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Senate Standing Committees on Rural Affairs and Transport.  
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28<sup>th</sup> June 2011

Sir,

Re: Impact of Mining Coal Seam Gas on the Murray Darling Basin.

Introduction

My name is Anthony (Tony) Pickard and I have a small Wool Growing enterprise in the Jacks Creek area 40km south of Narrabri, and adjacent to the Pilliga East State Forest. Eastern Star Gas has a Pilot Production complex (Dewhurst 8) 1500m to the north north-east, on an adjacent property. (See photo below).



*Aerial Photograph taken from North looking Southward*

Killara Property showing Dewhurst 8 Pilot Production Complex

Anthony Pickard's Property Rockdale

I am 8km north east of the Bibblewindi Water Treatment and Bibblewindi Nine Spot complex, and there is a production sized core hole (Dewhurst 6C) 4km to the south.

My property is 320ha in size and has an area of 210ha leased to the Namoi Catchment Management Authority (CMA) as a Biodiversity area, and a further 30ha cannot be developed without a Property Vegetation Plan (PVP).

I have over the course of years since late 2006, watched the march of Coal Seam Gas into the area. Since January of 2009 I have been documenting both in videos and photos the effects that this Eastern Star Gas (ESG) has been having on the assets, both Council and Private, as well as the slow break-down of the local Social Structure as ESG favours one person and organisation over another.

I have seen a Council that is trying to come to grips with this Industry only to have their decisions overturned in the space of less than 2 weeks by powerful lobbying of the some of these same Councillors, the type of lobbying that the normal ratepayer cannot match.

I have seen and recorded (photographic and video) many instances where Council assets have been damaged in the course of Coal Seam Gas Mining in the Narrabri Shire and there has been a clear breach of the Exploration Licences, as well as the Part 3A conditions, and only minor action has been taken by Council and State Government authorities, despite having the breaches reported to them accompanied by the recorded evidence.

These Coal Seam Gas miners pay no rates to Council, except for that on the little land that they own, and yet their proposed Development of 550 Well Sets, is going to cover an area of 2410ha, and yes, the project is mainly in the Pilliga State Forest. However, the Council, State and Federal controlled roads are used to access the area, and with a proposed construction workforce of some 500 and a permanent staff of some 200 when in full production, the movement of these people, let alone the heavy vehicles associated with this project, will put a big strain on the Shire Ratepayers if ESG does not contribute to Council for the usage of Council, State and Federal assets.

Because ESG has been able to get away with so much in the past, I fear that the very action of Coal Seam Gas Mining in an area of such importance to the health of Aquifer Waters, of the Southern Recharge of the Great Artesian Basin, the Namoi River, and the Darling River Basin and hence the Murray Darling Basin, will have a detrimental effect on the health of the water, farming, towns and Australia's food security.

ESG has not held a full and open public meeting since August 2005, and has instead preferred to sponsor events, teams, and civic sporting related infrastructure (see Part 3A application May 2008, section 4-3). The only general public that they talk to are in small groups of no less than 1 and no more than 6. ESG has addressed Narrabri Council in open session, however it is mostly not advertised and there is very limited opportunity for questions from the public gallery.

Narrabri Council passed a Resolution in May of 2010 that ESG form a Community Consultation Committee. Nominations for that Committee were called for in March 2011, and to date no Committee has been formed. On June 3<sup>rd</sup> and 4<sup>th</sup> ESG held an Open Information Half Day, preferring to talk again to small groups, citing fears that a full and open public meeting may be hard to control. Questions were encouraged at these Information Half Days and I was told that my questions would be answered within 14 days. I am still waiting for my answers.

