Submission No 35

INQUIRY INTO WATER AUGMENTATION

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Submission to: The General Purpose Standing Committee No.5 Inquiry into the augmentation of water supply for rural and regional New South Wales

Sir/Madam

I thank you for the extension of time granted to enable members of the the public to provide input into the Inquiry via submissions.

As the terms of reference are broad I have decided to make my submission on only small sections of "a" and "b".

As an opening statement, it is my considered opinion that the performance of the Government Departments/Agencies is totally dependent on the leadership of the Minister responsible for that Department/Agency and the Policies of the Government of the day.

NSW Government Departments and Agencies have in the distant and recent past assisted in the covering up of events that have led to alteration of water quality, the alteration of the natural balance of GDE's and other aquatic life forms. These Departments/Agencies have nearly always taken the side of the perpetrators and dismissed or severely downgraded the concerns and complaints of individuals and members of the community even after time and dated photographic and independent analytic proof had been provided. These same NSW Departments/Agencies have, and continue to dismiss any Community produced Industry based documentation that contradicts what the Australian based industry is telling them. Government Departments and Agencies have in the past and up until recent times not properly read the material presented to them by at least one Industry, that being the CSG Industry whose operation is in Narrabri NSW.

These and many more documented events, which I am sure other submitters will bring to the Inquiries attention, are some of the reasons behind why sections of the community do not trust the NSW Government Departments and Agencies to do the right thing by them and the environment no matter how good their intensions may be. This Community mistrust could be a reason why the NSW Government Departments and Agencies are not performing their allotted tasks as well as they should, but if the leadership was of a sufficiently high standard as to be respectful of all parties and their views then and maybe only then would the departments and agencies be able to do a proper and timely job with regard to Augmentation of water supply for rural and regional New south Wales.

It is also unfortunate that the NSW Government Departments and Agencies have a tendency to tell only part of the full truth to the Community while having full knowledge of a subject themselves. As an example I refer to Bacteria especially Sulphate Reducing Bacteria and the Iron Reducing and Precipitating Bacteria and the effects that they have on introduced infrastructure such as water and sewer infrastructure, introduced metals and cement based products into the ground and water environments. Do not get me wrong Bacteria perform many good and essential functions in keeping the environment healthy and that is why they have survived up until now and will well into the future, but man has introduced a more abundant food supply and these bacteria have taken full advantage of that with their populations increasing to unprecedented levels. As a result there are well documented problems arising in many industries ranging from Agriculture to Mining and especially the Oil and Gas Industry, yet the NSW Government its Departments/ Agencies do not

want to acknowledge publically that there are problems despite the supporting evidence concerning the extent of the problems caused by bacteria.

How does this all fit in with the augmentation of water supply for rural and regional New South Wales? Very simply, Government Departments and Agencies who take on the responsibility for the implementation and development of any rural and regional water augmentation program must take full responsibility for the effects that the above mentioned bacteria and other bacteria may cause to that infrastructure and what damage to the environment that is caused as a result and not hide behind legislation.

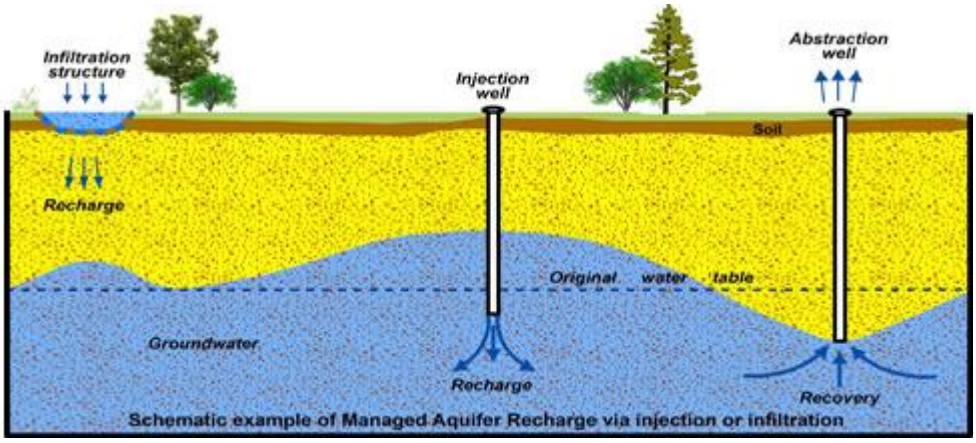
From the Australian based material that I have accessed (see material referenced list) it is very obvious that the State of New South Wales is well behind most of the mainland states of Australia with regard to aquifer recharge. NSW, could be considered to have procrastinated with regards to this field of water saving and augmentation, especially in areas where water of suitable domestic, stock and irrigation quality is in short supply either due to the climatic conditions, location, over use or the oversupply of poor quality water from mining and gas industries.

