IN THE MATTER	**of the Resource Management Act 1991 and The Environment Canterbury (Temporary Commissioners and Water Management) Act 2010**
AND	
IN THE MATTER	**of the Hearing of Submissions on the Proposed Land and Water Regional Plan**
BY	**IRRIGATION NEW ZEALAND INCORPORATED** and **FEDERATED FARMERS OF NEW ZEALAND INCORPORATED** and **HORTICULTURE NEW ZEALAND INCORPORATED** <u>Submitters</u>
TO	**COMMISSIONERS OF THE CANTERBURY REGIONAL COUNCIL** <u>Local authority</u>

BRIEF OF EVIDENCE OF ANDREW ROBERT CURTIS ON BEHALF OF IRRIGATION NEW ZEALAND INCORPORATED, FEDERATED FARMERS OF NEW ZEALAND INCORPORATED AND HORTICULTURE NEW ZEALAND INCORPORATED

Dated: 4th February 2013

INTRODUCTION

Qualfications and Experience

1. My name is Andrew Curtis. I am the Chief Executive of Irrigation New Zealand Incorporated (INZ). I hold an upper second class BSc(Hons) degree (Physical Geography and Environmental Biology) from Oxford Brookes University and a PGDip (Environmental Management) from the University of Surrey. I also hold a New Zealand National Certificate in Irrigation Evaluation, and Massey University Certificates of Completion in Sustainable Nutrient Management in New Zealand Agriculture for both Intermediate and Advanced courses.

2. Alongside the advocacy role I fulfil for INZ I also provide a technical expert one and it is in this capacity I am presenting my evidence. My experience and knowledge of irrigation in NZ is considerable, in terms of both land uses (pastoral through horticulture and viticulture) and irrigation systems (drip-micro and spray). Whilst at INZ I have co-authored the irrigation industry code of practices and standards for design, installation and evaluation and I have also co-authored the irrigation operator and manager training resource package. I was also the owner of a vineyard whilst in Hawke's Bay and successfully operated both a frost protection and drip irrigation system.

3. I have much recent experience of water policy development. For example. as a representative of IrrigationNZ I have been actively involved in the Land and Water Forum process - plenary, small group and water quality management infrastructure and water allocation working groups since 2009. The multi-stakeholder water allocation working group explored a number of topics including, the nature of rights, allocation methods (administrative through market), over-allocation and water accounting..

4. My previous New Zealand (NZ) work experience includes six years employment for Hawke's Bay Regional Council, initially as an extension officer with a focus on irrigation and then as Strategic Advisor – Water. In this role I helped lead the development of the Hawke's Bay regional water strategy. This had a strong non-

regulatory focus (water storage, water user groups, water metering.......) to compliment and better enable traditional regulatory pathways.

5. Prior to my employment with Hawke's Bay Regional Council I was employed in a variety of horticultural (in NZ) and a mixed cropping/sheep and beef (United Kingdom) orchard and farm management roles.

(a) Code of Conduct

6. I have read the Environment Court Code of Conduct for expert witnesses and agree to comply with it.

7. I confirm that I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

SCOPE OF EVIDENCE

8. Evidence with regard to the water quantity component of the pLWRP has also been presented by Peter Callander from Pattle Delamore Partners Limited, Ian McIndoe from Aqualinc and Geoff Butcher from Butcher Partners Ltd. I agree with the evidence presented by Mr Callander, Mr McIndoe and Mr Butcher and support their conclusions and recommendations. My evidence provides additional technically-based observations to further support some of those conclusions and also provides additional conclusions on matters not covered.

9. My evidence will cover the following matters:

   (A) Principles of Irrigation *(Definition, Policy 4.50 & 4.67)*

   (B) Efficiency *(Definition)*

   (C) Consent Duration and Investment *(Policy 4.76)*

   (D) Over-allocation *(Policy 4.73 & Rule 5.107 5.)*

(A) Principles of Irrigation

10. 'Irrigation is the artificial application of water to land'. For agriculture it is primarily used as a risk management tool to assist in the production of crops (vegetation) during periods of inadequate rainfall (periods of soil water deficit - drought). However there are other justifications for its use, for example; activating herbicide applications; leaching salts; cooling crops; preparing the soil for cultivation; urban amenity areas (where the focus is not always soil moisture replacement).

11. The definition of irrigation contained in the pLWRP is agricultural focused. it includes stock and could exclude other uses, particularly in the amenity space. The inclusion of stock is technically not correct. The section 42A report recognises this, but then states 'the reality is that irrigation assists in the production of stock' and leaves the definition unchanged. The simple definition given in paragraph 10 would provide a better definition of irrigation, as it allows for the wide range of reasons for which it is used.

