The conclusion is that with the quantity of water being asked for abstraction the Motutangi aquifer is at or close to the suggested safe level.

Anecdotal evidence at the time of the trials for Kaitaia water supply stated that some artesian bores in Waipapakauri either ran dry or were well below normal pumping levels, this should surely require some study.

The Burnage road test sites show anomalies which have been put down to bore leakage but to the best of our knowledge no one has checked if this is factual or is an indication that this aquifer has some other factor going on.

Deep excavation in the Houhora area on Avocado orchards indicated that water in the trenches rose and fell after tidal action, this could give credence to the view that some at least of the replenishment is from the sea.

The report also suggests that in the low lying Motutangi area that global warming and sea level rise can mean that sea water will move higher inland through the drainage system now prevailing in the use of pastoral farming. The study warns that this is a potential source of future salt water intrusion.

We have been told and it is a factual observation that after severe pumping the levels in the bores regain to previous heights within a small period. In the precis the original writers talk of the elasticity factor with pressure build up in the deep water bearing sand structure. So, what we have is a deep sand slurry which is much denser than the water in the bore which is in fact like a straw so the deep hydraulic pressure takes the weakest path and pushes the water up.

Our hypotheses are that eventually that slurry will cease to have weight and suddenly, the aquifer will without a great deal of warning loose the elasticity and collapse

We have already discussed the fact that the studies all refer to a dense soil structure of an impermeable nature preventing the water under pressure coming to the surface but surely this same structure prevents the surface water from recharging the aquifer. This would suggest that replenishment in total or in part is coming from filtered sea water.

In previous statements we have discussed the fact that the topsoil structures apart from coastal sands are of a low permeability nature and so how and where is the recharge taking place. Certainly not in the winter when the clays and even the sand become saturated and impermeable.

All the studies suggest that as far as coastal monitoring is concerned that there are insufficient locations to give accurate data.

It is our belief that the study of the aquifer needs to also take in the potential contamination from densely populated areas still relying on septic tank and effluent field disposal, an example of which is the Pukenui/Houhora area and Waipapakauri.

In the case of Pukenui/Houhora sampling of ground water which is impeded by the sandstone layer from going deeper and subsequently finding its way through the overlying sands and then running out of the cliff faces into the Harbour could be tested for faecal contamination.

A concern is that with the potential pressure imbalance between the Aquifer and ground structures the aquifer could become contaminated from rural and human actions.

The study of the aquifer we contend needs to take in a more holistic view of these wider considerations.

We are not against abstraction but we are concerned that the lack of adequate factual data and ongoing independent study "looking outside the square" can lead to another series of assumptions causing the failure of an important resource.

The communities affected by, or potentially affected by the abstraction have not been officially consulted, which is of great concern.

The initiatives for community consultation have always been via the Houhora Settlers and Ratepayers Association, which to widen the inclusiveness of the area has been renamed to the Te Aupouri Community Association.

Accordingly, we would like consideration to be given to the above issues and further studies undertaken before consents are granted for the totals requested.

Eric Wagener

Chairman

3778 Main North Road R.D.4 Kaitaia 0484.

Addendum:

The questions which arise and need to be answered are:

1. We have heard from the applicants that they have relied in the main for their evidence on the Lincoln study. This is the same study which states that the aquifer is unique in it's structure and so other hydrology methods of establishing how it will react to severe abstraction have had to be modified to fit conclusions.
2. The applicant advisor has stated that their method of assessing pumping effects was to monitor the outflow of the bore, determine that the flow was sustainable, and monitor depth recovery. This we contend is a seriously flawed method as:
   (a) This deals with a singular draw off. All the new bores will presumably require ground water at the roughly same period and so any test for recovery and abstraction potential effects should take place at the same time. Has this been done? If not why not?
3. The applicant stated after a question that it was possible that the shell bed extended out from the coast line. This raises further concern as the principle of liquid inter -transference we believe from the Lincoln study relies upon density, ie sea water being more dense than fresh if the Aquifer is water suspended in water bearing sand then that slurry is very dense and will be acting as a natural barrier. If that consistency is changed then sea water will have a large intrusion factor. The NRC needs to be assured that this is not a threat.
4. Claims are made about bore recovery rates indicating bore sustainability. Again the report talks about the compressibility of the deep aquifer which is held in sand slurry, we contend that this compressed slurry with its density being larger than pure water is the reason for the water recovery in the Bore "straw" If this is accurate then the only warning of aquifer collapse will be when that compressibility factor is

removed by over abstraction. The NRC needs to obtain independent advise as to whether that is a factor, remembering that the concentration of abstraction is proportionally in a very concentrated area.

5. What studies have been done on the base flow potential through the sand slurry from other non pumped areas into the applicant and other areas?
6. The age of the aquifer is stated in thousands of years. If this is factual why is it? As if the resource was constantly being replenished the age should reflect that factor.
7. The fact is that in the past a huge proportion of the claimed replenishment area was and still is largely made up of soils which in soil maps are rated as only semi permeable. Motutangi was a swamp, Kaimaumau was a swamp, Kaitaia/Awanui was wetland or swamp and so on all these areas were swamps due to the factor that the soil did not allow penetration to any great effect. They have been drained by recent habitation, and now we are being told that these are the very soils which contribute to the replenishment. The NRC needs to be assured that the replenishment factor calculation takes in these factors. If you look at GIS soil maps 290 it will give a very good indicator of the area of poorly drained land classification. The NRC should be asking applicants for reappraisal calculations on the replenishment factor?
8. Further the Lincoln Study states that the reason for the Aquifer under density pressure to remain at the depth it is is due to the impermeable nature of the overlying soil structures. You cannot have it both ways. That is the aquifer cannot be replenished through impenetrable soils, if the same structures are stopping the aquifer from breaking out to the surface. The NRC should be asking if this Lincoln statement is the case?

So how to minimise the effects of heavy abstraction.

One method could be to have major abstractors pump into holding ponds and from there into the orchard. In this manner the draw down on the Aquifer would not have a major shock factor. A smaller pump could be used for replenishment.

Again we state we are not against abstraction but do not believe that sufficient information has been substantiated to allow for the assessment of sustainability.

Eric Wagener on behalf.