



The Artesian Bore Water Users of NSW Inc. (ABWUA) is the umbrella organisation of both bore water trusts and private bores in NSW.

Many of our members rely either solely or heavily on water from the GAB for their livelihoods and their lives. This fact ensures that the health and longevity of the GAB is an emotive issue. Without GAB water parts of Australia will be uninhabitable as identified in the Draft Great Artesian Basin Strategic Management Plan (DSMP) regarding the history of the GAB.

Without the GAB the map of Australia is irreparably changed. This can not be a practise run in risk management. If we get it wrong this will be the new Australia



It is very concerning that Issue 1 page 4 states *“Lack of recognition that the Basin is a declining and finite resource, (Smerdon et al. 2012). The Basin’s water resources require judicious use and stewardship of the remaining water pressure, temperature and water quality to ensure that its benefits continue to be available for as long as possible.”* as well as page 8 *“All jurisdictions and stakeholders have a shared obligation to enable the Basin to provide benefits for as long as possible.”* Granted the basin is declining and finite in some locations (admitted to later in the Draft plan) but it is ABWUA’s commitment to reverse the decline and ensure the GAB is around for many, many future generations. We do not want to be known as the generation that started the change towards the new map of Australia.

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The DSMP should show a map of the GAB with state boundaries, zones, flowlines and some towns so people know what it is about. Having an incomplete map on page 25 doesn't allow for ease of understanding. A list of definitions would also make understanding easier and help provide education so often mentioned in the DSMP. Definitions of judicial, water use, waste, sustainability, optimal use, CSG, natural gas, shale gas etc would make sure everyone is on the same page in their understanding of these terms. At present 20 different people could have 20 different meanings for the same word.

Even the "Vision" states that GAB water must be "managed judiciously" ...to ensure optimal use". These ideas are further explored in:

- "strategies to address persistent wasteful behaviour and practices of some water users and associated environmental degradation
- strategies to address continued declining artesian pressure and increasing rates of extraction across some areas of the Basin
- identifying funding sources that reflect public and private user benefits, to ensure a financially sustainable approach to minimising water wastage and the recovery of artesian pressure"

"The review also documented emerging issues including risks to groundwater that may arise from mining and unconventional gas development. It noted (3.1): 'It is crucial that water extractions for mining and unconventional gas related activities is transparent and accountable, does not compromise the long-term sustainability of the resource, does not erode the water rights of other users and minimises any potential third party impacts.'"

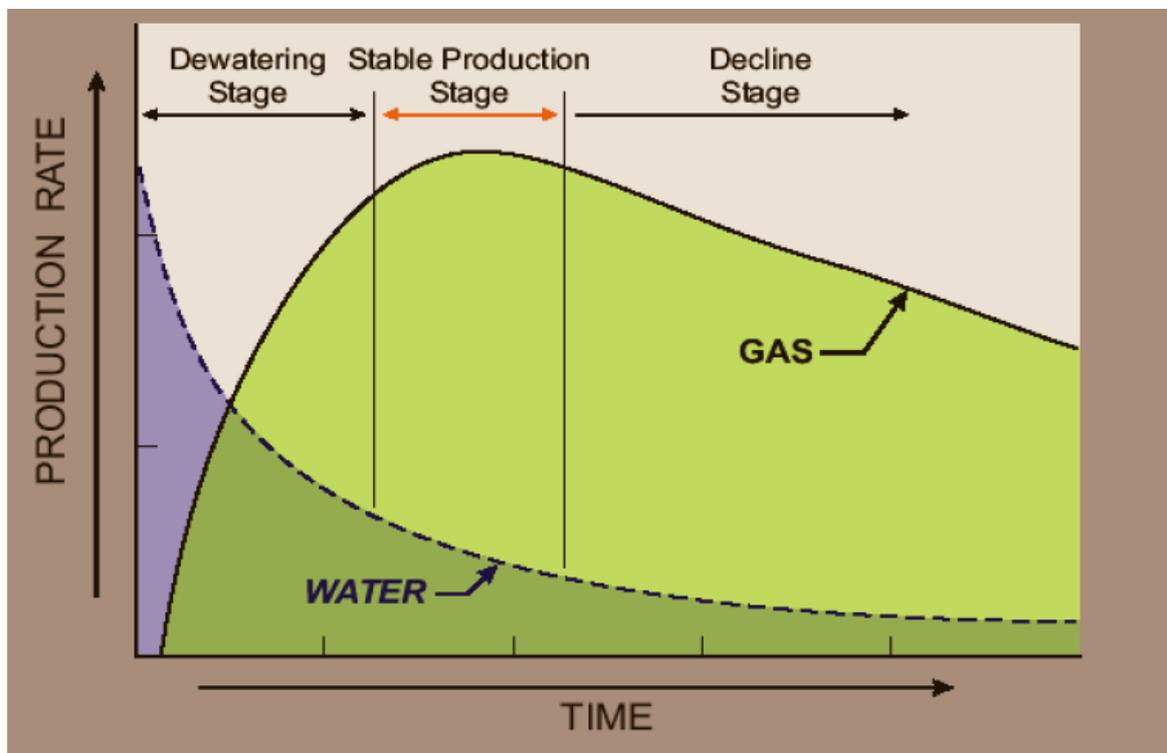
"The unwillingness of some users to accept their on-going responsibility to minimise waste, and to adapt and invest to use water more productively."