12. Upon the summer dry plains and rolling downlands of Canterbury primary production is water limited. Without irrigation production opportunities have become more and more limited over time. Markets and processors now require consistent quantity and quality of produce to maintain shelf space and processing viability. The increased requirement for consistent quantity and quality means reliability of water supply is paramount for irrigation.

13. Over time reliability will also maximise the value received from irrigation. Reliability allows a wider range of high value agricultural production systems to be utilised. The high capital investment and seasonal inputs associated with high value permanent horticultural crops require certainty. This is very evident in Canterbury where low reliability run-of-river takes have pasture dominated land use, feed can be brought in or livestock moved in times of restriction – you cannot move a crop.

14. High reliability, the dynamic efficiency of the allocation system (paragraph 21) and the cost of application (paragraph 16) are the main drivers of resource use efficiency. A reliable water supply enables irrigators to invest in modern irrigation

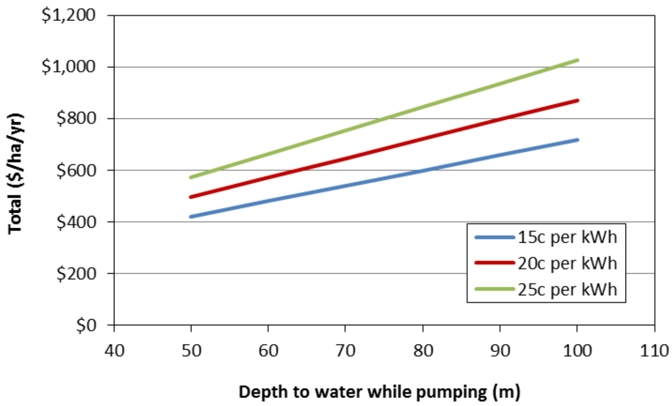
infrastructure (gives investment certainty) and also optimal irrigation practice (move to ‘as and when’ practice instead of a precautionary approach).

15. When designed, installed, operated and maintained well, irrigation will optimise plant growth throughout the growing season and also from season to season. Well-managed irrigation replaces the soil water used by plants once a trigger has been reached. The trigger and amount applied is defined by soil water holding characteristics, soil temperature, the crops physiological characteristics (water use and drought tolerance) and climatic conditions.

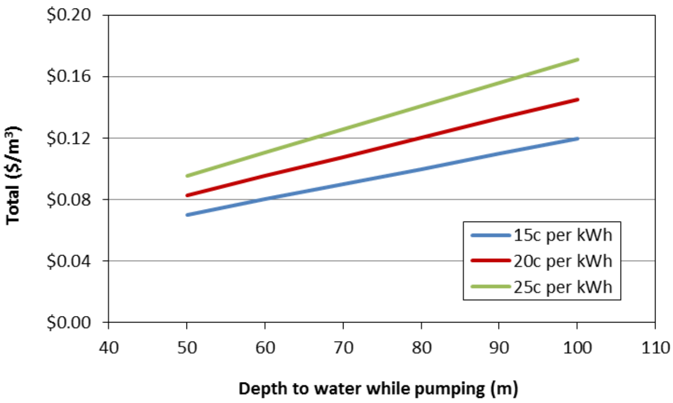
16. There is an on-going cost associated with the application of irrigation this includes the capital cost of infrastructure, energy, labour and infrastructure wear and tear. Typical figures for a groundwater scenario are between \$0.08 - \$0.14m^3 or \$500 - \$850ha/year[1] depending on depth to water and energy price. This considerable cost is a primary driver for the application of water, alongside the management characteristics of the irrigation system itself.

17. There may be good reason for irrigating outside the irrigation season. Policy 4.67 therefore provides an arbitrary limitation. For example, with the predicted impacts of climate change (NIWA[2] predict increased temperature and decreased/more sporadic rainfall for the Canterbury plains) it is plausible there may be a reason why irrigation should need to be applied outside the amended timeframe given in the Section 42A report. Irrigators typically avoid applying water unnecessarily due to the cost of application and the potential negative impacts upon production. Also as outlined in paragraph 10, it should be noted that irrigation can also be used for other reasons outside of soil moisture replacement and production. Irrigation should therefore instead be subject to ‘justification of its application - was there a valid reason for it to be applied?’ Such an approach is by far the best way to encourage and promote efficient resource use.

