BEFORE INDEPENDENT HEARING COMMISSIONERS

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the hearing of submissions on Proposed Variation 1 (Hinds) to the Proposed Canterbury Land and Water Regional Plan

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STATEMENT OF EVIDENCE OF ANDREW ROBERT CURTIS ON BEHALF OF IRRIGATION NEW ZEALAND INCORPORATED

Dated: 15th May 2015

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. My experience and knowledge of irrigation in New Zealand (**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 the irrigation manager and development training resources. I have also published a number of papers on the history, current extent and future development of irrigation in NZ. I was also the owner operator of a vineyard whilst in Hawke's Bay and successfully managed both a frost protection and drip irrigation system for eight years.

3. I have much recent experience in the area of water policy development. For example, as a representative of INZ I continue to be actively involved in the Land and Water Forum process - plenary, small group and in this current iteration core elements and nature of rights and implementation of water allocation flexi-groups. These multi-stakeholder expert groups will explore a number of topics including, exploration of potential reforms to the current rights regime, allocation methods, options for resolving over-allocation and water accounting.

4. My previous New Zealand work experience includes six years employment with 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 (including water storage, water user groups, water metering) to complement 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.

Code of Conduct for Expert Witnesses

6. As part of my role with INZ, I am an advocate for the irrigation industry. However, I have a good deal of technical knowledge and experience in respect of irrigation matters generally, and the Hinds zone specifically.

7. To this end, I cannot provide this evidence as an independent expert but I confirm that the evidence I set out below addresses matters that I have a level of expertise in given my qualifications and background.

8. 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

9. My evidence will cover the following matters:

   a) *Transfer of Water Permits (Policy 13.4.16 and Rules 13.5.33 & 13.5.34)*

   b) *Allocation Methodology (Policy 13.4.16 and Rules 13.5.30, 13.5.31)*

   c) *SMART Irrigation – The INZ framework for Irrigation Good Management Practice (Schedule 24)*

   d) *Current challenges with OVERSEER (general comment for consideration with the nutrient Polices & Rules)*

TRANSFER OF WATER PERMITS

10. Water permit transfer within the regulatory regime in Canterbury is limited. Data received from Environment Canterbury shows that during the 2013-14 financial year shows there were 341 full transfers and 19 part transfers for water permits over the entire region. At the time of writing this evidence point of take transfers (water transferred from one property to another) were unable to be separated from a change of ownership only (a property sale or change in business name). However it is likely the latter scenario makes up a significant proportion of these.

11. From discussions with irrigation consultants and irrigators it seems clear that the majority of water permit transfers are -

- *From* previously irrigated properties that have been subdivided and thus the water is no longer required, or from properties that have modernised their irrigation installing a more efficient system, for example moving from a rotorainer to a centre pivot where the efficiency gain creates a small amount of surplus water.

- *To* an existing allocation for the purposes of either 'topping-up' due to a land use change or increasing reliability. For examples an existing irrigated cropping farm converting to dairy that has been allocated a volume less than the 9 in 10 year irrigation demand for pasture and thus requires more water to 'top-up' their allocation, or alternatively an existing cropping or dairy farm that is looking for greater reliability.

12. From this it appears evident that prohibiting transfer as a means of providing a solution to over-allocation will achieve little benefit to the zone.

13. For the 2013-14 year actual water use for the 73% of takes measured in the zone was 64%[1] In 2012-13 actual water use for the 71% of takes measured in the zone was 55%[2] Typically it is estimated that between 50-70% of the allocated water will be used for irrigation in the Hinds and Valetta zones, this is due to; climatic variations, crop rotations, pasture allocations, consent double-ups, adaptive management consents and irrigation system breakdowns.

14. In my opinion, the reasons for the limited numbers of water permit transfers despite a typical actual water usage of 50-70% in the zone are –

    (a) Reliability – Irrigation in NZ's maritime climate is subject to large climatic variation from year to year. An allocation is provided to irrigators on the basis of enabling them to successfully operate their business in a 9 in 10 year drought scenario. This means in 8 out of 10 years they will have more water than they need, in 1 out of 10 years they will have just the right amount of water and in 1 out of 10 years they will not have enough. Typically irrigators will not on-sell this reliability as they realise it is key to their business long-term success. In fact it is common for irrigators to invest in greater reliability than a 9 in 10 year drought scenario.

