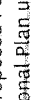


Submission on Proposed Pareora Catchment Environmental Flow and Water Allocation Regional Plan

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SUBMISSIONS ON A
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SCHEDULE 1 OF THE
RESOURCE MANAGEMENT ACT 1991

 Environment Canterbury Regional Council <i>Kaumihara Taiao ki Waitaha</i>	Form 5: Submissions on a Publicly Notified Proposed Policy Statement or Regional Plan under Clause 6 of Schedule 1 of the Resource Management Act 1991
B ☐ Tick this box if you do not wish to be heard in support of your submission; ☒ Tick this box if you do wish to be heard in support of your submission; and, ☐ Tick this box if you would be prepared to consider presenting your submission in a joint case with others making a similar submission at any hearing.	Return your signed submission by Friday 1 October 2010: Freeport 1201 Proposed Pareora Catchment Environmental Flow and Water Allocation Regional Plan Environment Canterbury P O Box 345 Christchurch Email: mailroom@ecan.govt.nz

A

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Date: 1.10.2010 EC184328 EC119054

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cl- Buddle Findlay

Barristers & Solicitors

P.O. Box 332 Christchurch

Signature:  Attention: Rachel Dunningham

(Signature of person making submission or person authorised to sign on behalf of person making the submission)

Please note: all information contained in a submission under the Resource Management Act 1991, including names and addresses for service, becomes public information.

[illegible]

The specific provisions of the proposed Pareora Regional Plan that my submission relates to are:	My submission is that:	I seek the following decisions from Environment Canterbury:
Page 7, 2 nd paragraph.	Fernwood Dairies Limited considers that a series of flow statistics are presented which are misleading and potentially confusing. In addition, if they are sourced from the de Joux and Scarf (2010) report, then one of them is wrong. Naturalised flows are quoted and are stated as being measured by the Canterbury Regional Council which is incorrect. There is no definition anywhere of what a naturalised flow is and a naturalised flow is a calculated estimate and cannot be measured.	Provide a definition of "naturalised flows". Provide a correct full list of recorded and naturalised flows for each of the statistics mentioned and not just the mean annual low flow so the actual recorded statistics can be compared to the estimated statistics. In addition, if recent data have been used to provide the naturalised 7-day mean annual low flow estimate and it is not copied from the de Joux and Scarf (2010) report as is indicated by the comment "(at the time of writing)", then updated data should be provided for all flow statistics.
Page 12, Issue 1, 1 st paragraph, last sentence.	While this is a quote from the Aitcheson-Earl et al. Report (2006), the statement is clearly incorrect as the MacKenzie Basin (ECan area) and parts of Central Otago (Otago Regional Council area) receive less rain and have greater soil moisture deficits than the Pareora catchment.	Replace with "The Pareora River Catchment lies within one of the driest coastal areas in New Zealand."
Page 12, Issue 1, 4 th paragraph, from sentence 4	Fernwood Dairies Limited considers that it is not possible to sustain a flow in the lower Pareora River even under natural conditions with no abstractions. The river will go dry on occasions irrespective of whatever minimum flow is imposed. Therefore increasing the minimum flow will only reduce the	Add the words "for longer" after the words "In order to try and sustain a flow"

The specific provisions of the proposed Pareora Regional Plan that my submission relates to are:	My submission is that:	I seek the following decisions from Environment Canterbury:
	length of time the river is dry in the downstream reach.	
Page 14, Point number 4	Approach 4 is contradictory. At the start of the paragraph it states that it is to "... reduce the impact of abstraction on instream values ... while maintaining reliability of supply for existing users..." and then at the end it states "... minimum flows will be increased over time." If minimum flows are increased on irrigators who already irrigate efficiently, then their existing reliability will be compromised if minimum flows are increased.	Revise Approach 4 by deleting the words "and signalling that minimum flows will be increased over time".
Page 14, Objectives 2, 3 and 4	Fernwood Dairies Limited supports Objectives 2,3 and 4. It considers maintaining the existing values of the Pareora River Catchment, and the existing reliability of supply, achieves the objectives of Part 2 of the RMA, as does using abstractive water efficiently.	Retain Objectives 2, 3 and 4
Page 14, Objective 5.	Fernwood Dairies Limited opposes Objective 5, unless reduced reliability for existing irrigators is adequately supplemented by, for example, increased access to water for water storage or availability of more reliable flows above minimum flows through augmentation from other water sources.	Add a proviso to Objective 5 such as "without compromising reliability of supply for existing abstractors", or such other amendment as will meet Fernwood Dairies Limited's concerns.
Page 15 Policy 1.1, (d)	Fernwood Dairies Limited queries the statement asserting that the flow of 4.5 cumecs is that required to scour	Amend Policy 1.1 (d) to reflect evidence as to what flows are in fact required to scour periphyton build-

