Tabled @ Hearing 19 June 2015

Written Response to Outstanding "Day 1" Questions to CRC

1. Are there any footnotes attached to Variation 1's Table 11(a) that should also be attached to Variation 2's Table 13(a)?

   Response (Matthew McCallum-Clark): This matter is still being considered. We expect to be able to complete this within one week and provide a written response.

2. Variation 2 Rule 13.5.12 – why does it refer to condition 2 of Rule 13.5.10? Does that have any unintended consequences in terms of prohibiting farming activities?

   Response (Matthew McCallum-Clark): Yes, the drafting of that rule would appear to have unintended consequences. While a cohesive set of provisions will be provided in reply, at this juncture it would be reasonable to delete condition 2 of Rule 13.5.10 from Rule 13.5.12 and insert it into Rule 13.5.11 (non-complying activities).

3. Can you please check the use of the two phrases 'baseline land use' and 'nitrogen baseline' used in the policies and rules to ensure they are used consistently and correctly?

   Response (Matthew McCallum-Clark): When the Council officers present a revised version of the Variation and associated report and recommendations in reply, particular attention will be paid to this matter and adjustments made accordingly.

4. Why is it recommended to change the titles for Table 13(j) and 13(k) to Targets instead of say Targets/Limits? Does that recommended change provide suitable 'shelf life' for those tables?

   Response (Matthew McCallum-Clark): This matter is still being considered. We expect to be able to complete this within one week and provide a written response.

5. What is the interplay between Rule 13.5.31 and Rule 5.130 as raised by RDRML? If both the Mayfield-Hinds and Valetta GAZs are fully (or over) allocated what ability is there to take deep groundwater under Rule 13.5.31?

   Response (Matthew McCallum-Clark): It is acknowledged that there is a difficulty with the current policy and rule structure, in that transfer to groundwater is 'encouraged', while the groundwater limits are fully or over allocated. A different framework is in place in part of the wider Ashburton Sub-regional section of the LWRP, where a specific groundwater allocation is available for consent holders seeking to substitute deep groundwater for existing surface water. Officers are considering what such a policy and rule framework may comprise, given

some of the uncertainties and reliability issues. A full response and any recommended changes will be made in reply.

Technical advice has been received, to the effect that if the full potential volume of surface water consents were transferred to groundwater, this may require a groundwater allocation of 24.6 million m^3/year in the Mayfield Hinds groundwater allocation zone (GAZ) and 25.8 million m^3/year in the Valetta GAZ.

Appendix A (attached) provides additional technical and contextual information related how these numbers were derived, and the technical issues associated with using them allocation values.

6. What is ECan's response to the Fonterra/ Dairy NZ evidence that only 15,000ha of new irrigation is feasible (refer to Dr Brown's evidence that only 19,000ha plus or minus 5,500 is available and Ms Hayward's evidence that 15,000 ha is a feasible area)?

Response (Lisa Scott): In review of this evidence, it appears that the main reason for the difference is the continued development over the past 4 years. The ECan technical team are aware of the continued change which was addressed in a memo by Scott (2014). ECan's is a maximum estimate based on 2011 land use data. DairyNZ/Fonterra has used current land use data (2015). They also used a more refined method to identify irrigated land than what was available to ECan technical team during plan development. Using our approach, and taking on board the known increase in additional irrigation, a conservative estimate for current feasible new irrigation will be towards the upper end of Dr. Brown's range: 23,500 ha.

For the modelling scenarios, we were asked to construct a development scenario with 30,000 hectares additional irrigation. This was to meet an economic priority outcome set by the Zone Committee when we began development of the plan in 2012 (AZC, 2014). We used GIS maps of farm-scale land use to identify all dryland and part-irrigated farms for our baseline year (2011). We did not refine the irrigation data to sub-farm or paddock scale. Our models used slightly less than 30,000 ha (27,500 ha to 28,500 ha) because it was difficult to find enough dryland and part-irrigated land to meet the requirements for conversion. In general, the uncertainties in this type of catchment scale analysis are large, as indicated by Dr. Brown's range of 11,000 ha difference between his maximum and minimum estimates (Table 3, Evidence of Peter Brown).