    (b) Permit Double-ups – For reasons of reliability and cost of water supply it is common for irrigators, where multiple sources of water are available, to have both a surface water and groundwater consent for their property. These would cover the same area and have the same seasonal volume applied to them. In the Hinds & Valetta zones direct surface water takes without storage are typically unreliable, to a lessor extent water supplied from irrigation schemes also has reliability issues. Where it is an option

[1] Canterbury Region Water Use Report for the 2013/14 water year. Environment Canterbury Report No. R14/104
[2] Canterbury Region Water Use Report for the 2012/13 water year. Environment Canterbury Report No. R14/4

irrigators therefore frequently have a groundwater supply as a back-up for seasons with low river flows. The reduced cost of pumping means surface water consents are preferable, they are therefore used until minimum flows are reached and then a swap to groundwater pumping is made. Typically irrigators will not on-sell this reliability as they realise it is key to their business long-term success. As a result the groundwater allocation that relates to such consents will seldom be used in full.

(c) Adaptive Management Consents – Within the Valetta zone there are numerous consents that have adaptive management conditions placed upon them. This is implemented in the form of a minimum water level for the aquifer past which abstraction is not permitted (bore water levels are monitored). Therefore in years of low groundwater levels (low winter recharge) the seasonal volume allocated is not able to be utilised.

(d) Pasture Based Allocation – Consents have typically been granted with a pasture based allocation. This decision was made as it allowed for flexibility of future land use, particularly for cropping farmers in the lower part of the zone. The decision was also made because it prevented adverse impacts on land value given the value of water is presently incorporated into land in NZ and a reduction in water availability would likely impact this. Irrigators leverage against their land value to provide security when debt financing business investment. Whilst there are no direct examples of this, as decisions to date have landed in favour of the pasture allocation, there is an exemplar for this. Land is currently valued based on the amount of water available and the reliability of this an assessment of whether this restricts the land use potential. An existing irrigator's investment can therefore be affected by significant decisions post the granting of the permit.

From reviewing the s32 and s42A Reports, there seems to be a perception that there is a risk of enterprises either transferring their excess water to an unirrigated property or undertaking land use change to a pasture based enterprises and thus more fully utilising their allocations. As far as I am aware, this has not occurred to date or at least not to any noticeable extent. I consider the nitrate management regime that Variation 2 introduces now provide an extremely significant additional barriers to this. Whilst it could be argued this unproductively "locks up" water, the reality is preserving this allocation gives a continued ability for irrigators to leverage off their existing land value. This underpins the considerable financial investment that is currently being made in irrigation modernisation so has a direct environmental and economic output.

15. Based on the evidence above it is my opinion that it is extremely unlikely that the current total allocated volume in the Hinds and Valetta zone would ever be fully used, even in a drought year of high abstraction (high evapotranspiration and low rainfall). However I also do not

believe there is much “surplus” water in the zone so I consider the risk of converting “dry” allocation to “wet” allocation or “surplus” water being transferred to be minimal because:

(a) Irrigators are not going to transfer the water they have not been using if they know they would need it in a 1 in 10 year dry event. Such water cannot truly be considered “dry” allocation as it is not meant to be used except in the more extreme events. I am not aware of any situations where an irrigator has transferred water and taken a reduction in reliability in order to do so – for example, I consider it is extremely unlikely that a farmer with enough water for 9 in 10 years reliability is going to transfer water and accept a drop in reliability to 7 in 10 years;

(b) The most usual situation of transfer I am aware of is where an irrigator has made efficiency gains so that they need less than their allocated volume to achieve 9 out of 10 year reliability. In such a case the water has in fact been used in the past, so it is “wet” allocation. The reward and incentive to the irrigator making efficiency gains is in being able to sell that water. The relatively small amount offered tends to be bought by farmers wishing to increase their own security rather than establishing new operations.

16. Although transfers are always going to be limited in number for the reasons set out above, there are some significant benefits to allowing – rather than prohibiting – a transfer system. Improved dynamic efficiency (transfer) is key to growing the socio-economic benefit the community receives over time from its water resource. In particular the growth of a temporary transfer market is of much value and the past season has clearly demonstrated this.

17. Temporary transfers (movement of an allocation from one point of take to another typically for a single season) are of particular value to as they allow the inevitable swings in climate and commodity prices to be better accommodated – it improve community resilience. The flow-on benefits of improved transfer include;

(a) Increased allocative efficiency – water will be provided an additional mechanism to move to its highest value use (particularly on a temporary transfer basis). This will optimise the overall community socio-economic benefit that could potentially be created from its available water resource. For every $1 of private gain from irrigation it has been well proven there is in excess of $3 of public benefit;

(b) Increased technical efficiency – the ability to on-sell potential efficiency gains provides an incentive for irrigators to continuously improve upon their existing practice to further reduce drainage losses and thus nutrient loads. Improved transfer will therefore ultimately add to the more timely reduction of nutrient loads in the catchment.