"5. judicious use of groundwater"

As well as other areas in the DSMP.

Taking into consideration all the issues above regarding waste, judicious management, sustainability, optimal use etc mentioned how can an industry that does not actually "use" the water be allowed to operate in the GAB? The 'produced' water from mining, CSG and other industrial activities within and adjacent to the GAB is a by-product, a waste, a problem. None of the mining and gas industries, nor governments have found a long term solution on what to do with the polluted water, salt or anything else that they bring up out of the ground. These problems do not have answers. The simple act of 'dewatering' aquifers beneath the GAB to increase the flow of gas is morally abhorrent. We live in the driest inhabited continent in the world, with a damaged and finite resource and we allow water to become a waste product for a short period of time, (+/-30 years) for a few people to make money, that could cause irreparable damage to the GAB. Extrapolate the export dollars brought in by agriculture and other sustainable industries in the GAB over the last 100+ years and the next 100's of years then compare it to the income for the unsustainable mining and CSG industries for 30 years. Then consider the value of sustainable jobs, towns and lives for the indefinite future and sustainability, long term Agricultural and Pastoral based activities wins over short term mining and CSG gains.

The CSG industry has had over 22 years to "Develop and implement innovative water use efficiencies in all sectors through improved technologies and better water management practices." But they still do not have answers for the produced water, salt etc. You can not have water use efficiencies when you aim to de-water a whole aquifer system.



“Basin governments have a constitutional responsibility to protect natural and cultural heritage values and to ensure water is used judiciously to support community values and benefits.” Community values and benefits are not best served by wasting our most precious and finite resource - water.

The GAB is finite but it is also renewable with careful stewardship. This is imperative in the recharge areas. If we limit the take and ensure the recharge areas are ‘allowed to do their thing’ the GAB is a renewable resource. We can not allow mining, especially in the NSW recharge areas, to disrupt this natural balance. CSG dewateres the underlying aquifer and this can not be allowed especially in recharge areas. The aquifers of the GAB filter down to the lower aquifers over time. This is how it works. Coal mines as close as 200 metres from the Namoi River disrupt and remove, by their special State based Water extraction licences, the recharge flows that naturally form part of the GAB recharge. This must not be allowed. As the DSMP states:

“The Basin will be affected by disruption or modification of recharge and natural discharge areas...”

Recent research indicates that surface channels and water storage areas may be of critical importance to Basin aquifer recharge, especially during heavy rain events. Land use changes can mechanically disturb channels and water storage areas and cause silting of river beds that are important to sustaining recharge. Recharge may be affected by climate change impacts on both rainfall intensity and duration.”