The specific provisions of the proposed Pareora Regional Plan that my submission relates to are:	My submission is that:	I seek the following decisions from Environment Canterbury:
	periphyton. It is assumed that the 4.5 cumecs is equivalent to the rule of thumb that a flow that is 3 times the median flow is required to scour periphyton. In de Joux and Scarf (2010), the flow is set at 3 times the measured median flow (1.409 cumecs) which calculates out to 4.2 cumecs. In May of last year as part of Fernwood's application, Jen Ritson and Shirley Hayward of ECan sent a memo to Zella Smith of ECan Timaru stating that a flow that was 8 times the median flow (11.2 cumecs) was required to scour periphyton because the velocities of the flow at 4.2 cumecs was too slow to move the periphyton. Flows of this magnitude will not be significantly affected by allowing existing irrigators to renew their consents on the same or similar terms as they currently hold them, or by allowing B permit takes at 3,700 L/s.	up.
Page 15, Policy 1.2	Fernwood Dairies Limited considers that the current provisions in Table 1 referred to in Policy 1.2, and in particular the minimum flows in Table 1, including for the B Block, are not necessary or appropriate and should be reviewed having regard to Objective 2.	Amend provisions in Table 1 to achieve Objective 2 as identified in submissions below on Table 1.
Page 17, Policy 1.8	The proposal in Policy 1.8 to move towards an A block allocation which is less than 30% of the seven-day MALF is unnecessary given the economic and social benefits afforded	Delete or amend Policy 1.8 to maintain existing economic and social benefits afforded by irrigation.

The specific provisions of the proposed Pareora Regional Plan that my submission relates to are:	My submission is that:	I seek the following decisions from Environment Canterbury:
	by the existing use of water from the Pareora River.	
Page 17, Policy 1.9	Fernwood Dairies Limited supports Policy 1.9 which allows replacement consents to maintain the rate of take used under the previous consent.	Retain Policy 1.9.
Page 17, Policy 1.10	Fernwood Dairies Limited opposes the exclusive use of the method described in Schedule 2 for the calculation of volumetric limits.	Amend Schedule 2 to include any modelling method that meets the criteria listed in Section 1 of the Irrigation Guidance Document (ECAN, 3 June 2010) Copy attached.
Page 17, Policy 1.12 (b)(i) and (b)(ii)	Fernwood Dairies Limited opposes Policy 1.12(b)(i) and (ii). With respect to Policy 1.12(b)(1), the minimum flow for A Block takes to storage should be no different from that for A Block abstractions taken directly for irrigation. Fernwood Dairies Limited does not consider there is any justification for a higher minimum flow for A Block takes to storage. With respect to Policy 1.12(b)(ii), the proposal to exclude concurrent A Block abstractions for run-of river irrigation and abstractions for storage is overly prescriptive and imposes inefficiencies and infrastructural and operational complexities on the water user. The environmental benefits of this proposed policy are doubtful given that other measures can be used to protect the environment and ensure the efficient use of water.	Delete or amend Policies 1.12 (b)(i) and (b)(ii) to meet Fernwood Dairies Limited's concerns.