[1] Survey of Costs of Surface Water Irrigation Schemes in Canterbury, Aqualinc 2012
[2] www.niwa.co.nz/our-science/climate/information-and-resources/clivar/scenarios



Calculated annualised cost of installing and operating a groundwater supply in the Canterbury region in $/ha/year. These costs are based on groundwater being available for abstraction and do not include power extension or transformer costs



Calculated annualised cost of installing and operating a groundwater supply in the Canterbury region in $/m3. These costs are based on groundwater being available for abstraction and do not include power extension or transformer costs

18. Policy 4.50(a) sets a seasonal or annual allocation condition on consents when changing a 'run of river' take to a 'take to storage'. The section 42A report states that this is appropriate to 'ensure water is used efficiently and to protect flow variability'. As discussed in paragraph 14, reliability of supply, the dynamic efficiency of the allocation system, and the cost of application are the main drivers of water use efficiency. Setting a volume based on technical efficiency (80%) and a 9 in 10 year drought scenario will have a relatively small impact. For example, 8 years in 10 there will be an excess of supply for an 80% technically efficient system – so how does this encourage efficient use?

19. For river takes it is the maximum instantaneous rate of take (the potential impact of all takes combined upon river flow) combined with the rivers flow regime (limits that define when water can be taken) that dictate flow variability. Again the application of a seasonal volume will have relatively little impact upon this.

20. The conversion of run-of river takes to inter-seasonal water storage needs to be encouraged in Canterbury as it will increase reliability of supply (refer paragraph 14) and its subsequent economic and environmental benefits. Management regimes that enable more water to be taken, noting that the actual take will always be limited by the instantaneous rate of take, in seasons of high river flow may also take the pressure off rivers in subsequent years, particularly if they are ones of low flow.

(B) Efficiency

21. Understanding and then defining efficiency requires a multi-dimensional approach, where the beneficial use over time associated with social, cultural, economic and environmental factors must be considered. There are numerous definitions of efficiency in terms of resource use. Each individual definitions applicability and subsequent use depends on the particular aspect under consideration. However, as outlined in the first and third Land and Water Forum reports and also a recent Aqualinc report on Irrigation Efficiency[3], efficiency of resource use has three important dimensions that must be accounted for in any general definition:

    (a) **Technical efficiency** – How well was the water applied or used? An efficiently designed and installed irrigation system sets the platform for technical efficiency. How and when it is used (the practices) is also extremely important.

    (b) **Allocative efficiency** – Was the water used for its best use, considering the regional availability and value of water. Understanding the economic benefits of water use helps to determine how to share (allocate) the water available, especially in water short areas or times.

[3] What Is Irrigation Efficiency? Aqualinc 2012

(c) **Dynamic efficiency** – How easily the water is able to move (transfer) to its best use over time through reallocation to higher value uses? Dynamic efficiency is extremely important aspect of efficiency as it is an indicator of the resilience of the resource management system. It is also the key driver for both allocative and technical efficiency once the initial allocation has been made.

22. The section 42A report states there is no need to include dynamic efficiency within the efficiency definition as 'it is not widely understood' and 'it is already accounted for as allocative efficiency is included in the definition'. This displays a poor understanding of the key components that drive efficiency of resource use, alongside their interactions.

23. As outlined in paragraph 17, dynamic efficiency encompasses a different component of efficiency from allocative, however they are interrelated. Allocative efficiency is a measure of whether the best value is being gained from the available resource at a point in time (past, present or future). Dynamic efficiency is a measure of the framework itself and how well it provides for allocative efficiency over time – in essence how effective is the re-allocation system. Both concepts are commonly referred to in the economic literature relating to resource efficiency.

24. Importantly, the development and implementation of objectives, policies and rules pertaining to efficient resource use should be assessed as to their effectiveness overtime alongside any given point in it. For example there is a risk that an analysis of how different allocation systems react to an external 'shock' – how well they allow for adaption, may be overlooked if the dynamic component is omitted. It is therefore important that dynamic efficiency is included within the definition of efficiency contained within the pLWRP.

(C) *Consent Duration & Investment*

25. Policy 4.76 – 'being generally subject to a 5 year consent period in a Nutrient Allocation zone in which water quality outcomes are at risk' or 'catchments or groundwater allocation zones that are over-allocated' indicates a poor

understanding of financial investment for efficient and effective irrigation and nutrient management infrastructure. It also detracts from the long-term strategic approach that is required for successful water management.

26. The qualification of ‘impede the ability of the community to find an integrated solution’ is also extremely vague and uncertain and will lead to confusion as to what is required by consent applicants.

27. Creating investment certainty is a key element to improving on-farm environmental performance for water and nutrients. The adoption of more advanced Good Management Practices’s (GMP) commonly involves a more lengthy return on investment or alternatively, repayments need to be spread over a longer timeframe so as a combination of mitigations can be implemented.