Water extraction

“Extraction rates from the Basin are changing, reflecting improvements in management practices, the increased value being placed on Basin water, and resulting in increased benefits to the community. ...Stock and domestic water extraction for the pastoral industry is estimated to comprise almost 50% of Basin water use (156,000 ML/yr). The petroleum and coal seam gas industry extracts approximately 64,000 ML/year (20% of Basin water use), a substantial increase from 6,300 ML/year a decade ago, when it was mostly from conventional oil and gas production (Office of Groundwater Impact Assessment 2016). (Note, the above figures are different to those within the Frontier Economics 2016 report since this is a specific case study within Queensland). “

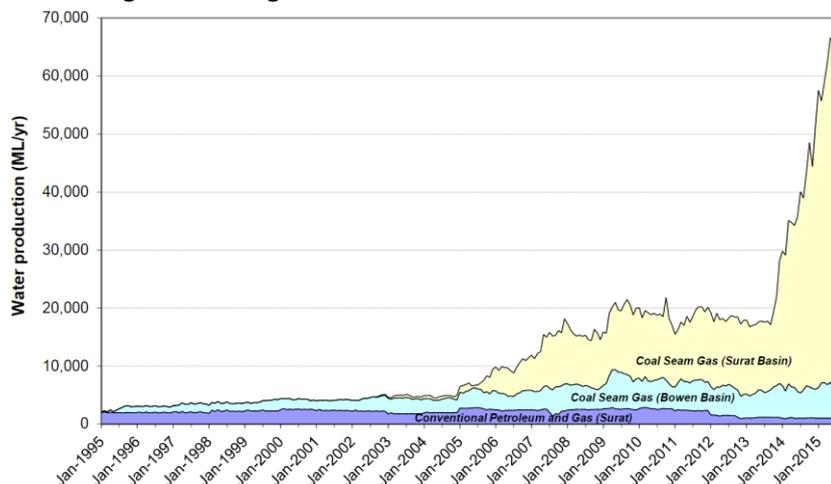
This Queensland case study covers the Surat Cumulative Management Area. Not all gas bores in Queensland fall in this area and therefore this study does not reflect the extraction rates state wide.

https://www.dnrm.qld.gov.au/data/assets/pdf_file/0008/345680/uwir-2016-summary.pdf.

According to a report from Dr. Steve Ward – Department of Natural Resources and Mines EHA QLD 9 September 2014 “Projected CSG Activity in Qld • Current – Total wells = >7000 • 2025 – Total wells = 30,000-40,000.”

<https://www.ehaqld.org.au/documents/item/725>

Combining these figures with data in the table below from the GABCC Frontier Economic Report,



it would show that the water take for the 7000 bores in the NRM report was between 20,000 and 70,000 ML/yr. I was unable to find an average figure of water take per year per bore so if we use the mid point of 45,000 ML per year and divide it by 7,000 bores we get a figure of around 6.5 ML take per year per bore. If we then calculate 6.5 ML * the estimated 40,000 total wells by 2025 we get a take of over 260,000 ML per year. The same calculation based on 65,000 ML per year reaches a staggering 371,428 ML of water taken per year in Queensland for gas bores.

This is a 571% increase on the CSG take according to The Frontier Economics Report.

<http://agriculture.gov.au/water/national/great-artesian-basin/economic-output-groundwater-dependent-sectors-great-artesian-basin>

Table 1: Water licences and entitlement volumes, GAB Queensland

Main approved purpose	Number of licences/ allocations/ entitlements!	Estimated total water (ML/yr)	GAB use
Commercial	31	617	
Irrigation/ agriculture	578	32,341	
Stock and domestic	5,476	121,759	
Stock intensive	248	16,098	
Urban (town water supply)	105	32,057	
Industrial and Mining	83	30,292	
P&G / CSG	(not currently licensed)	65,000	
Total licences	6,521		
Total GAB water extracted		298,164	

Source: DNRM provided data from Water Management Database.

(Unfortunately this table does not have a date to show when the data has been compiled.)

