

**SELWYN RAKAIA SUPER CLUSTER MEETING
MEETING ON MINIMUM FLOW CONDITIONS WITH VINCE BIDWELL
NOTES FROM DISCUSSIONS – LEESTON – 16/09/08**

WELCOME – CR MCKAY

- In response to requests from clusters for independent information on the model used to determine connectivity to surface water, Dr Vince Bidwell from Lincoln Ventures Ltd is here to speak and answer questions.
- ECan Councillors Demeter & Sage are also here. Important to get an understanding of this process around the council table.

**POLICY BACKGROUND TO MINIMUM FLOW CONDITIONS, CHRISTINA ROBB,
PROGRAMEE MANAGER WATER & LAND, ENVIRONMENT CANTERBURY**

Notes from discussion

- The consent review has three components:
 - Annual allocation
 - Metering
 - Hydraulic connection

Purpose of today's meeting is to explain the science and testing information behind the hydraulic connection conditions as requested by the cluster groups.

- Vince Bidwell is here to answer technical & scientific questions.
- The policy around hydraulic connections in the NRRP is:
 - Aiming to manage flows in surface water bodies, especially during low flows
 - Acknowledges that every groundwater take has an effect on surface water flows, it is just a matter of how much time it takes for the effect to be seen in the surface water bodies.
- The NRRP provides three levels of hydraulic connectivity:
 - HIGH – if after 7 days pumping, 90% of the water is coming from the surface water. These takes will have a minimum flow condition.
 - MODERATE – if after 150 days pumping, 60% of the water is coming from the surface water, and the amount being taken from surface water is greater than 5 litres/second. These takes will have a minimum flow condition.
 - LOW – if after 150 days pumping, less than 60% of the water is coming from surface water. These takes will have no minimum flow condition.
- A sieve has been applied across this zone to determine which consents will be assessed for surface water connectivity. Takes which are within 2kms of a stream or spring, and less than 30m deep will be assessed.
 - If you are assessed as having surface water connection, then ECan can tell you which stream/spring you have been connected to.
 - If you have a minimum flow condition, you will be restricted from taking when the stream is below that flow. If the stream goes dry for the length within 2km of your take then you can start taking again. This is to protect takes near rivers that naturally go dry.
 - The streams were taken from the topographic maps and aerial photographs. Need to use local knowledge to determine if all of these are accurate – please discuss this with ECan consents staff.
 - The 2km distance is taken from the NRRP and is based on scientists' advice.

SURFACE WATER CONNECTION MODEL, VINCE BIDWELL, HYDROLOGIST, LINCOLN VENTURES LTD

Notes from discussion

- All groundwater takes are taking water from surface water bodies. The difference is the time till we see this effect. E.g. a take at the foothills may take 3 years to show a lowering in surface water, were as a take in the low plains may show up in a week.
- The 2km, 30m sieve gives those takes where the effect on surface water is likely to be seen in the same season as the take.
- Connectivity is assessed using the Jenkins Model.
 - Jenkins Model developed by the US Geological Survey. Has been the method which they have used to assess connectivity since 1968.
 - International method.
 - Is available on the ECan website.
 - Data from local pump tests is used in the model
 - Like all models it is not perfect. There are situations that it doesn't cover. There are several studies which qualify these situations & the difference in the model. The worst case shows that approx 50% less water could be abstracted than the model showed.
 - The Jenkins model is a conservative estimate of what can be abstracted.
 - The model doesn't work well where the sediments in the bed of the stream is very confining, so there is not much water moving between the stream and ground water.
 - Can look at local stream systems to see if this is the case.
- Another model available is the Hunt Model.
 - This was developed in New Zealand.
 - Is available on the ECan website.
 - This model takes into account the different properties of the stream bed.
- 'Rakaia Selwyn Groundwater Zone – Technical summary of the effects of groundwater abstractions on stream flows and reliability of groundwater' is available on the ECan website.
 - This provides a good description of the stream and groundwater systems in the area.
 - Goes into the situations where there could be differences with the model.
- If you were doing the study would you be more inclined to use the Jenkins or the Hunt model in this area?
 - Depends on the local stream bed characteristics
 - Can use stream gauging and measurements techniques to determine stream bed characteristics.
 - If you have information which you think would influence the model outcomes then you need to provide this to ECan.
- In the lower plains where wells are more than 30m deep it is likely that they don't have an effect in the same season because of the confining layers. This is an extra factor that has been considered by ECan.
- Throughout this zone (foothills to coast) water comes into the system from rainfall and from recharge from the big rivers. The lower part of the zone is the discharge zone for this water.
 - The water enters Lake Ellesmere in a variety of ways - springs/streams/drains, small amount of direct groundwater discharge.
 - There is argument amongst scientists about how much water is discharged from this area directly to the sea.
 - Although local stream levels are very sensitive to groundwater abstraction, the lake level is not so sensitive. Therefore streams are affected earlier.
- The models are based on time-response figures. The calculation uses distance from the stream, and aquifer properties (transmissivity & storage) and gives a figure in days. It is simplified but the model takes into account the main variables.
- Has there been any field testing of these models?