ESG has over the course of the past 10 years started to alter the water quality security of this region. All this will have a flow on effect through all the surface and ground water systems, and hence have an impact on the social and economic conditions that exist today. While in the short term there may be benefits, these will only be for a small number of people. However, as the effect that this Industry will exert on the Environment via the placing of Treated Coal Seam Water, which is high in Sodium Bicarbonate – 134 parts per million (ppm) in a 230 ppm Total Dissolved Solids (TDS) after treatment

water analysis (see page 19, of Attachment I), Sodium Bicarbonate is Alkali in nature and well above the existing levels of the Aquifers in the area. Below is an analysis of shallow (between 59 and 71 metre depth) water taken from my bore in 2009 showing the conditions, however, if quantities of Sodium Bicarbonate enter the aquifer systems, then the existing bicarbonate and alkalinity levels will rise permanently from those that now exist in my bore water.



Cotton CRC, Namoi Catchment

	Electrical conductivity	TDS	Sodium	Calcium	Potassium	Magnesium	Chloride	Sulphate	Bicarbonate	Carbonate	Alkalinity (Hydroxide) as CaCO3	Alkalinity (total) as CaCO3	Anions Total	Cations Total
	uS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	mg/L	meq/L	meq/L
EQI	1		1	1	1	1	0.2	0.2	1	1	1000	1	0.01	0.01
ANZECC2000			800 <sup>#3</sup>				1000 <sup>#7</sup>							
ANZECC-Barley														
ANZECC-Beef Cattle			1000 <sup>#14</sup>											
ANZECC-Cotton														
ANZECC-Dairy Cattle			7000 <sup>#13</sup>											
ANZECC-Irrigation-General							750 <sup>#8</sup>							
ANZECC-Irrigation-Specifics							700 <sup>#9</sup>							
ANZECC-Pigs			800 <sup>#12</sup>											
ANZECC-Poultry			4000 <sup>#11</sup>											
ANZECC-Sheep			13000 <sup>#10</sup>											
ANZECC-Stock						2000 <sup>#5</sup>		1000 <sup>#15</sup>		2000 <sup>#16</sup>				
ANZECC-Stock-Risk														
ANZECC-Sunflower			5500 <sup>#2</sup>											
ANZECC-Wheat			5000 <sup>#1</sup>											
Australian Drinking Water			500 <sup>#3</sup>	180 <sup>#3</sup>			250 <sup>#4</sup>	250 <sup>#4</sup>						
Early Season Cotton			1500 <sup>#18</sup>											
Field ID	Sampled Date-Time													
G29	26/07/2009	178	85.71	22	<1	6	3	44.7	9	<1	<1000	9	1.48	1.38

- my bore requires.

- Comments
- #1 Unsuitable for Wheat irrigation.
  - #2 Unsuitable for Sunflower irrigation.
  - #3 Unsuitable for drinking.
  - #4 Unsuitable for Cotton irrigation.
  - #5 Unsuitable for Barley irrigation.
  - #6 Stunted growth for Cotton and Sunflower
  - #7 Risk to cotton growth.
  - #8 Risk of increased Cadmium intake by crops.
  - #9 Non-satisfactory for stock.
  - #10 Loss of production and a decline in sheep condition and health.
  - #11 Loss of production and a decline in poultry condition and health.
  - #12 Loss of production and a decline in pigs condition and health.
  - #13 Loss of production and a decline in dairy cattle and horses condition and health.
  - #14 Loss of production and a decline in beef cattle condition and health.
  - #15 Increased fouling potential of water.
  - #16 If used on early season cotton, the final yields could be diminished.
  - #17 Chronic acute health problems in stock.
  - #18 Causing foliar injury in Cotton and Sunflower.
  - #19 Adverse effects on stock.
  - #20 Adverse effects on cattle.

*not a good if cations & cations on clay if already difficult then*

LocCode = 'G29'

G29.xls\_27/08/2009

*Analysis of bore water at Rockdale taken in July 2009*

What will happen if the quantities of treated coal seam water, as quoted in the Referral of proposed action 2011/5914, containing Sodium Bicarbonate are released into Bohena Creek, a major out flow creek, which for now is ephemeral? How long will the Bohena Creek stay ephemeral with between 42 and 84 ML of water per day put into it and containing between 9.64 and 19.27 tonnes of Sodium Bicarbonate per day?