Broken Hills water problems are a prime example where the CSIRO and others including the Federal Government had done studies with regard to Aquifer Recharge and “cavern” storage, yet NSW Governments and their responsible Departments/Agencies have to date done very little or nothing to act on any recommendations of these studies.

At this point it should be pointed out that Local Government in NSW must also shoulder its share of fault for not taking a positive lead and showing responsibility in regards to aquifer recharge and general saving and reuse of storm waters (see City of Salisbury SA [Charles Sturt Uni.] and WA in Material sourced).

My fear now is that the NSW Government its Departments/Agencies will have a knee-jerk reaction to the problems and rush head long into some sort of system using “treated poor quality water” from various sources without consideration of what could be the long term ramifications of such an action on the environment, existing ground and surface water quality and to the Socioeconomic stability should there be adverse conditions caused to the natural environment and Agricultural activity by their response.

Aquifer recharge can be done by two methods: either direct injection under high or low pressure into an aquifer or confined and sealable underground cavern or by the natural pathway utilising dams, trenches and the like to allow waters to naturally move downwards into an aquifer. Both have problems with regards to possible contamination of ground/surface waters from the introduced waters. These problems along with solutions have been noted in many of the sourced documents.



Picture from Government of Western Australia Department of Water- Managed Aquifer Recharge publication, showing the two best known forms of Managed Aquifer Recharge (MAR).

All the 'sourced documents' note that the injected water and to some degree the natural flow recharge waters should have had some form of treatment to ensure that these introduced waters do not have any affect in anyway on the existing water quality and thus its usage and especially the Groundwater Dependant Ecosystems (GDE's).

These GDE's in all their forms which range from Bacteria to Animals known as Stygofauna, are of so great an importance to groundwater quality and for some reason neither the NSW Government or its Departments/Agencies do not want to recognise or protect. This is not entirely true because there are some GDE's that are protected, but only a select few, however in the main the above statement applies.

Waters from mining and gas extraction activities pose the greatest threat if not "treated" correctly prior to being used for aquifer recharge. The second greatest threat to retaining water quality is not carrying out proper Independent and Government monitoring of the groundwater/aquifer prior too, during the recharge period and for years after the "treated water aquifer augmentation/recharge" has been carried out.

Some states have even designated recharge waters for various re-use, such as Industrial, Mining and Domestic usage only. However the mechanics of separation is not fully explained in the sourced documents.

If you look at Aquifer Recharge (AR), in the context that is meant by the wording then the NSW Government and its Departments and Agencies need to have a good look at their total lack of standards and direction taking into account; any form of guidance, supervision including monitoring before, during or after any Aquifer Recharge.

If you look at Managed Aquifer Recharge (MAR), in the context that is meant by the wording, then the NSW Government, its Departments and Agencies certainly have dropped the ball in many areas, because mining and the gas industries certainly have been given approvals to carry out activities that could potentially contaminate ground and surface water. (As an example of one such approval, see Leewood Produced Water Treatment and Beneficial Reuse Project especially the subsurface salts accumulation per hectare per annum as seen in the BeneTerra Attachment [the Santos document

has an ‘inadvertent’ mistake re the total salts accumulation, which was missed by the Government Departments and only bought to the fore by the Community being able to make comments on the REF. The accumulation of salts is mainly from the relative low pressure subsurface drip irrigation and are leached (flushed) away from the site and allowed to enter the aquifer recharge environment by the expected twice yearly runoff caused by heavy and consistent rain events.