This would increase the total take on the GAB in Queensland by 124%. This increased take on an already stretched system does not include the increased take by the number of proposed new coal mines in the state. The expansion of all these industries and their effect on the GAB must be taken cumulatively. These figures are arbitrary as they are not at the exact same point in time, figures differ between reporters and they are reliant on the information given on bores that are not metered. They do not include unreported take, inter-aquifer leakage or any other number of things. It is impossible to know if wells will peak at 40,000 or increase, even double, triple or more. Is it easier to realise in 10 years time that this take is unsustainable or is it easier to ensure now that irreparable damage is not done? We only get one crack at this.

Economic factors must not be the most important factor in determining the management of the GAB. The industry making as much money as is possible, as quickly as possible, will generally not result in the most positive outcome for the environment and health of the GAB. Long term sustainability of the GAB must be paramount to ensure future economic benefits in the very long term. How do we measure the worth of a town. With over 120 towns relying on GAB water, with a very small percentage of the overall take, they are not an economic boon. But who gets to determine the future of these towns should the risks to the GAB eventuate?

Whilst we understand there is no way to enforce inter-agency cooperation between federal and state governments, we ask what methods can be used to ensure cooperation? Uniform regulations must be adhered to to make sure the benefits of the GAB are provided to all. There must be similar rules for all jurisdictions. Australian Standards should be in place for activities such as drilling of wells and plugging and abandoning ie: what license is required to do it, process used, materials used and records kept of GPS points involved. Licenses and allocations must apply to all entities taking water. Thought also needs to be put in to the 'rules' around future activities. Fracking and reinjection have been talked about for ages. Fracking has taken place in NSW. Re-injection of untreated produced water from CSG has occurred in PEL 238 in the 1990's and has been done in Queensland this century. Both areas where this activity took place have links with the GAB. These are not issues that are going to be put on the back-burner for 15 years. They must be discussed now and inter-agency consensus must be reached. Research from overseas provides plenty of proof that fracking and re-injection have dire consequences. Many governments in the world are banning one or the other or both and these decisions would not be taken lightly or without proof. Question - why is artesian water not stagnant? Any other nearly still body of water is. ABWUA commissioned a study into stygofauna in the Pilliga region. There are 3 previous reports done in 2012/2013 this one is the 4th and most recent was done in the Pilliga Forest in response to comments in the 2016 Santos Environmental Impact Assessment that there was uncertainty that they existed in the Pilliga. Prior to the EIS the company involved denied the existence of Stygofauna on the basis that "they had not located any", but then again they were not looking for them. This [report](#) explains what stygofauna do in their environment and the detrimental effect on them when water brought up is treated through reverse osmosis then re-injected. Processing the water kills them then when the water is reinjected it still contains chemicals and the stygofauna population does not have the numbers to successfully keep the water clean. The presence of Stygofauna in certain areas indicate that the assumed geology (all Pilliga Sandstone) is not correct as Stygofauna require large spaces to move around in, in order to "hunt" for food and a consolidated material sandstone is not suitable, and as such there appears to be big gaps in the shallower geology formation. It is this shallow geology that determines the quality and quantity of the GAB recharge water.

What has not been covered fully by any Management Plan or Review is the damage to well infrastructure and water quality by BACTERIA both naturally occurring and introduced. These bacteria include, but are not limited to, Sulphate Reducing Bacteria (SRB) and the Iron Bacteria. Sulphate Reducing Bacteria produce Hydrogen Sulphide gas which at certain levels is not supportive of life and when combined with moisture or water produces a sulphuric acid solution which attacks steel and cement to name just few, while the Iron Bacteria attacks the metal surfaces of any well/bore as well as the natural Iron, this bacteria waste precipitates out as a reddish cloud that, in many cases renders the water unusable unless the water is treated and this process is expensive. Both bacteria are known to be "moved" from one location to another by Well/Bore Drilling equipment. Many recorded cases exist on Government files of these bacteria contaminating previously clean areas, yet bacterial damage to both infrastructure and water quality is not mentioned in the Management Plan 2018 nor is there any mention of testing for them and ABWUA has to wonder why?