18. I therefore conclude the implications of prohibiting transfer in the Valetta and Hinds and Valetta zones far outweigh the limited benefits that such a decision would create.

ALLOCATION METHODOLOGY

19. A robust allocation methodology must be able to account for:

(a) the irrigated production system(s)

(b) the irrigation system(s) type

(c) the soil type(s)

(d) the climate and it's variation over time

(e) a given reliability

(f) a given technical efficiency

In my experience it is complex to do this from records of past use. For example how is this practically performed for a cropping enterprise that grows multiple crops in a rotation over a farm with multiple soil types?

20. The concepts of water allocation and actual use should not be confused. This is of particular importance for NZ where irrigation season rainfall and the diverse range of crops grown upon different soil types significantly impact upon actual use from one season to another. Basing an allocation on past use creates issues such as -

(a) It does not easily account for NZ's cyclical climatic variations

NZ has irregular 3-10 year climate cycles. It is challenging and therefore costly to put each season's reliability versus its actual use in the context of a 9 in 10 year reliability.

(b) It does not easily account for rotational cropping farming systems

Cropping farmers typically run a 4 – 8 year rotation to avoid issues such as increased disease resistance or incidence, and to meet market entry requirements, seed crop quarantine needs for example. Crops vary significantly in their water needs based on rooting depth, leaf area, length of growing season and the soil they are grown in. Using actual use for establishing an allocation therefore has a high probability of unfairly reducing the reliability of supply for a cropping irrigator – either allocating them less water than their farming system actually requires or alternatively becoming unnecessarily complex to determine.

21. In my opinion limiting the allocation methodology in schedule 10 to method 1 will be problematic. It is widely accepted internationally[3] that the best mechanism for setting a fair and equitable allocation volume is through using a water balance model as is allowed for in method 2.

SMART IRRIGATION – GOOD MANAGEMENT PRACTICE IRRIGATION

22. Regional Council's often state they apply seasonal volumes to surface takes on the grounds that they will achieve efficiency of water use. In my experience, seasonal or annual volumes do not drive efficiency as for most years (depending on the reliability chosen) an irrigator has more water available to them than they need. Rather, seasonal volumes are derived to give certainty (a defined reliability of supply) to an irrigator usually based upon a particular drought scenario and to relate an individual allocation to the total allocation available.

23. In my view, a better method to drive efficiency is the application of the INZ SMART Irrigation (Irrigation Good Management Practice) framework. It should be noted that the Irrigation Farm Practices (consistency with industry design standards, annual calibration of equipment, use of site specific monitoring and providing proof of the these) contained in Schedule 24 reflect the requirements of the INZ SMART Irrigation framework.

24. The expectations of the SMART Irrigation framework are complementary to improved production (both quality and quantity – through uniformity of application and appropriate application depths and timing), minimised operating costs – through hydraulic design and scheduling, and thus profitability.

Requirements of SMART Irrigation

25. The requirements of SMART Irrigation are simple -

(1) The Irrigation System Can Apply Water Efficiently

Industry codes of practice and standards provide minimum design performance levels

Once installed the performance is checked annually

[3] Crop evapotranspiration - Guidelines for computing crop water requirements - FAO Irrigation and drainage paper 56

(2) The Use of Water for Irrigation is Justified

There was a valid reason why I applied irrigation today

(3) Proof can be provided of the above

I am accountable for my actions

The Irrigation System Can Apply Water Efficiently

26. This is achieved through –

(a) Any new development, upgrade or redevelopment is consistent with the INZ Irrigation Design and Installation Codes of Practice and Standards

INZ has developed Codes of Practice and Standards for Irrigation Design[4] and Installation[5]. Both of these were reviewed and updated between 2012 and 2014. They have been developed in collaboration with technical experts from the irrigation service industries and irrigators. INZ Accreditation Ltd was established in 2012 in part to introduce an accreditation programme for Irrigation Design Companies[6]. This first requires design companies to demonstrate they can achieve the Standard through the application process. Accredited companies then agree (through a legal agreement) to adhere to the INZ Design and Installation Codes of Practice and Standards and be audited biannually with regard to this. The programme has been developed to give irrigators confidence that an accredited company will deliver an irrigation system design that meets the Codes of Practice and Standards. This will ensure it can deliver the required amount of water at the right time to maximise the production potential and importantly minimise environmental impacts.