Another example of this salts movement that will effect aquifer quality later on if the practice continues, is the approved continual use of excessive watering from a source that could be considered as not the same as the aquifer that the water will eventually enter, and as a result this water can be termed recharge water and the method of recharge called recharge by Infiltration. That has the potential to cause problems by aiding in the establishment of excessive salts accumulation in the recharge water flow path. The use of approved excessive watering along with the use introduced natural processed chemicals to ‘free’ up the trapped salts in the subsurface soil layers of the die back (spill/discharge) areas of the Pilliga Forest that have been caused as a result of poor work practices, along with poor supervision by the NSW Government Departmental/Agency, has allowed the salts to move on and to be dispersed in the wider collection aquifers of the local Recharge Area of the Great Artesian Basin). This is a very sad reflection on the NSW Government Departments/ Agencies to properly understand and manage the problems that will be associated with all the forms of Aquifer recharge.

It is obvious what is required so that the NSW Government Departments/Agencies can do their job with clarity is a clear cut definition as well as a description of what types of Recharge along with the uses for that Recharge water are acceptable under the following:

1--Aquifer Recharge.

2--Managed Aquifer Recharge (MAR).

3--Aquifer Recharge by Injection.

4--Aquifer Recharge by Natural (Infiltration) flow.

5—Source of the water used that is eligible to be called Aquifer Recharge Water.

6—Once a flow of water to an aquifer has commenced, what length of time is required before a flow is classed as Recharging an aquifer.

NSW government websites that should have all relevant information including Studies done on the subject of Aquifer Recharge either do not have the information or have the information but do not want the community to have easy access to it. In the main, using Government Department/Agency web sites is very difficult unless you have a Master’s degree in Computer Science. This problem is further compounded by the reshuffle of areas of responsibility, renaming of Departments/Agencies and the splitting up and dividing off of responsibilities within these Departments/Agencies. To be honest, NSW Government web sites are not ‘user friendly’ towards the Community. The NSW Government is now setting up another “central repository for Environmental Information” with links to other data bases within the NSW Government Departments/Agencies. If it is anything like the dogs breakfast that is “Digs Open” with its multiple cross references all on the same page. The old “DIGS” site which is not much better with the way information has been entered. (E.g. you get

different information depending on the character size, spacing between characters and the Company name just to name a few)

Getting information from NSW Government Department and Agency web sites can be best summed up by a line from "Yes Minister" where Mr Humphries says in response to making communication to the public easier *"if it were easier then everyone would use it and we cannot have that".*

The following are the some types of situations that nearly all NSW Government Department or Agencies do not want to acknowledge openly and as such reduce the confidence in the ability to perform to a standard acceptable to the community.

There is much practical field, laboratory and factual modelling work to be done before any Policy can be put into place around Aquifer Recharge or Cavern Storage of water for any purpose, let alone actually implementing any Recharge, sadly it looks like NSW is well behind other States.

I will now break away from the general overview and work done by other Australian Governments and Agencies/Universities and voice concerns with regard to possible contamination of groundwater and aquifers from Aquifer recharge in both forms; Forced Pressure Injection Recharge and Infiltration Recharge of an aquifer.

As mentioned in the first section of this submission (see the Leewood REF in material sourced), there are methods of establishing Aquifer Recharge and of Recharge water quality. I have highlighted one example already that could be classified as being either recharge by infiltration or pressure because the application of waters remote to the area is by both surface spraying and reasonably low pressure in the subsurface drip irrigation. In this case, the definition of Aquifer Recharge certainly fits both infiltration and forced with the source of the water, the coal seam aquifer being the remote source of the recharge water. The only problem with this treated recharging water is that while the TDS is around 600 PPM and classed by some as being "near drinking water standards" it still contains more salts and has a different pH value than the waters of the aquifers which it will eventually recharge. True it can be said that during travel through the soil the water will take on a more aquifer friendly composition, but it leaves behind in its travels the salts, and these have a tendency to accumulate and will eventually travel down to the aquifer with the recharge water, thus causing a change in the water quality and possibly to the population of GDE's in that aquifer.