Whilst GABSI funding has been a fantastic program the job needs to be completed. All bores need to be eligible to have the required work completed. This work involves rehabilitating or plugging of old corroded or dribbling bores, piping of open boredrains and drilling of new bores when the old ones are not able to be rehabilitated. The GAB will function more efficiently and environmentally friendly when it is a mostly closed system. The only places not closed should be the naturally occurring springs and discharge points. The latest drought has proven how important this water is. Farmers above the GAB may not have feed but farmers chasing feed and water for their livestock are far worse off. Climate change or not our seasons are changing and becoming drier and more volatile. GABSI funding also needs to be looked at as a whole of basin cost. At present the Federal government has offered GABSI funding. I believe NSW have not taken up their end of the deal. This means the money is lost from GABSI and reverts to the Federal coffers. This does not help anyone. The money should be spent in NSW even if the NSW government does not cough up. It will still go some way to completing the work required, albeit not as far. What is spent in Queensland benefits South Australia and NSW so if that funding was to be withheld it is not only detrimental to Queensland.

Issues noted in the Review of SMP 2015.

“The review also documented emerging issues including risks to groundwater that may arise from mining and unconventional gas development. It noted (3.1): ‘It is crucial that water extractions for mining and unconventional gas related activities is transparent and accountable, does not compromise the long-term sustainability of the resource, does not erode the water rights of other users and minimises any potential third party impacts.’” These issues are not simply going to go away. Dewatering the aquifer, destruction of stygofauna, lack of processes to deal with extracted elements (water, salt, chemicals etc) will all compromise the long term viability of the GAB and erode the water rights of other users and investors. The actions of CSG companies are not transparent and accountable as is evidenced by broken relationships with landholders, spill and contamination cases with state EPA agencies, drawdown of landholders bores and gas escaping from bores. There are many cases that have made court and many others that have settled out of court.

Issues (p 4)

*“New or emerging issues... The Basin’s water resources require judicious use and stewardship of the remaining **water pressure, temperature** and **water quality** to ensure that its benefits continue to be available for as long as possible.”* This does not actually list water as an important resource. But more than ‘important’ it is as vital to life as the air we breathe.

Challenges (p 5)

What is seen as unwillingness or the persistence of wasteful practices in the farming community is generally a monetary problem. The majority of farmers, once educated on the benefits of capping and piping, are keen to undertake the process. Any members we have spoken to that were not keen have definitely seen the merits afterwards. I have never spoken to anyone that is unhappy once the process is completed satisfactorily. The only negative comments I have ever heard are from farmers that had problems with the process ie: bore failure that happened after the NSW Department drilling unit was disbanded. One other bore I am aware of had problems with bore members and I believe their bore is still not completed. All landholders that have not already capped and piped must be offered GABSI funding so all schemes can be completed. The last ones to be done in NSW are predominately single landholders in the western areas and they can not outlay that kind of money by themselves – especially in the current climate.

Opportunities (p 5)

I question whether infrastructure for CSG wells can be technically deemed water delivery infrastructure. Yes it is taking water out of the aquifer but it is not being ‘delivered’ to be used, beneficially or otherwise. It is being predominately sent to holding ponds to sit there until it evaporates.

“Enable and encourage the beneficial use of co-produced water” The industry has had over 20 years to come up with a use for this waste water. They have not done so yet.

“Investigate a long-term funding arrangement for Basin-wide replacement of bores.” User pays. All bores will fail within 100 years. No government will be able to afford to replace even the plugged and abandoned bores. They can not

afford to do it now and there will be many 10's of thousands more bores after CSG is finished. The CSG companies will also be long gone so the taxpayer will have to foot the bill. If landholders that had CSG wells on their place assumed responsibility for the wells and received payment then they will be responsible according to some industry contracts. Most of these bores will last significantly shorter periods than 100 years. They will then need to be 'made over' every ? number of years. No-one knows how often. Please watch the following on well integrity and the inadequate rules required for the CSG industry. Professor Ingraffea is one of the world leaders regarding well integrity and he has some insightful comments regarding the differences between Australian and American geology that we hear so much about from the CSG industry here. <https://www.youtube.com/watch?v=WJ0cBZxpghg>