Even if 20% of the treated coal seam water is used elsewhere that, still leaves between 33.6 and 67.2 ML per day discharge, and the quantity of Sodium Bicarbonate is now down to between 7.71 tonnes and 15.42 tonnes per day, all of it going into an already slightly alkaline water environment. Based on these figures of 80% discharge of treated coal seam water, then Bohena Creek will still become a flowing creek and the Sodium Bicarbonate will still heavily influence the alkalinity levels of the surrounding waters, thus changing the environmental outcomes of the entire catchment and basin water systems.

The standing water level in Bohena Creek today measured over 6km from the discharge point of the Biblewindi coal seam water treatment works is 600mm at the 6km mark going to permanent pools on the surface at the point of discharge.



*Coal Seam Treated Water Outlet in Bohena Creek*

Still it will take a few years for the effects to show, maybe after the gas mining has ceased, but you cannot deposit that much alkali material into the water system and hope it will go away. Currently the health of the Murray Darling River System is being assisted by the reduction and removal of water entitlements from the Agricultural Sector, however, this can be all for naught if as a result of coal seam gas mining and the discharge of alkaline waters is allowed to enter to proceed unabated.

I ask you to read my Comments to the Referral of proposed action 2011/5914, as given to the Department of the Environment, Water, Heritage and the Arts (Attachment 2).

### Submission

I will start this submission by quoting from one of ESG's Review of Environmental Factors (REF) dated December 2006 and titled Water Treatment and Disposal Project. The REF concerns the Bibblewindi Treatment Complex and to date of writing this submission, it has no attachments, revisions, updates or modifications listed on the NSW DPI website. A request to that Department has been made, to try to uncover any "lost" paperwork, so until any is found and made publicly available, then that REF and the information contained within is ESG's Operation's Manual (Attachment 1).

Eastern Star Gas states the following (*Taken from page 24 Section 3.3 Geology & 3.4 Regional Scale Drainage, The Bohena Coal Seam Gas Project, Review of Environmental Factors, Water Treatment and Disposal, PEL 238, Gunnedah Basin, New South Wales.*)

*Geologically, the extended area containing the Bohena CSG Project comprises the northern portion of the Permo-Triassic Gunnedah Basin, which forms the central part of the much larger Sydney-*

*Gunnedah-Bowen Basin system. Jurassic and Cretaceous sediments of the Surat Basin sequence unconformably overlie the Gunnedah Basin sequence and outcrop over all except the easternmost areas of PEL 238 where Triassic, Permian and basement outcrops.*

*The Gunnedah Basin covers an area of more than 15,000 km. sq. And is bound to the east by the Hunter-Mooki Thrust Fault System and the New England Fold Belt, and to the west by the Lachlan Fold Belt where sediments gradually onlap. To the south, the basin is arbitrarily bound by the Mt. Coricudgy Anticline and to the north by the Bellata High, where the Permo-Triassic sequence thins over basement.*

*The Gunnedah Basin is a true foreland basin developed as the result of island arc accretion to the east. The Hunter-Mooki-Goondiwindi fault system to the east forms the effective present day eastern margin of the Basin.*

*Jurassic and Cretaceous sediments of the Surat Basin unconformably overlie the Gunnedah Basin sediments and thicken rapidly to the northwest. In the north-western portion of PEL 238, and beyond the limit of the Gunnedah Basin, sediments of the Surat Basin sequence directly overlie basement lithologies of the Lachlan Fold Belt.*

*The primary CSG target seams in the Early Permian Maules Creek Formation are located in the north-south trending, longitudinal depo-centre and eastern portions of PEL 238 within the Bohena Sub-basin, the coals lie at the depths ranging from 560 to 1000m and do not outcrop.*

