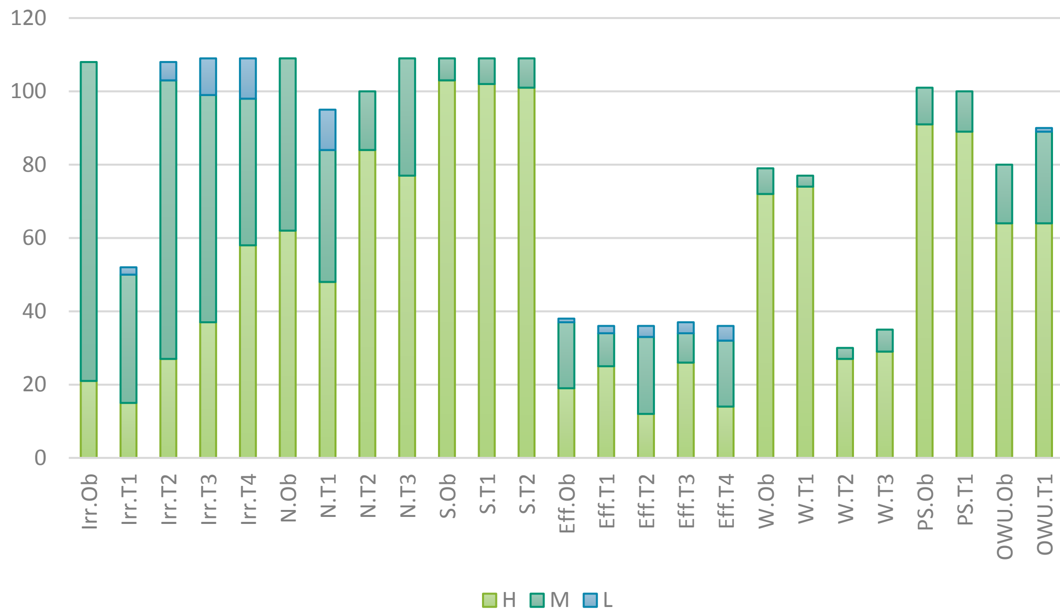
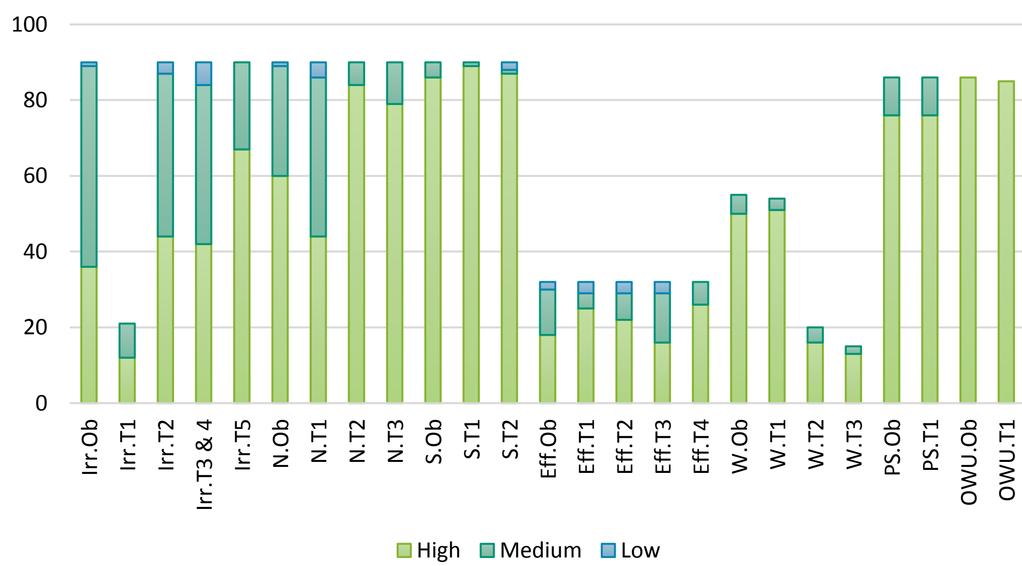