28. When debt financing the maximum loan period is subject to the duration of the consent – the period of certainty around which repayments can be made. This is because there is no explicit right of renewal for consents. There is a possibility that a consent could be declined upon its renewal. Financial institutions now recognise the ability for consent conditions to be considerably changed upon renewal.

29. Short-term consents also create longer time periods where re-investment is impeded. It is extremely unusual that significant reinvestment is made any longer than five years out from the consent expiry date. Again this is due to the uncertainty of future consent conditions upon renewal.

30. Short-term consents create short-term thinking - ‘how can I get the most out of this in the short-time available’. This leads to corners being cut - a minimalist approach, and a reliance on existing recipes - the tried and tested ‘what Grandad did’. Long-term consents provide an environment in which long term strategic thinking and innovation can occur. The latter is required if the socio-economic potential is to be achieved alongside the proposed freshwater objectives.

(D) Over Allocation

31. The interpretation of over-allocation needs careful consideration. If interim limits, for example first or second order methods for groundwater, are in place and the volume or rate allocated is greater than these, technically the situation should not be referred to as over-allocated. First and second order allocation methods are default methodologies where limited information has been used to derive an allocation (I refer you to the evidence of Mr McIndoe). However, once interim limits have been set further allocations should only be made if comprehensive and specific evidence is provided (third order), otherwise this may create risk to the environment and existing users (compromise their security of supply).

32. Only once a catchment has been through a science informed community values based process from which freshwater objectives and corresponding limits are set, can it be described as over-allocated.

33. Once the existence of an over-allocation has been established it should be dealt with at the catchment level as a specific task. This will minimise the likelihood of unintended consequences. The management of water quantity within limits is complex. Whilst multi-faceted, catch all solutions are preferable unless they have been carefully analysed complexities commonly occur.

34. For example, using the transfer mechanism (as per policy 4.73 and rule 5.105 5.) as a means of clawing-back an over allocation through the removal of a % share upon each transaction will impact upon dynamic efficiency (in particular it will dis-incentivise the growth of a temporary transfer market for water). This will then have flow on impacts upon;

    (a) allocative efficiency - water will remain 'locked up' instead of being incentivised to move to its highest value use (particularly on a temporary basis) and thus detract from maximising its socio-economic benefit;

    (b) technical efficiency - there is reduced incentives (returns from the sale of excess water are compromised for example) to make efficiency gains above and beyond the reasonable use test. Providing incentives for leading irrigators to continue to improve (enabling a continuous improvement culture) should be of high priority.

35. The updated objectives 3.4 (maximise efficient storage, distribution and use), and 3.5 (land use continues to develop and change in response to socio economic and community demand) contained within the section 42A report are also compromised by this policy and associated rule.

36. Dealing with an over-allocation as a catchment specific task focuses the community of interest to find practical catchment specific solutions for themselves. Having determined a workable solution they are then more likely to 'buy into it'.

37. The following list sets out an equitable stepped process for dealing with catchments where there is an over-allocation. It is adapted from the working papers of the Land and Water Forum, where a method for the resolution of over-allocation (managing down to a limit) was discussed in detail.

STEP 1

- Develop and incorporate into the Plan the standards to be applied to determine reasonable use.
- Engage with water users to foster understanding of the issues and potential range of solutions as regards the over-allocation.

STEP 2

- Create a register of existing takes, uses, dams, diverts, discharges. Include all authorised takes, for examples permitted activity rules; authorisations under Section 14 (3) (b).
- Fill gaps in the register, area irrigated for example, and fix errors, location of takes, source(s) from which water is taken for examples.
- Apply the reasonable use test to each.

- Adjust registry values where necessary to bring them into line with what the Plan specifies is 'reasonable use'.
- Seek submissions within a specified time frame and adjust values as needed.
- Re-calculate the level of allocation and then re-apply the question of 'is the catchment still over allocated'?

STEP 3 (If still over-allocated)

- Establish whether it is feasible to eliminate the over allocation by developing water infrastructure?
- Determine if, when, where and why over allocation is occurring?
- Determine the rate at which the current allocation will be reduced to the limit (transition time) and how the cuts are to be distributed over that time frame.
- Determine who will bear the cost of the cut, and which allocations will be cut. Use the backstop method of equally distributed cuts (a haircut) to incentivise active participation by the community of interest.
- Design and incorporate within the Plan the policies and rules needed to implement the 'community agreed' method for reducing allocations to the limit.

Conclusion

38. The changes proposed in my evidence to are intended to help improve the water management approach described in the pLWRP in a way that is more consistent with the RMA, the NPS for Freshwater Management, the CRPS and is closer to achieving the desired outcome of the Canterbury Water Management Strategy which is:

Andrew Curtis, Chief Executive Irrigation New Zealand Incorporated

4th February 2013