There has been some conversion of land use since 2011 and the remaining area available will be lower. DairyNZ/Fonterra's data include part of the available area already converted during the plan development period. Data collected by the Hinds Plains Land and Water Partnership (HPLWP) was presented to ECan in a workshop in January 2014 (Scott, 2014). We estimated that HPLWP's data included an additional 5000 ha converted to irrigated dairy land use between the end of 2011 and the start of 2014. This would bring the total available new irrigation area to 23,500 ha, which is within Dr Brown's estimates of 13,500 to 24,500 ha.

Ms Hayward's estimate of 15,000 ha is at the lower end of the range indicated by Dr. Brown and is based on discussions with two irrigation companies (RDRML and BCIL) on what they consider realistic for irrigation in the catchment (paragraph 6.11, Evidence of Shirley Hayward), rather than on mapped available land areas.

References:

AZC, 2014: Ashburton ZIP Addendum Hinds Plains Area, Ashburton Zone Committee, March 2014.

Scott, L. 2014: Hinds Plains Water Quality Modelling – Comparison with Land Use Areas from HPLWP, memo to Bob Bower, 3 April 2014. Included in Hinds/Hekeao Plains Compendium - Technical reports and memos, p 215 – 222.

7. **What is ECan's response to other expert's estimates of current N load based on more contemporary estimates of current land use, namely that the current N load is closer to 5,600 tonnes per annum as opposed to 4,500 tonnes per annum?**

Response (Lisa Scott): Some of the increase from ECan to DairyNZ/Fonterra estimates is likely to arise from development that took place over the past 4 years. Using our model, the current load could have increased by 200 to 300 t due to recent development (Scott, 2014). But most of the difference between the estimates is likely to be increases on paper (as a result of using different modelling tools and input data) which have not changed the actual leaching from farms.

Because the irrigated area has expanded over the past 4 years, it is likely that the N load will also have increased from our 2011 baseline. New irrigation will largely support higher N-leaching land uses. Using our model with 2014 land use data from HPLWP, we estimated the current load could be 4700 to 4800 tonnes N per annum (Scott, 2014), but not as high as the DairyNZ/Fonterra estimates. Coincidentally, a load of 5600 t/yr is what we modelled for full 30,000 ha additional irrigation if all land use was at GMP with no additional N loss reductions.

The main source of difference between ECan and submitter estimates is the use of different input data (land use, drainage and N loss) for the catchment load calculations. In particular, the DairyNZ/Overseer 6.2 model uses significantly higher drainage volumes and higher N losses which have been adjusted by a 'drainage correction factor' to anticipate what the N load might be if modelled with the newest version of Overseer. Neither ECan, nor the submitters have actually modelled farm N losses for the catchment using Overseer 6.2. Changing versions of the Overseer model is a live issue for ECan at the moment and ECan is working through the implications for technical assessments, planning, consents and compliance monitoring.

Although the input data are different and N loads estimated by submitters is considerably higher than ECan's version, the ECan and DairyNZ/Fonterra models predict similar average nitrate-N concentrations (ECan 12.5 mg/L, DairyNZ/Fonterra 11.2 to 13.9 mg/L from Table 7,

Evidence of Peter Brown). The modelled concentrations also agree well with monitored data Paragraph 4.26, Evidence of Shirley Hayward).

Catchment nutrient loads cannot be measured directly and must be modelled. The modelling involves a range of estimates and assumptions about land uses, drainage nutrient leaching rates and fate in the environment. Estimates can be refined if better data and better models become available, but in general, we agree with Ms Hayward that 'the overall catchment load estimates inevitably remain uncertain'.

8. Table 13a: Why is the value for Cyanobacteria 50%, when CDHB/Public Health seek 20%? (See page 6 and 7 of Alistair Humphrey's evidence)

Response (Matthew McCallum-Clark): This matter is still being considered. We expect to be able to complete this within one week and provide a written response.