The specific provisions of the proposed Pareora Regional Plan that my submission relates to are:	My submission is that:	I seek the following decisions from Environment Canterbury:
Page 18, Policy 1.15	Fernwood Dairies Limited opposes the 5,000 L/s minimum flow proposed for the B Block in Table 1 and questions the justification for it. This proposal overlooks the limiting effect of finite dam capacity and other constraints and mitigations. Fernwood Dairies opposes the proposal that B Block takes are "apportioned equitably" across landowners within the catchment as this proposal assumes that all or most landowners will, at some future date, decide to abstract and use B Block water. This policy has the potential to "lock up" water for an indefinite period that could otherwise be used productively. It can also create inefficiencies because B block takes are used for storage, and large storage facilities are inherently more efficient than small storage facilities.	Amend minimum flow for B permits to 3,700 L/s Delete the requirement in Policy 1.15 to apportion B Block takes "equitably across landowners".
Page 18, Policy 1.17	Fernwood Dairies Limited does not consider that minimum flows need to be increased as proposed during the months of October and November in order to protect instream values, and to do so on renewal, will adversely affect existing irrigators' reliability.	Delete or amend Policy 1.17 so it does not impact on the reliability of existing irrigators.
Page 18, Policy 1.18	Fernwood Dairies Limited opposes Policy 1.18, insofar as this policy will adversely affect existing irrigators' reliability. While some existing consents do require a 50% reduction at identified flows above the minimum flows, there is no need to mandatorily require this on all consent renewals and flexibility	Amend Policy 1.18 so that the existing reliability which irrigators have is not adversely affected.

The specific provisions of the proposed Pareora Regional Plan that my submission relates to are:	My submission is that:	I seek the following decisions from Environment Canterbury:
	should be maintained to renew consents on terms which reflect the needs of that consent holder Furthermore, as currently drafted, this Policy could be read as requiring permit holders who do not join a water user group to be restricted to 50% of their consented take regardless of flow in the river. While it appears from the explanation that that is not what was intended, (rather that as flows reduce towards the minimum there would be a point at which the take would reduce to 50%), the drafting should be clarified to make this intention clear	Amend Policy 1.18 to make it clear the 50% reduction is only triggered when the minimum flows reach the prescribed flows set out in Table 1.
Page 19, Policy 3.1	Fernwood Dairies Limited supports Policy 3.1 which facilitates transfers of water permits but notes that this policy is inconsistent with Policy 1.15 and Table 1 which seeks to arbitrarily limit the amount of B permit water available to any property	Retain Policy 3.1
Page 21, Policy 3.6	Fernwood Dairies Limited opposes Policy 3.6 which limits the duration of any new consent to take, use or divert water to no later than 1 January 2025. There is no reason to limit the full discretion which the decision maker has to grant consents on any term up to 35 years. If water harvesting is to be encouraged, then applicants need the certainty of supply to encourage the investment required for water storage. Granting consents on a short term basis will not encourage	Delete Policy 3.6.

The specific provisions of the proposed Pareora Regional Plan that my submission relates to are:	My submission is that:	I seek the following decisions from Environment Canterbury:
	such investment.	
Page 21, Policy 3.7	Fernwood Dairies Limited opposes the reprioritisation of irrigation as a second order priority. This policy discourages and devalues investments that contribute to the economic development of the catchment.	Delete Policy 3.7
Page 22, Rule 2.3	Fernwood Dairies Limited is opposed to minimum flows for A and B blocks as set out in Table 1 applying to irrigation takes.	Amend Table 1 so that existing reliability of supply for irrigators is able to be maintained on renewal of consents.
Page 26, Table 1	Fernwood Dairies Limited opposes the minimum flows and the 50% restrictions for A permit takes shown in the third column of Table 1. Fernwood Dairies Limited opposes the minimum flows for takes to storage from the A permit allocation block being set at 1,600 L/s. Fernwood Dairies Limited will be directing all A permit water into a storage dam which is currently under construction, even if it is irrigating at the same time (ie on a run of river basis), so none of its A permit water will in due course be used directly for irrigation without going through a storage facility first. It is impracticable and unnecessary to set up two systems for conveying the water, one which omits it going through the storage dam. A minimum flow of 1,600 L/s would dramatically reduce the reliability of supply to this	Amend the requirements in the third column of Table 1 to allow for minimum flows and restrictions which do not affect the reliability of existing consents on renewal. Delete the requirement in Table 1 for A permit takes to adopt a minimum flow of 1,600 L/s when the take is going to storage.

