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WATER ALLOCATION IN HAWKE"S BAY

Hastings District Council – Joint Maori Committee **April 22 2010**

Themes:

Water Allocation
Methodology
Groundwater
Water Demand
Future Proofing

1. Water Allocation:

1.1 Water allocation has been a contentious issue within the Hawke's Bay region with demand rising dramatically over the last 15 years. Water allocation and minimum flow setting for our rivers and streams are intrinsically linked. These two elements of water management along with water quality are the responsibility of regional councils under section 30 of the Resource Management Act, 1991.

1.2 In the mid to late 1990's demand for more surface water for irrigation was growing, particularly within the Ngaruroro River valley. The wine industry was becoming well-established with Hawke's Bay making a name for itself as a producer of premium wines. Pastoral farmers in the Ngaruroro valley were looking to diversify into more productive pursuits reliant on irrigation - dairy farming, cropping and viticulture - but in terms of the proposed Regional Water Plan, the Ngaruroro River was fully allocated.

1.3 Regional Council was under pressure to make more water available and at the bulk renewal of resource consents for the Ngaruroro in 1997, farmers were pushing for additional water volumes to add to their expiring consents and several other entities were lining up for any new water that may become available.

1.4 The commissioner at the hearings for the renewals (Adrienne Young Cooper) insisted that the renewal stage was not the place to apply for more water when a river was already fully allocated in terms of the Regional Water Plan, and that the proper way was via a plan change or variation to the Water Plan, which would ensure that all interested parties could then have input into the process. At the time there was considerable opposition from tangata whenua of Omahu for any increase in water takes from the Ngaruroro.

1.5 Regional Council then embarked upon a “scientific” study to research the lowering of the minimum flow and a corresponding increase in allocable volumes from the Ngaruroro, as regulated through the minimum flow site at Fernhill (Omahu). The result was a series of reports under an initiative called the Sustainable Low Flow Project (Wood, 1997). The first report suggested that the minimum flow for this river could be lowered from the existing 2,800 litres per second to 2,000 litres per second, thus releasing an additional 483,840 cubic metres per week, and that the 2,000 litres per second would be justified under the sustainable management principles of the RMA, 1991. For determining allocation volumes, a management tool called the Summer 7-day Q95 was adopted by HBRC. This calculated from historical records the amount of flow that was in a river for 95% of the time during the November – April irrigation season, and the difference between this flow figure (in litres per second) and the minimum flow of a river, was deemed to be the allocable volume for that river. Using this equation, the Q95 for the Ngaruroro was calculated to be 3981 litres per second. The lower the minimum flow, the greater the allocation.

1.6 Following completion of the scientific work, a variation to the Regional Water Plan was drafted and publicly notified. As a result of the hearings and resolution of appeals, the Ngaruroro minimum flow was reduced, not by the 800 litres per second as per the proposed variation, but by 400 litres per second. This added 241,920 cubic metres to the weekly allocation from the Ngaruroro, making a total allocation of 956,189 cubic metres per week. This quantity was also included in the proposed Regional Resource Management Plan (RRMP) when it was notified in June, 1999. The same methodology for determining allocable volumes and minimum flows was also applied to other major catchments in Hawke’s Bay, and carried forward when the RRMP became operative in August, 2006. The one exception was with the flow of the Tukituki River as measured at Tapairu Road, where it was agreed between appellants and HBRC that the 1,900 litres per second level would be accepted pending further research.

2. Methodology:

2.1 The methodology employed to validate minimum flow setting on the Ngaruroro and our other major rivers was a version of the Instream Flow Incremental Methodology (IFIM). This is a system that utilises data from river flow as velocity, substrate composition and water depth to calculate habitat for a range of aquatic species. The IFIM model used on the Ngaruroro referenced North American rainbow trout habitat curves. At the time, HBRC believed this to be appropriate given the statutory requirement in section 7 (h) of the RMA, 1991, for the protection of the habitat of trout and salmon within decision-making processes. There were no equivalency models run or research undertaken to gauge habitat preferences for indigenous species, or tangata whenua perspectives, preferences and values for the proposed river levels.

2.2 At the time it was pointed out by the Department of Conservation, Iwi and Fish and Game that the use of North American trout models was faulty, particularly within braided river systems like the Ngaruroro when compared to the majority of North American rivers which were predominantly single channel and snow-fed for much of the year. It was acknowledged later by HBRC, that the methodology used was not scientifically robust. Subsequent research by the Cawthron Institute has justified these claims as North American rainbow trout are smaller than New Zealand rainbow trout so require less water. Cawthron has also carried out further analysis to determine preferences for a range of indigenous species including eels. This indicates a suitable flow for the Ngaruroro of around 3,000 to 3,200 litres per second at Fernhill.