9. Variation 1 manages surface water and ground water as one resource, so why does Variation 2 differ?

Response (Don Vattala): As discussed in the Overview Report (Bower, 2014), the conceptual model of the Hinds/Hekeao Plains catchment, is primarily centred on the condition of water quality and quantity in the groundwater system. The vast majority of the surface waterbodies in the catchment rely on groundwater. Consequently, there is no physical reason why the system could not be managed as a single resource.

However, surface and groundwater allocations were historically treated separately. This approach, without having robust allocation blocks or policy provisions, has resulted in very large surface water allocations, relative to the amount of water available (please refer to paragraph 10.4 in section 42A report). This significant and widespread over-allocation of surface water is somewhat different to the Variation 1 situation.

Variation 2 provides a number of provisions to address the over allocation of surface water in the Hinds/Hekeao Plains Area. This includes:

i. Facilitating substitution of groundwater for surface water;
ii. Prohibiting water transfers;
iii. Facilitating managed aquifer recharge to replenish the groundwater system
iv The work of the Hinds Drains Working Group, and the signalled revision of the flow regime for lowland waterbodies.

While moving to a single allocation block may be an option, it may detract from the ability to focus attention on the over-allocation of the lowland surface waterbodies in Variation 2.

Officers are continuing to consider the merits of managing surface and groundwater as a single resource, as a response to this question. Officers are considering whether the issues identified above can be addressed by a policy and rule framework that is based on a single resource while specifically addressing surface water over-allocation, and whether there is scope within the submission points to do this.

Appendix A - Contextual information for answer to Supplementary question #5

We have assessed the potential volume of water that could be converted from surface to groundwater by looking at the surface water consents in the plan area and performing a Schedule WQN9 (of the Natural Resources Regional Plan) assessment of potential irrigation requirements for each take. An alternative allocation tool is Irricalc and this may result in a different potentially required volume. We used WQN9, as it is CRC's default consent volume tool.

During the evidence preparation period, Mike Thorley (providing advice to Ngai Tahu) requested information for "... reviewing the volume of water that may or could be moved from surface water and shallow groundwater to deep or the schemes."

CRC staff prepared a spreadsheet of this assessment that was placed on the Variation 2 web-page. It is important to note that this analysis was conducted as a high level, desktop study and could vary in practice based on a number of site specific conditions including: whether the property has alternative sources of water (e.g. an existing supplementary deep well), or local geology at a site limits the amount of physically available water.

Based on this high-level assessment, the total potential required irrigation volume for surface water to transfer to groundwater is approximately 24.6 million m^3 in the Mayfield Hinds GAZ and 25.8 million m^3 (estimate date 6/5/2015) in the Valetta GAZ.

It is vital to note with this assessment method, that these numbers represent maximum potential volume if all the surface water takes transferred their potential full consented surface water volume to deep groundwater. In addition to the information discussed above, in reality many of these consents (48 of 112) already have a deep groundwater well, so are unlikely to need the full potential volume.

Technical Issues with using these assessment values to set new combined "one allocation", it is:

1. *high-level - has not had official peer reviewed, in reality the actual amount is highly dependent on a number of site specific conditions*
2. *does not take into consideration the physical availability of water – total allocation numbers should be readdressed before adding a new block*
3. *assumes everyone will switch and that all takes will get the full volume – not the case where flows are still considered reliable, farm ponds (used to store surface flows) have been built, or supplementary water is already available and reliable.*

The physical availability of water in the Valetta GAZ is a concern, if this extra volume is allocated without at least a one for one increase in recharge (i.e. additional recharge through MAR) there will be considerable further environmental degradation. This means groundwater levels (storage) will decline below current levels. These surface water switches to groundwater are reliant on a corresponding net increase in recharge (MAR) over time in order to not exacerbate the current state of water quantity in the Valetta GAZ.

References:

Calder-Steel, N., (2014). WQN9 Method. http://ecan.govt.nz/our-responsibilities/regional-plans/regional-plans-under-development/lwrp/variation-2/Documents/v2-doc2.pdf

Durney P., and Ritson J., (2015). An estimate of the volume that may be transferred from surface water to either deep groundwater or scheme water is included on a consent by consent basis. http://ecan.govt.nz/our-responsibilities/regional-plans/regional-plans-under-development/lwrp/variation-2/Documents/v2-doc1.pdf