The specific provisions of the proposed Pareora Regional Plan that my submission relates to are:	My submission is that:	I seek the following decisions from Environment Canterbury:
	existing irrigator. Fernwood Dairies Limited supports the provision in Column 5 for existing consents to be replaced on expiry, notwithstanding the progressive move to an allocation limit of 198 L/s. Fernwood Dairies Limited opposes the minimum flow for B permits of 5,000 L/s. A minimum flow for B permits of 3,700 L/s would still achieve the objective of maintaining sufficient freshes and floods to remove periphyton and move sediment, while providing more reliable access to water for storage. Fernwood Dairies Limited opposes the provision in column 7 of the table which requires no more than 500 L/s of B permit water to be allocated per property. Fernwood Dairies Limited already has existing investment in a dam under construction and has an application for 1,000 L/s of B permit water which is necessary to utilise this facility fully. There is no resource management reason for limiting the allocation to an individual property, as long as the water is used efficiently on the properties it is applied to. It is also more efficient (for example in terms of farming land lost) to have fewer larger storage systems, than a number of smaller storage systems. Finally it is not clear how this requirement relates to the Policy 3.1 regarding transfers of consents and which would	Retain the provision in Table 1 for existing consents to be replaced on expiry. Amend minimum flow for B permits to 3,700 L/s Delete the requirement that no more than 500 L/s can be allocated to the property.

The specific provisions of the proposed Pareora Regional Plan that my submission relates to are:	My submission is that:	I seek the following decisions from Environment Canterbury:
	prevail in the event of an application to transfer additional B permit water to a property..	
Page 35, Schedule 2	Fernwood Dairies Limited opposes the exclusive use of the method described in Schedule 2 for the calculation of volumetric limits.	Amend Schedule 2 to include any modelling method that meets the criteria listed in Section 1 of the Irrigation Guidance Document (ECan, 3 June 2010) Copy attached.
Entire document.	Consequential amendments are needed to the explanatory text and advice notes in the Plan if any of the above submissions to change the Plan are accepted.	Make any consequential amendments to the text in the Plan to reflect the changes made to the policies, objectives and rules listed above.

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IRRICALC GUIDANCE DOCUMENT**3rd June 2010**

SECTION 1: CRITERIA**Consent protocols****Use of models to calculate seasonal irrigation volumes****BACKGROUND**

The proposed NRRP allows consent applicants to use a model to estimate a seasonal volume that complies with the policies of

- 80% application efficiency
- Allocation for 80 percentile year

Any method used to demonstrate this must be verifiable, and where a modelled approach is used, there must be sufficient data available to calibrate for the specifics of the location.

This document sets out the criteria and requirements for a model and its application to estimate seasonal irrigation water use and to set seasonal irrigation water use limits.

PROPOSED SET OF REQUIREMENTS FOR A MODEL AND DATA**Model capability**

1. The model must be able to predict irrigation water supply requirements for a specified:
 - Application efficiency (including 80%)
 - Water supply adequacy (including 4 years out of 5, or 80 percentile year)
 - Land cover (including pasture)
 - Soil type
 - Climate
2. The model must provide sufficient outputs to enable a third party to verify that the estimated irrigation water use and water use limit are based on policy-compliant inputs
3. The model's validation performance must meet or exceed an r^2 of 80%

Model documentation

4. Methods
 - a. Specify the assumptions, equations and time-steps used in the model
 - b. Specify the data inputs, parameters and data outputs
 - c. the sources of data, and the date range of all time-series data inputs used.
 - d. Model documentation must explain how the water supply adequacy (e.g 80%tile year) is determined.

5. Model Parameters and Testing
 - a. The model parameters must either be internationally accepted parameters (for example the FAO crop factors) or be calibrated and validated using Canterbury data.
 - b. Set out the calibration and verification procedure and results.
 - c. If parameters are developed from Canterbury data, the model documentation must comment on the applicability of the calibration across the whole of Canterbury and the applicability in years outside the calibration/verification period.
6. Input data
 - a. Describe the QA procedures used to verify that input data is fit for purpose.
 - b. If using standard input data or factors (as listed in Annex 1) then QA procedures are not required for the particular standard input or factor used.

Reporting of Model Application

1. Model application reporting must include the application efficiency used in the estimation of seasonal irrigation water use and the water supply adequacy used to determine the seasonal irrigation water use limit.
2. Model application reporting must outline the irrigation practices (management rules) and comment on their appropriateness for types of irrigation equipment.
3. Model application reporting must specify soil type, climate data and land-cover.
4. Model outputs must be reported or supplied in sufficient detail to enable a third party to verify that the modelled irrigation applications that the irrigation water use estimates are based on comply with Policy standards for application efficiency and water supply adequacy, are practical and result in soil moisture levels being maintained within best-practice limits.