(b) A new development, upgrade or redevelopment is commissioned to demonstrate that it has achieved the Irrigation Design Standards

INZ produced a freely available standard installation contract in 2013 and alongside this a commissioning template was also produced in 2014[7]. Together they allow the irrigation systems design performance parameters to be incorporated into the contract. These can then be used in the commissioning process to hold the installer/designer to account.

[4] http://irrigationnz.co.nz/industry/design/
[5] http://irrigationnz.co.nz/industry/installation/
[6] http://irrigationaccreditation.co.nz/
[7] http://irrigationnz.co.nz/news-resources/irrigation-resources/

(c) *The irrigation system is self-evaluated annually to demonstrate that it continues to perform efficiently*

INZ updated the Evaluation Code of Practice in 2014[8]. It is now called the Irrigation Performance Assessment Code of Practice. Within this self-evaluation performance methods for all irrigation system types have been collated and documented. The outcomes from the self-audit should be compared to the design performance parameters in the commissioning report. If anomalies are observed they should be rectified, alternatively if there is uncertainty as to the issue a full independent evaluation should be undertaken. Such an approach makes economic sense, ensuring the irrigation system is working as it should is an essential risk management strategy for production.

The Use of Water is Justified

27. *Annual justification of irrigation applications to demonstrate responsible use*. Firstly it is important that consistency with any consent condition is demonstrated. These are a legal requirement and therefore must be adhered to. For the justification of use there are a number of ways this can be done. Soil moisture monitoring provides one easy pathway and is becoming more commonly used. A simple water budget (climate and soil data combined with irrigation applications) provides another. There are also crop models available, for example orchardists can use the Tree-Vine irrigation calculator (CropIRLog) and arable growers can use Aquatrac. For irrigation applications that are not triggered through plant induced soil water deficits, other evidence should be provided – for example for frost protection temperature records should be kept.

28. To support and enable all irrigators to perform SMART Irrigation, INZ has developed a comprehensive Irrigation Resource Kit - 'Irrigation in a Box'[9]. This contains information books to assist in irrigation management and development, irrigation system pre-season checklists, evaluation materials and a range of other information – a one stop shop for irrigators. Alternatively INZ also has one day irrigation operator and manager training courses now widely available[10]. Five of these courses are planned for the Selwyn-Waihora zone during 2014-15 and will be attended by in excess of 120 irrigators. Attending the day allows irrigators to practically understand SMART Irrigation. They also receive a complimentary Irrigation Resource Kit.

[8] http://irrigationnz.co.nz/industry/performance-assessment/
[9] http://irrigationnz.co.nz/news-resources/irrigation-resources/
[10] http://irrigationnz.co.nz/events/

Proof can be provided of the above

29. The provision of auditable evidence is key to providing accountability and establishing trust. SMART Irrigation has become an integral part of Farm Environment Management Plans. For Canterbury, and particularly for the Selwyn-Waihora zone, it will therefore become an accountable industry led pathway for the achievement of improved continuously improving environmental performance.

30. A summary of the INZ SMART Irrigation framework has been included to:

    (a) Demonstrate that the irrigation component of Schedule 24 is consistent with the INZ initiative to improve irrigation environmental performance. Schedule 24 will incentivise actual farm irrigation practices to change for the better – this is what matters if environmental outcomes are sought.

    (b) Demonstrate to the wider community that INZ is committed to moving irrigators along the environmental improvement pathway, importantly improved irrigation practice is intimately linked to the achievability of any nitrate reduction targets set.

THE OVERSEER ISSUE

31. Until the release of the latest version of OVERSEER (6.2), the tool has not been able to robustly account for nutrient gains through improvements in irrigation application efficiency. Compounding this there are also challenges with differing methodologies having been used. As a result there are significant challenges associated with the numerical values in the plan change.

32. Despite the new version now having a greater ability to reflect this, there is yet to be a formally agreed protocols for its use. This still being a work in progress. The intention was to provide a couple of case studies to illustrate the changes however within the short time frame and also as the protocols being still under development, noting INZ has taken the lead on this in conjunction with eth OVERSEER owners. We will however endeavour to provide information on this at the hearings.

Andrew Curtis

15 May 2015