2.3 Unfortunately, application of the faulty model to our rivers has led to some catchments now being over-allocated both in terms of the operative plan and sustainable management. This is acknowledged by HBRC and they are now working on new minimum flows and volumes for our major river systems. With the recent bulk consent renewals for abstraction from the Karamu Stream, the Tukituki and

Ngaruroro, HBRC have granted short term consents so that new minimum flows and allocable volumes can be assessed and used when the consents next come up for renewal. HBRC hopes to have a plan change for water ready by July 2012 to regulate the issuing of the new consents.

3. Ground water:

3.1 The Ngaruroro River recharges both the unconfined and confined Heretaunga aquifers at the average rate of 4,200 litres per second. Recharge occurs mainly between Roy's Hill and Fernhill. Rainfall also contributes to the unconfined aquifer. There are flow losses from the river to ground water between Maraekakaho and Roy's Hill of up to 800 litres per second. Water enters the unconfined aquifer which then becomes progressively confined towards the east. Aquifer discharge is via weaknesses in the different strata in the confining layers where springs emerge under pressure and contribute to surface water flows – streams, rivers, wetlands etc. There are also fresh water springs that discharge into Hawke Bay. The Ngaruroro also contributes to the flow in the lower reaches of the Tutaekuri River and the Tutaekuri-Waimate Stream. It has been calculated that the annual rate of recharge to the aquifer equates to (on average) 188 million cubic metres per annum (Dravid and Brown, 1997). Approximately 60 new consents to take from the aquifers are issued annually.

3.2 Ground water abstraction from the Heretaunga aquifers is not restricted by any total maximum volume or rate. Hydraulic connections between the different layers of aquifer are also not fully understood. Using sustainable management principles and a logical approach, one would assume a sensible way to sustainably manage the aquifers would be to allow for a similar amount of abstraction per annum as the annual rate of recharge, whilst allowing some reserve quantity for our frequent summer droughts. However, HBRC has already allocated more than the average annual rate of recharge.

Table 1: Level of allocation of groundwater by region

ARR = Annual Rate of Recharge

Council	% of groundwater allocation for which ARR is available	Average estimated annual recharge (millions m^3)	Allocated annually from resource with calculated ARR (millions m^3)	% of average annual recharge allocated	Number of weeks for which weekly allocation could be taken
Northland	Uncalculated	> 90	6.9	< 8 %	> 482
Auckland	87 %	46	30.8	67 %	32
EBOP	18 %	54	11.7	22 %	190
Hawke's Bay	86 %	188	220	117 %	32
Wellington	94 %	390	107	27 %	150
Tasman	82 %	196	67.8	35 %	97
Canterbury	75 %	2643	1236.1	47 %	71

Information on Water Allocation in New Zealand; Lincoln Environmental
Prepared for Ministry for the Environment (Report No 4375/1, April 2000)

3.3 Since the year 2000, ground water allocation in Hawke's Bay has increased substantially. On average ground water levels in the Heretaunga aquifer have dropped 2.5 metres since 1975 and water levels in 62 % of monitored wells throughout Hawke's Bay are trending downwards. The only thing that has prevented the situation getting worse is that many irrigators do not use their full allocations.

3.4 Applicants who apply for consent to take ground water are required to undertake an assessment of environmental effects (AEE), pursuant to sections 88 and 104 of the RMA. The testing of wells for ground water abstraction typically occurs over the winter when fewer irrigators are operating and ground water levels are high. Extrapolations are then done to calculate the amount of drawdown that would likely occur as a result of the well operating and a sustainable level of abstraction from that particular well is calculated using these figures. What is not taken onto account is the substantially lower water levels and reduced pressures during the main irrigation season, when many irrigators within an area are abstracting simultaneously.

3.5 The assessment criteria in the regional plan is also limiting as it includes a 400 metre rule for shallow groundwater abstraction and its likely effects on surface water bodies. Abstraction from deeper wells has not triggered consideration for effects on surface water even though reduced aquifer pressures inhibit spring flows to streams and rivers.

3.6 The problems that we are now experiencing at Bridge Pa, Omahu and on the Ruataniwha Plains are the result of economics being given priority over environmental protection, sustainable management of the water resource and basic human needs. The failure of our regulators to take into account the hydraulic connections between the shallow and deeper layers of aquifer, and ground water / surface water interaction has also contributed.