ANNEX 1: APPROVED STANDARD INPUTS

Soils Data

1. Soil maps and plant available water for soils on a property can either be obtained from the most recent publically available version of the Landcare Soils Database or obtained from site specific measurements
2. If site specific maps/measurements, the documentation must outline the soil survey work, and include photos and a description the texture analysis undertaken.

Climate Data

1. Daily climate data from–
 - NIWA Tier 1 or Tier 2 climate station data or
 - Data from NIWA Virtual Climate Station Network or
 - Site specific data for rainfall in combination with climate data from the nearest climate station that meets or exceeds NIWA Tier 2 standards.
2. If data record is for less than 30 years, then a correlation with either the VCS or climate sites with 30 years must be carried out and used as part of determining the 80 percentile year.

Crop Data

1. Crop Factors in FAO 56

SECTION 2: How to calculate a farms seasonal irrigation water limit using the IrriCalc maps

This procedure is designed to provide seasonal irrigation water use limits that comply with Environment Canterbury's policy that such limits be based on the assumption that irrigation application efficiency is 80% and provide sufficient water volume to meet reasonable irrigation water use 4 years out of 5, on average.

This procedure is also designed to provide seasonal irrigation water use limits for arable farms, as well as for pasture-based farms. The seasonal irrigation water use limit for an arable farm is based on the seasonal irrigation water use limit for the farm if the farm was pasture-based. The seasonal irrigation water use limit for the farm is determined for pasture first and then this number is converted to the arable farm equivalent.

Step 1: Find out which soil water holding capacity class to use for your farm

Do this by locating where your farm is on the Soil Water Holding Capacity (SWHC) map for your area. See Appendix 1 in the map book covering your area.

Once you have located your farm on the SWHC map, use the colour at that location with the legend at the top left corner of the map to determine the SWHC for your farm.

For example, if your farm was located in the middle of the Burnham military camp (!) it would have a SWHC of 60mm.

If the soils information for a farm comes from a different source the following points need to be taken into account:

- Determining Soil Water Holding Capacity (mm) – The SWHC to be used with the Irricalc method is the soil water volume (mm) that is stored in the plant root zone between wilting point and field capacity. The depth of the plant root zone varies between crops/pasture/lucerne. For pasture a root zone depth of 600mm is recommended. Note that the Profile Available Water given in the ECan GIS system is for a soil depth of 900mm.
- Determining the Soil Water Holding Capacity Class – The SWHC class labelled as “60mm”, for example, represents the range of soil water holding capacities in the range 50mm to 69mm. The “80mm” class represents the range 70mm to 89mm, and so on.

Step 2: Find out the seasonal irrigation water limit for pasture on your farm

To do this you need to use the seasonal irrigation water use map that is labelled as an 80% Efficient irrigator AND the SWHC class of your farm AND the “reliability” standard of 4 years in 5. You will find this map in Appendix B of Aqualinc Report Number C09065 (November 2009).

Locate your farm on the map that is labelled with the 80% Efficient Irrigator and the SWHC for your farm and the 4 years in 5 “reliability” standard.

Once you have located your farm on this map, use the colour at that location with the legend at the top left corner of the map to find the seasonal volume contours that the farm lies between.

For example, if your farm was located in the middle of the Burnham military camp it lies between the 700 and 750mm seasonal irrigation water use limits. Linearly interpolate between the contours that lie either side of the farm to get the seasonal irrigation water use limit for that farm.

For this example the policy compliant seasonal irrigation water use limit is 745mm.

Step 3: If the farm is an Arable Farm, Convert the Seasonal Volume for a Pasture-based Farm to the Arable Farm equivalent.

Arable Farm Seasonal Volume = Pasture-Based Farm Seasonal Volume multiplied by 0.65

For example, if the farm at Burnham was an arable farm its seasonal volume would be

$$745\text{mm} \times 0.65 = 484\text{mm}$$

Step 4: Convert the Seasonal Volume, in mm, to Seasonal Volume in cubic metres

Seasonal Volume in cubic metres = Seasonal Volume (in mm) x 10 x the area irrigated (in hectares).

For example, if Seasonal Volume from the map is 745mm and you irrigate 100 hectares the Seasonal Volume in cubic metres is $745 \times 10 \times 100 = 745,000$ cubic metres.

Guidance Notes for more detailed applications

What if you have several soil types or several irrigation systems on your farm?

Work out the seasonal volume for each relevant combination of soil type and 80% Efficient Irrigator and add the volumes up.