### 3.4 Regional Scale Drainage

*The Bibblewindi Nine Spot Area lies within the Namoi River Basin Catchment, one of the main tributaries of the Barwon Darling River System. The Namoi River Basin covers an area of 43,000 km. sq. and incorporates the regions major centres of Tamworth, Gunnedah, Narrabri and Walgett (Corkery and Assoc., 2004). The Bohena Creek sub-catchment covers an area of 1500 km.sq., and is the major drainage feature in the area. It is ephemeral in nature and flows only with significant rain fall in the catchment associated with significant rainfall in the catchment associated with the Warrumbungle Ranges some 60 km to the south.*

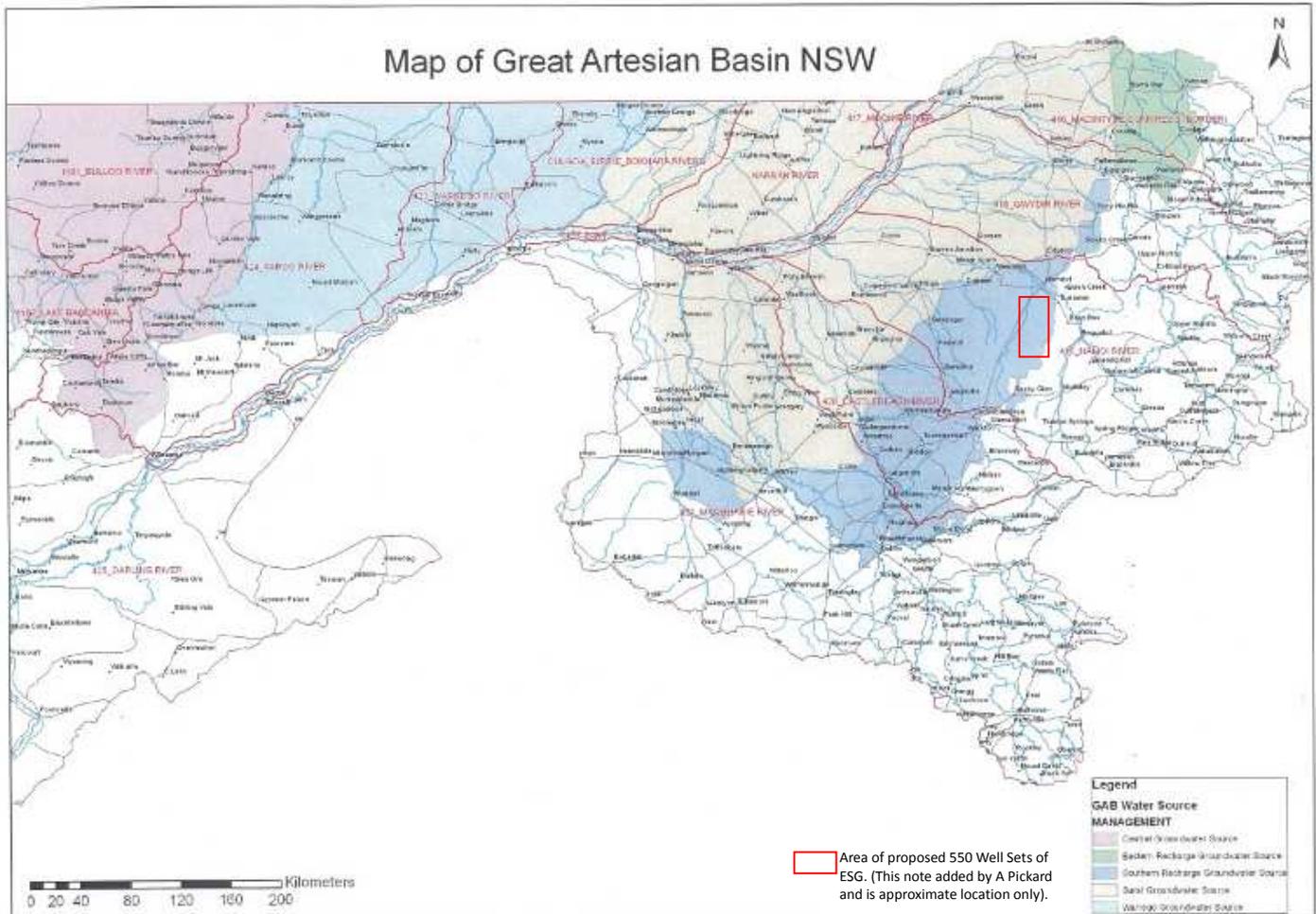
**I would at this stage like to mention, that the same admissions as above are in all the ESG's Production Lateral Pilot REF's, even the last Production REF, Tintsville REF (November 2009) has the same admissions as to location with-in the Barwon Darling River System.**