Then there is the high pressure Recharge Injection of water directly into an aquifer. Ignoring the quality issues but looking at the mechanics of such and injection. There are many factors that have to be considered when using the high pressure injection method these include but are not limited to the Geology of the region, aquifer make up and suitability for withstanding the effects of pressure injection recharge. It is for these and many other reasons that pressure injection recharge should be discouraged when contemplating recharging aquifers that are rock (with the exception of fragmented coal based aquifers). Much has been written and documented with regards to reinjection gone wrong including earth movements as a result, yet Government Departments and Agencies refuse to openly acknowledge the problem almost bullying and ridiculing those who ask the questions around Pressure Recharge and other associated matters as mentioned here in this submission.

In the sample examples above I have looked at some forms of Aquifer recharge by pressure reinjection of a treated water source not from the depleted or targeted aquifer. I will now turn my attention to the Recharge by Infiltration. In this case waters from sources such as rain/storm water runoff, treated effluent and from many other sources are contained in a pond or dam and allowed to seep naturally through the base of a dam, pond or trench, downward to eventually recharge a depleted ground water source or aquifer. Again the theory behind this is that some of the waters have had some form of pre-treatment and some have not, but the waters will be suitable for use in some form because the contaminates and salts will be removed by a soil and rock filtration process. Only one flaw in this around the Accumulation of contaminates and salts which will eventually reach the recharging aquifer or underground water body and contaminate it. Nature can flush them to somewhere else for the time being but eventually that will not work and besides that you need a water flow or rain event to do that and the lack of these events is why there is a proposed program for water augmentation in rural and regional NSW.

There is now a prickly question relating to forms of natural infiltration recharge of an aquifer:
The stored water in the infiltration recharge has run-off into it from a contaminating source such as mining or gas operations. The operator/manager of the dam does or does not know about the introduced water contaminating his dam. The affected dam water then infiltrates downwards into the aquifer suppling his neighbour. His neighbour discovers that there is a significant change to that waters chemistry along with an increase in Bacteria levels. Who is responsible for the clean-up and rectification and why was the problem not foreseen during the Department or Agencies Assessment and Approval process?

This example question could easily be applied to the salts and other filtered contaminates from the infiltration recharge that have been ‘flushed, leached or otherwise moved on’ ending up being deposited in such a way as to adversely affect a non targeted water supply.

Thank you

Mr A J Pickard

11th August 2016

Material from which information for submission has been sourced.

Santos- REF Leewood Produced Water Treatment and Beneficial Reuse Project including Attachments.

GISERA Qld.
http://gisera.org.au/publications/tech_reports_papers/water-proj-3-reinjection-modelling.pdf

http://gisera.org.au/publications/tech_reports_papers/GISERA-water-project-2-Re-injection-of-CSG-water-Final-Report-Dec2015.pdf

Charles Sturt University
http://www.charlessturt.sa.gov.au/page.aspx?u=609
https://www.csu.edu.au/__data/assets/pdf_file/0007/770767/AJEM-Managed-Aquifer-Recharge.pdf

UNSW
http://www.wrl.unsw.edu.au/sites/wrl/files/uploads/files/solutions/managed-aquifer-recharge.pdf

Santos QLD Water management Plan
http://www.santoswaterportal.com.au/media/pdf1833/131009_santos_glng_stage_2_cwmmp_revision_2_summary_plan.pdf

WA
http://www.watercorporation.com.au/water-supply-and-services/solutions-to-perths-water-supply/groundwater-replenishment?pid=res-wss-spw-np-gr

WA. Operational Policy
http://www.water.wa.gov.au/__data/assets/pdf_file/0016/1564/96686.pdf

WA Managed aquifer recharge
www.water.wa.gov.au/urban-water/water-recycling-efficiencies/managed-aquifer-recharge

WA picture- simple explanation
http://www.water.wa.gov.au/__data/assets/image/0003/2883/1.6-Managed-aquifer-recharge.png

VIC. MARs
http://www.epa.vic.gov.au/~/media/Publications/1290.pdf

http://www.qt.com.au/news/can-water-coal-seam-gas-be-re-injected-ground/2596245/