3.7 The Sustainable Water Programme of Action and the proposed NES for Ecological Flows attempted to place default limits on surface and ground water abstraction where existing policy was not based on sound scientific methods. The default level of abstraction for aquifers was set at 35 % of average annual recharge. In Hawke's Bay we have allocated close to 3.5 times this amount (Table 1). With the change of government last election, the outcomes of the proposed NES are uncertain. Consents for ground water abstraction have been relatively easy to obtain in the past and only recently have HBRC required more robust assessments of environmental effects from consent applicants. Between 1995 and 2003, there was an increase of 65 % in hectares irrigated in Hawke's Bay.

3.6 What has become apparent over recent years is that lower ground water levels in the Heretaunga aquifer induce greater flow loss from the Ngaruroro River due to a steeper hydraulic gradient, therefore many ground water takes are now known to affect river flows during low-flow periods. This also manifests itself through reduced spring flows into rivers and streams as ground water levels and aquifer pressures decline.

3.7 In the early 1980's Hawke's Bay went through several years of lower than average rainfall including a major drought in the summer of 1982-83. At one stage the Ngaruroro River actually stopped flowing at Omahu. The Waipawa River now runs dry every year between the confluence with the Mangaonuku and Highway 50. This stretch of dry riverbed varies from 7 to 14 kilometres. With climate change trends bringing a drier east coast of the North Island, this problem is likely to get worse (3 droughts in the last 5 years).

Table 2: Rainfall

Year	Rainfall at Nelson Park[1] (millimetres)	Minimum flow at Fernhill[2] (litres per sec)
1979	968	1181
1980	819	5059
1981	596	9593
1982	548	3801
1983	647	246
1984	823	3754
1985	594	1691
1986	751	4007

1. Source – Weather Station 2. Source – NIWA Tideda

3.8 In response to declining water levels in the Heretaunga plains aquifers during summer drought conditions of 1982/1983, the Catchment Board decided to augment natural groundwater recharge to reduce the risk of serious water decline in the Heretaunga Plains aquifer system by diverting water from the Ngaruroro River. The artificial recharge was commissioned in 1988. Early trials indicated it was successful when allowed to operate down to 2,800 litres per second. In 1997, the 2,800 restriction was raised to 5,000 litres per second and the recharge failed to operate as effectively as previous. The artificial recharge was discontinued in 2008 due to this reduced efficiency and the water quantity (700 litres per second) put out to tender. The 5,000 litre per second restriction was then removed for most of the successful tenders thus allowing them to abstract down to 2,400 litres per second which will affect other consent holders due to faster decline during flow recession.

4. Water Demand:

4.1 Unfortunately the demand for water has not abated as the irrigation of properties can double and in some cases triple property values. Historically irrigation water has been issued at a specific rate in litres per second, up to a maximum weekly volume in cubic metres per week and according to crop water requirements. During the late 1990's and early 2000's irrigators would calculate water requirements for pasture irrigation as this would require the most amount of water. Then some would switch to other less water demanding crops.

4.2 Over the last few years tangata whenua have been trying to restrict some of the water takes by seeking adherence to an irrigation season of November to April as was intended by the regional plan. The rationale for this is that we see a need to allow the rivers and aquifers to recover, and many crops do not require water for more than 6 months of the year anyway. This should be picked up during initial assessment of resource consent applications by HBRC staff. State of the Environment monitoring is showing a gradual decline in 62% of monitored wells. The Regional Resource Management Plan refers to an irrigation season, but there is an assumption amongst irrigators, that once a resource consent is issued, it can be used all year round.

4.3 There are 34 water management zones on rivers and streams in Hawke's Bay. These regulate water use through minimum flows at specific sites. For some zones irrigation bans usually commence prior to Christmas (Te Waikaha, Irongate, Awanui and sometimes Te Karamu). Large volumes of stock water are not counted within water management structures or allocable volumes. Some farms require more water for stock than many smaller irrigation consents. Where irrigation is applied to land and the pasture or crops grown are for stock feed, the resultant increase in stock numbers and consequent stock drinking water requirements is an "effect" as an "effect" of the irrigation and should be treated as such. This already occurs in some other regions (Northland, Otago).

4.4 There is an assumption amongst our regulators that the current minimum flow for a river will leave sufficient water to cater for tikanga Maori values and cultural use. However, as flows continue to decline below minimum flow, cultural values are diminished. There is an irony that stock on irrigated pastures can continue to take water from our rivers during low-flow periods and reduce the cultural values and relationships of Maori with their taonga. Stock water volumes should really be factored into total allocation volumes. This would also provide greater accuracy for state of the environment reporting and cause-effect analyses.