The requirement for Queensland CSG companies to 'make good' on landholders bores when they have caused problems, is on the surface a good idea. The landholders cannot have to foot that bill. It does however create more 'pinholes' into the GAB and increase the chance of inter- aquifer leakage. Many landholders have said the well gets replaced and treated as the old bore. The new wells are not issued with a new number, licence or anything so does anyone know how many wells there are and how many plugged and abandoned or just abandoned wells there are? The landholders can not go public with this information as they have to sign a confidentially agreement to get their new well. This is not a very transparent industry. There are wells which were abandoned and not plugged that have now started leaking with the increase in GAB pressure. A new Queensland "Water Plan (Great Artesian Basin and Other Regional Aquifers) 2017 commenced on 2 September 2017. New elements in the plan include; improved water efficiency by mandating all uncontrolled bore and drains be made watertight by 2027." Who will be responsible for the bores that have already been abandoned by the CSG industry?

Table 2 (p 12)

"Landholders are encouraged and supported to manage important physical landscape features that support natural recharge and discharge processes" Does this include CSG and mining industry companies that are not the landholder but that conduct operations on land, sometimes against the wishes of the landowners?

"The rights of all authorised users must have a clear, secure statutory basis, and responsibilities must be clearly defined and understood by all water users regardless of access arrangements." All stock and domestic bores have to have a stock and domestic licence. What type of license do CSG & mining companies have? Do they follow the same set of rules? This falls into the 'not transparent' category as I have not been able to find out a definitive answer when asked by ABWUA members?

Table 4 (p 16)

"Extraction and management of groundwater, including storage, disposal and aquifer reinjection, is in accordance with rights and responsibilities specified in relevant authorisations." Where do you find information regarding these authorisations? Are they enforceable yet?

"Basin governments identify, attribute and publicly report costs associated with Basin water resource planning and management. " Is this dissected per industry type? Does this include compliance costs?

"All authorised groundwater extraction is accounted for." What about unauthorised extraction? Are there penalties for unauthorised extraction?

Any landholders that have capped and piped under GABSI, except for South Australian landholders are investors in the GAB. Anyone that owns land, especially farming land, above the GAB is an investor in the GAB. If the perceived risk to the GAB becomes too great and people believe their water source is at risk they will try to get out of their investment before it is unsaleable. Banks may withdraw support for farms above the GAB. The billions of dollars in farm real estate may become worthless without water. Foreign investment in the agricultural sector could decline sharply. Our considerable investment should ensure we have a say in the future of our asset.

Tourists are not only attracted by cultural and natural history but also by the perceived medical benefits of hot artesian water.

There are two sides to every debate. There are two scientific opinions to most debates. In order to make an informed opinion about the veracity of each conclusion, one only needs to follow the money trail. The scientist paid, sponsored, funded, supported etc by anyone remotely connected with an industry, either obviously or by stealth, can not have

their work deemed independent. The scientist that is not paid by big industry and is undertaking research for research sake, not a pre-determined outcome, is more likely to be grounded in science. CSIRO's GISERA is a perfect example of the former. CSIRO reports prior to the introduction of GISERA or funding by the CSG industry provided more balanced information. Reports since the inception of GISERA have been at pains to say positive 'facts' about the industry. So much so that APPEA, the peak CSG industry body quite often laud GISERA for their 'independent' research. One example of this is https://www.appea.com.au/media_release/csiro-report-points-to-environmental-benefits-of-CSG/. Another view of GISERA, backed up by their own employees is



The Chief Executive of CSIRO and scientists have admitted that if they do not provide reports with the correct 'scientific bias' they won't get paid.

We insist that you listen to our concerns and that any industry that is not sustainable is not allowed to risk our precious water.

Anne Kennedy

President

Sonya Marshall

Secretary/treasurer

ABWUA