- Yes, the 'effects of groundwater abstractions' report has results from field tests.
 - Very difficult to assess by actually measuring stream flow while you are pumping.
 - The tests find out what the aquifer properties are and these are then put into model.
 - Believe there is enough science to show that this is a valid method.
- Groundwater takes affect surface water in a sensitivity hierarchy – streams are most sensitive (get affected earlier), then lakes, then oceans.
 - Water takes in the lower plains still affect surface water in the same hierarchy.
 - The long term average effect on surface water from groundwater takes in the lower plains is no more than the long term average effect on surface water from groundwater takes in the upper plains. However because in the lower plains the takes are closer to surface water bodies the 'hole' created in the groundwater by the take doesn't have time to 'flatten out' before it reaches the stream.
- Many consent holders in the lower plains believe that they are abstracting water that would be flowing to the sea not to surface water, so why a minimum flow condition?
 - If you think of the groundwater system as a bath tub. Springs flow when the groundwater reaches the overflow hole, so even if the water you take wasn't going to flow into a stream, by taking that water you lower the level of the bath below the overflow hole and therefore the springs stop flowing.
- Is a very complex area, is ECan simplifying too much?
 - Where transmissivity values are known these are put into the calculation. The variation across the area is taken into account.
 - It is a complex question. Many arguments put forward have already been taken into account.
- In the lower plains we have been irrigating for years with no effect on streams. Why has this suddenly changed? Are the lower plains being unfairly treated?
 - Climate over the last decade has had major effect resulting in lower recharge.
 - Increased abstraction is also having an effect.
- Is the irrigation water in the upper plains recharging the shallow aquifers?
 - True that some of the water goes back into the ground, but studies have shown that water takes for irrigation are net consumptive users as most of the water applied is taken out of the soil through the plant.
- If we have a well near a stream, do you need to do a pump test to prove no connectivity?
 - If there is no information for your well, ECan has taken aquifer properties from wells close to you so that not everybody has to do a well test.
 - A pump test on your well may prove you are not connected, equally it may show you are.
 - Data from previous pump test is still relevant for this review.
 - Guidelines on undertaking pump tests are on ECan's website. The contractor/consultant undertaking the test should be able to give you the required details.
- Is there a way that we could all work together and take a sample of pump tests rather than as individuals? Would this give enough data to allow us to 'disconnect' from the surface water?
 - Extra knowledge across the zone, such as pump tests data, stream bed nature and impeding layers could add more accuracy to the process & allow for a better understanding for the variability across the zone.
 - The more information gathered the more knowledge we have. There will always be uncertainty, but this can be lowered. There will always be a boundary were individual pump tests will prove if they are connected or not.

- The next step of improvement would be to look at larger groundwater models, but this is a big step in terms of time and money.
- If only wells less than 30m are covered, then what if we all put wells down to 50m?
 - Would still be taking the same amount out of the aquifer.
 - It would increase the time lag, therefore fewer takes would have an effect in the same season.