4.5 The huge increase in water allocation since the 1990's has created a false sense of security for consent holders in that when they go to renew their consents there is an expectation that these will be granted because: -

(i) It is for an existing activity
(ii) They have invested in irrigation infrastructure, and
(iii) They are contributing to the regional economy

These reasons are often used as leverage even when the water resource in question is over-allocated in terms of the operative plan.

4.6 There is growing demand for water to frost protect crops. Frost protection irrigation requires large amounts of water over relatively short periods. If a water resource is already close to or under an irrigation ban, then frost protection has the capacity to compound the problem resulting in irrigation bans of longer duration. Frost protection, in my view, should be subject to substantially higher flow restrictions than other consents as there are other options available.

5. Future Proofing

5.1 What needs to be sorted out quite quickly are the new allocation limits for our streams and rivers, and an allocation regime that uses appropriate priority setting. I would suggest incorporating the following: -

- Counting of all water abstraction volumes above 20 cubic metres per week within an allocation framework
- Determining of appropriate minimum flows for environmental protection
- Determining of tikanga Maori values within each catchment and a water management framework that respects and encompasses these values
- Surety for domestic (human) supply plus a percentage reserve to safeguard for future populations

- Priority access to deeper groundwater for reticulated water supply due to minimal requirement for treatment to meet drinking water standards
- Counting of all stock water within core allocations
- Restricting consents to an irrigation season to allow for ecosystem / aquifer recovery – somewhere in the region of 6 or 7 months as indicated in the Regional Resource Management Plan
- Retention of municipal water supplies in public ownership to guarantee supply

5.2 Investigations are currently underway for water storage options on the Tukituki and Ngaruroro. There are several drivers for these besides water demand including climate change trends for the east coast of the North Island, boosting the regional economy, increase in employment opportunities etc. What is crucial to sustainable management of the water resource is first establishing what our rivers require to maintain ecosystem function and integrity, protection and enhancement of tikanga Maori values and recharge of our major aquifers plus the numerous valley aquifers.

5.3 Initially flow augmentation during low flow periods was part of the water storage equation. If dams are to be placed on our major rivers, this is one of the issues that tangata whenua will likely insist on as it helps to protect what we value in relation to our rivers and wetlands. To date only one of the proposed six dams for the Tukituki include flow augmentation and this is for the Gwavas site on the Makaroro, a tributary of the Waipawa River which then joins the Tukituki at Tapairu Road. This site is in the headwaters of the Tukituki. If ground water abstraction on the Ruataniwha Plains continues at its current rate resulting in ground water deficit, then any additions to flow at Gwavas is unlikely to remain in the river as it will be lost to ground water while flowing across the Ruataniwha Plains.

5.4 Land-use intensification as a result of water storage poses another threat to our rivers in terms of water quality. Local government has been reluctant to place too many impediments in the way of development and one example is on the Taharua River, a tributary of the Mohaka. Consequently water quality on the Mohaka is in serious decline below the confluence where the Taharua joins the Mohaka. HBRC has put out several reports on the Taharua as a result of monitoring and is considering further controls on land-use intensification. If this same scenario is played out on the Tukituki, i.e. consider fixing the problem only when it gets really bad and a lot of publicity then water quality will require increased vigilance.

5.5 With the user pays philosophy and initial costings for irrigation from water storage off the Tukituki, to irrigate one hectare of land will cost $9,600. At the moment only dairy is showing enough return to compensate for this amount of investment. Much of the Ruataniwha consists of alluvial deposits and relatively shallow soils over gravel. With a high incidence of ground and surface water interaction, the risk to ground water pollution is elevated. If nitrate levels in the ground water resource become too high, this then poses a threat to export crops and human health. In addition, the Tukituki below Tapairu Road would be unsafe for swimming. We need to ensure that we are not replacing the nutrients from the CHB wastewater systems with more nutrients from dairy farm run-off

References:

Heretaunga Plains Groundwater Study: - Dravid, P. N. and Brown, L. J., May 1997.

Sustainable Low Flow Project: - Hawke's Bay Regional Council Technical Report, Wood, G., August, 1997.

Ruataniwha Plains Water Resources Study

Water Allocation in New Zealand: - Lincoln Environmental, Prepared for Ministry for the Environment, Report No 4375/1, April 2000.

Proposed National Environmental Standard for Ecological Flows