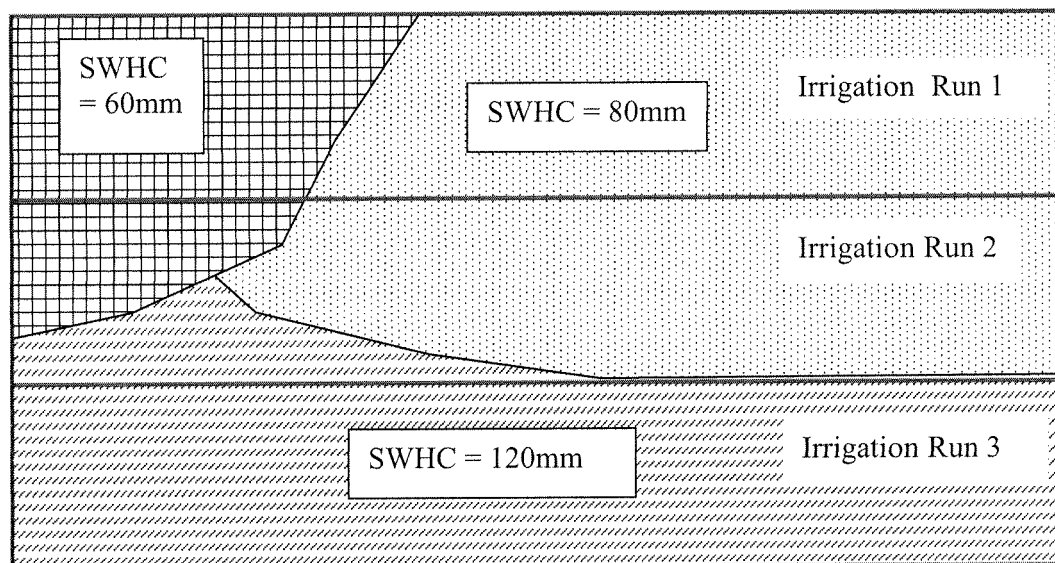
For example, if on the one farm at Burnham you had 150 hectares with SWHC of 60mm and another 50 hectares of 120mm SWHC soil, you would need to use the maps to look up seasonal volumes for each of the following and then add the volumes together.

SWHC	Irrigator	Seasonal Use (mm) from map	Area (hectares)	Seasonal Use (cubic metres)
60 mm	80% Efficient	745	150	1,117,500
120 mm	80% Efficient	697	50	348,500
Total Seasonal Volume for Farm =				1,466,000

What if an irrigator traverses more than one soil type on its run – which soil do I use?

Sometimes an irrigator will irrigate more than one soil type on its run. In this case the operation of the irrigator will probably be based on the soil type that has the smallest soil water holding capacity. It is this soil water holding capacity that should be used to calculate the seasonal irrigation volume for that irrigator run. The seasonal volume should be calculated for each irrigator run (or circle) and added up to give the total for the farm.

The following diagram illustrates this situation.



In this situation a judgement must be made about which SWHC to use for each irrigation run. Justification of the user's subjective decision about which soil water holding capacity to use is required. In this example use of a SWHC of 120mm and of 80mm for runs 3 and 2, respectively, is a straightforward decision. For run 1 it is not so clear-cut. If the crop grown is sensitive to soil water deficits then a SWHC of 60mm should be used. If it is not then a SWHC of 80mm would probably be appropriate.

What if the farm is located in an inland basin, such as the Mackenzie Basin?

The IrriCalc method uses a crop factor that has been calibrated for growing conditions on the Canterbury Plains. The length of the growing season in inland, high altitude, basins is significantly shorter than the growing season on the Plains. This will change some characteristics of the crop factor to be used. The IrriCalc method should, in this situation, be used with a crop factor that has been constructed using information contained in FAO Paper 56, "Crop Evapotranspiration: Guidelines for computing crop water requirements", 1998. Justification of any subjective decisions made by the user in the construction of the crop factor is required.

Section 3: Frequently Asked Questions – June 2010

What is IrriCalc and how does it work?

IrriCalc is a single-layer soil water balance model developed by Aqualinc Research Limited (ARL). It uses an equation to update the calculated soil water content on a daily basis from daily measurements or estimates of rainfall, irrigation, drainage and actual evapotranspiration. More detail on the equation and how IrriCalc works is provided in Bright (2009). Also a summary document “How to calculate a farms seasonal irrigation water limit using the Aqualinc maps” is provided (see Appendix 1).