GENERAL DISCUSSION NOTES

- Likely that this process is going to end up in the Environment Court or mediation which will cost both ECan and consent holders lots of money. Would rather that this money is spent on research to get better conditions/management. How can we do this?
- ECan Report – Stream depletion of the spring-fed lowland streams of the Rakaia-Selwyn groundwater allocation zone - says that the values of the stream beds are poorly defined in this area, and that the aquifer is not uniform. It says that the Hunt method would be more appropriate for modelling connectivity in this area. Every statement in this report is qualified by a 'maybe' or 'requires additional work'. So how can ECan say it has enough information to undertake a review on connectivity in this zone?
 - The initial sieve has been placed over the area, but ECan recognises that there will be case by case variation.
 - The onus is on the consent holder to prove that they have no connection.
 - ECan has put forward its evidence in reports which it believes provides the basis for this review.
 - This question is a legal one and can't be answered in this forum.
- When is ECan going to tell us who is connected to surface water or not?
 - Working on this for each cluster as the proposed consent conditions come out. Will be meeting with Clusters 4 & 5 with proposed conditions next week.
 - Once you have your individual proposed conditions then we can talk about individuals' cases.
 - You can meet with ECan staff who will be able to run you through what has been done. If you have other information, send this in before your meeting so ECan staff can have a look at this too.
- An existing take (issued 15 years ago) is 68m deep, 250m from Doyleston Drain and has a minimum flow condition. Why are there low flow conditions attached to drains which are manmade and were originally put in to drain swamps? Are older consents with such conditions going to be brought into line with the new conditions?
 - Legal precedent has been set that when water is in its natural location even in a different conveyance system, e.g. drains, that this water is managed under the RMA as for all other natural streams/ivers.
 - Older consents should be brought into line with the review. Need to discuss this with ECan staff.
- It is hard to understand the impact of this information when some people haven't got their conditions and others have already signed off on them.
 - The timing of this meeting is in response to requests from the clusters.
- Feeling that the clusters are being separated out, but want to deal as a community.
 - As explained at the first meeting with each cluster, the clusters were formed at the request of the community. They were broken down to try and deal with groups of a manageable size, not to separate people.
 - ECan started with a plan that looked good to everyone at the beginning. This is a working plan and have been flexible to date and won't stop being flexible.
 - We want to get this process right, so please talk with us.
- Chris Coughlan, Irrigation New Zealand has been given some feedback
 - Feeling that the process has not been followed as set out

- The 1/2hr meetings are difficult
- That community is being given mixed messages from the 1/2hr meetings
Only received the feedback last night, and needs to sit down with ECan and work out ways to address this.
- Upcoming meetings will discuss other proposed conditions. Questions from this meeting to be answered at following meetings are:
 - Why do some consents have limitations on dairying on them?
 - What response should we give to the landuse questions when we are part pastoral, part arable?
- Where do the minimum flow figures come from?
 - They are existing minimum flow figures, same as on existing consents.
- I already have a well at 67m I don't want everyone else going down there!
 - If you have the depth of your well, then as part of the change of consent conditions an assessment of environmental effects would have to identify & notify effects on neighbouring wells.
- In 2000 ECan said put the well at 18-25m and you will have no effect on surface water. What's going to happen in another 20 years?
 - As ECan gets more information our management changes to reflect this. It could change in either direction, not always to the detriment of abstractors.

FUTURE CLUSTER GROUP MEETINGS, PHIL MCGUIGAN, RESOURCE CARE, ENVIRONMENT CANTERBURY

- There are two process running in parallel here:
 - Statutory process – which has a timeline it needs to adhere to
 - Community engagement process – where lots of questions are being raised and we are trying to get answers for them

We want to make these two processes work together, so please talk with ECan and give us questions and suggestions.
- To try and address questions around what the WQN9v3 annual allocations mean for individuals, we have been talking to cluster representatives and want to engage with a farm consultant to compare a farm from each cluster with the new allocation. Are working with cluster representatives to try and identify farms that would be appropriate. Will keep everyone updated as this progresses.
- Recognise that there are people who haven't had minimum flow conditions previously. Have requested from our monitoring team a list of stream flows and number of days on restriction for the last 5 years to give people an idea of what this might mean for them. This will be available on ECans website.