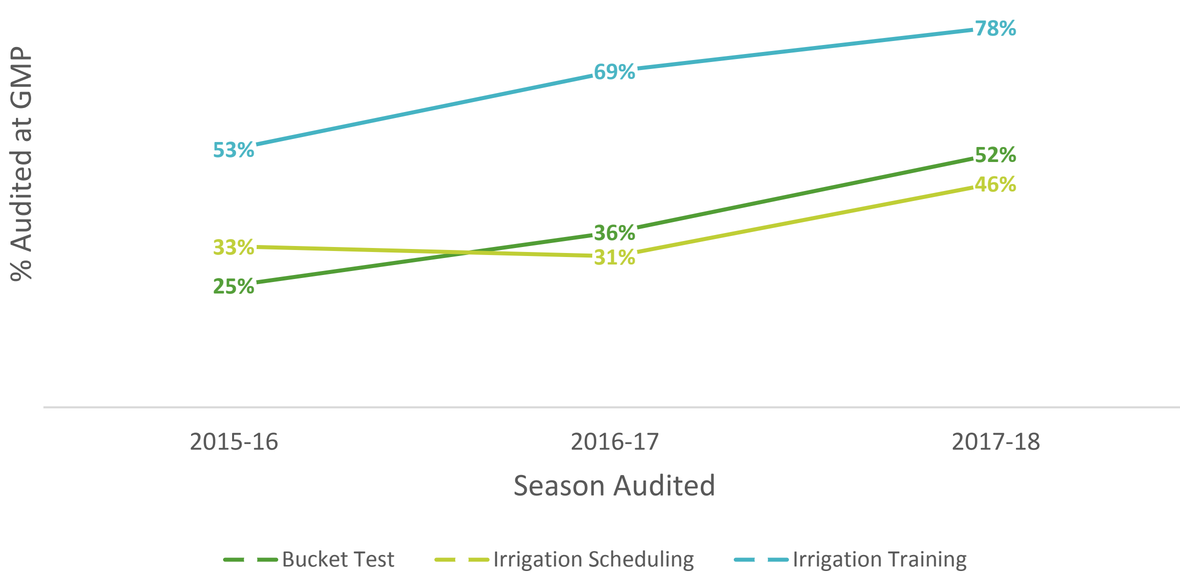
FIGURE 6: SUMMARY OF AUDIT GRADES FOR OBJECTIVES AND TARGETS 2017-18



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 another 50 or so attending the IrrigationNZ course. 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 uptake of bucket testing each season we have been operating our ASM programme. We have also seen a significant uptake of soil moisture monitoring scheduling tools between first and second audits (Figure 7) from 33% in the first season to 46% last season.

FIGURE 7: ACHIEVEMENT OF IRRIGATION TARGETS 2015-2017



Approximately 80% of shareholder properties have open stockwater races, however only 30% are located near natural waterways. Of these, the natural waterbody is generally adjacent to, but outside the property for all but two properties in the scheme. For this reason, the vast majority of properties were not assessed against Waterbody Targets 2 and 3.

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 have been excluded from the Scheme in the 2017-18 season, however one shareholder ceased their lease from an adjacent non-scheme property and another split their 2-shed dairy farm and sold a shed without scheme shares. Nick Vernon was notified of these changes in circumstances in November 2018.

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 Limited with OVERSEER 6.3.0

The OVERSEER model was updated to v6.3.0 in March 2018 and did not include any much change for dairy farm systems, but did see a significant increase in nitrogen lost from wheat crops compared to v6.2.3.

PDP were employed in July 2018 to update the background files and recalculate the nitrogen discharge allowance (NDA) using OVERSEER v6.3.0. A copy of the PDP report is attached.

The recalculated NDA was **3,002 tonnes N/year**, assuming 1,657 tonnes N/year from existing shareholders and 1,345 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 rule 5.60 of the Land and Water Regional Plan.

Method used to Calculate 2017-18 Season Scheme N loss

All shareholders irrigated by either BCI or AFIC in the 2017-18 season completed an OVERSEER nutrient budget, using data collected in the 2017-18 season. All nutrient budgets were completed using v6.3.0 OVERSEER and prepared (or reviewed) by a suitably qualified professional in accordance with the Best Practice Data Input Standards (March 2018) (BPDIS) where possible, or an explanation provided as to why deviation was necessary.

All nutrient budgets were prepared for all properties covered 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 34 different consultants over 8 months to generate the nitrogen loss calculations for this consent. Of these 31% required a “workaround” in order to run the Overseer model. 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 2017-18 season was **1,826 tonnes N/year**, which is 61% of the NDA limit for version 6.3.0 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 an OVERSEER 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 2018

APPENDIX 2: REVISED N LOAD CALCULATION – V6.3.0 OVERSEER