Where are the maps and how do I obtain a copy?

The maps for each of the Canterbury Plains regions are available as PDF files on CD. At this stage ARL have copies available for distribution. Environment Canterbury is planning to incorporate the maps into its existing GIS system. This is a major task and the CD's will need to be used manually in the interim.

What is the purpose of the criteria and how do I use them?

A set of criteria have been developed in consultation between ECan, ARL, and Irrigation NZ. These criteria are intended to provide consultants and farmers with a set of requirements for a model and data used to calculate seasonal irrigation volumes. They include the required capability of the model, documentation of methods, model parameters, model testing and input data, as well as the reporting of the model application. These criteria should be used to validate any calculations of seasonal irrigation volumes, if a model other than the pNRRP Schedule WQN9v3 is used. The policy-compliant version of the IrriCalc model has been endorsed by ECan as an approved method of calculating seasonal irrigation volumes. ECan is satisfied IrriCalc provides an appropriate method of calculating seasonal irrigation volume and is consistent with the policy requirements of the pNRRP.

If my irrigator is less efficient than 80%, can I use the maps for the less efficient irrigation systems and still be compliant with Policy WQN17 of the PNRRP?

Irrigation systems will be assumed to be 80% efficient, even if the actual system has a lower application efficiency. If your system is more efficient than 80%, then the higher efficiency figure will be used. This is consistent with Policy WQN17(2), Chapter 5 of the PNRRP, which states:

- “(2) When assessing water permit applications for irrigation....:*
- (b) assume that there is an irrigation efficiency of at least 80% even if the actual system being used has a lower application efficiency. Where the water permit application is for an irrigation system with a higher application efficiency, the higher figure will be used.”*

If I already have an annual volume (AV), can I use IrriCalc to increase my AV automatically?

No, but you are free to apply for an increase in AV as a new consent. However you will be in the same position as anyone else applying for new water and if you are in a “red” zone you will need to pass the tests set out in the pNRRP.

If my consent doesn't have an AV, can I use IrriCalc to obtain an AV?

Yes. If you have an existing consent that does not have an AV, you will be able to use IrriCalc to calculate a seasonal irrigation volume for your consent.

How do I use IrriCalc to obtain an AV?

Refer to Section 2: "How to calculate a farms seasonal irrigation water limit using the Aqualinc maps" for guidance on how to use the Soil Water Holding Capacity maps and the seasonal irrigation volume maps to derive an AV.

What situations may preclude use of the standard IrriCalc maps?

If your farm is located in an inland basin, such as the Mackenzie Basin. The IrriCalc method uses a crop factor that has been calibrated for growing conditions on the Canterbury Plains. The length of the growing season in inland, high altitude, basins is significantly shorter than the growing season on the Plains. This will change some characteristics of the crop factor to be used. The IrriCalc method should, in this situation, be used with a crop factor that has been constructed using information contained in FAO Paper 56, "Crop Evapotranspiration: Guidelines for computing crop water requirements", 1998. Justification of any subjective decisions made by the user in the construction of the crop factor is required.

What if I have system capacity issues?

The IrriCalc maps provide a prediction of a farms irrigation requirement and can be considered as the volume of water required for your crop assuming you can deliver the full irrigation volume on a daily basis. If there is a water volume shortfall between what is required for your crop, and the volume of water that is able to be delivered, then you should seek advice to look at ways to remodel your farms individual irrigation requirements.

What if I already have an alternative source of water (e.g. irrigation scheme water) on my property?

In evaluating your annual volume requirements for your farm, as part of a water permit application, you will need to consider and also disclose how the sources of water will operate together both on a return period and annual basis. In issuing consents to take and use water Environment Canterbury may have discretion on how takes from different sources are operated together. If you wish you may seek pre-application advice from Environment Canterbury's Consents section as each scheme will have individual characteristics that need to be considered on a case-by-case basis.

What if I have mixed soil types on my property?

Refer to Section 2: "How to calculate a farms seasonal irrigation water limit using the Aqualinc maps" for guidance on mixed soil types.

Section 3 References

Bright JC (2009): Estimation of seasonal irrigation water use – Method development. Aqualinc Report C08000/1, prepared for Irrigation New Zealand