The following is a brief description of my concerns over the activities occurring in the Pilliga State Forest in regards to ESG and PEL238 in relation to the Murray Darling Basin and associated systems.

Firstly, please note that nowhere has ESG mentioned the main underlying feature that underpins 95% of the Lease that they hold, this being the Southern Recharge Area of The Great Artesian Basin. ESG have, by clever wording, led many a reader to believe that their entire operation is in a basin called the Surat, with the geology of Pilliga Sandstone.

A quick look at the attached NSW Department of Water Map, (also see page 144 of the original Guide to the proposed Basin Plan Volume 1, MDBA publication no. 60/10), will confirm that ESG is indeed operating in all places through the Great Artesian Basin (GAB), and in at least 40% of their lease sits directly on the Southern Recharge of the Great Artesian Basin. All the proposed development is in that area and as there is proven interconnectivity between the Namoi River and the GAB, thus any pollution or aquifer interference must eventually affect the Murray-Darling Basin and its river systems.





The above 3 maps have only had the proposed 550 Well Sets superimposed. The full PEL's have not yet been superimposed as these are only areas of exploration and at this stage not heavily influencing potential water discharge into the Namoi River system as will occur if 550 Well Sets are approved.

ESG has stated in the Referral of proposed action to the Australian Government Department of Sustainability, Environment, Water, Population and Communities - Narrabri Gas Field Development – April 2011, that “*Preliminary modelling of water production has been undertaken for the project and is estimated to range between 0.08 and 0.16 ML per well per day although production may be outside this range*”. That equates to a range of between 44 and 88ML of production water per day from the 550 Production Well Sets. The targeted seam here is **the Bohena Seam or as is sometimes called the Maules Creek Seam**.

Yet on June 4<sup>th</sup> 2011, at a Community Information Day, I was quoted a figure based on current modelling of between 7 to 10ML of Production Water from the 550 Production Well Sets. Those who were present were Mr P Fox and Mr Petersen, both Eastern Star Gas Managers.

I find this difference from the Referral Document to be so staggering as to be well beyond belief. That was not all; the final straw was when, with a straight face, I was informed that Sodium Bicarbonate was not included in the TDS (Total Dissolved Solids) component of a Water Analysis. So then, why has Eastern Star Gas placed this component in its water analysis contained in Attachment 1 and Attachment 3?

I ask you to refer to my comment to this, especially the calculation table (Attachment 4).

At this point I would like to draw your attention to another REF and this one is targeting a different Coal Seam **the Hoskisson's coal seam**, this one titled **Tintfield Water Management Plan**, which only

became available May 10<sup>th</sup> 2011. In this REF, on page 20 under Water Production Modelling, ESG states, *“The preliminary production modelling carried out for the Tintsville pilot indicates that water production from the three Tintsville wells is heavily dependent upon the final technical characteristics of the lateral wells. Early estimates of flow rates based upon drill stem tests carried out on the Tintsville-1 core hole have suggest flow rates of up to 1000 barrels (160kL) of water per well per day initially before trending downwards to 500 barrels (80kL) per well per day after 6 months in operation. In cumulative terms, the daily water production from the pilot can be expected to approximate 3000 barrels (480kL).”*

I would like to point out that two different REF's for two different areas and from two different targeted Coal Seams give the same Production Water yield (See Attachments 1 & 5). That to me is a bit strange, and gives rise to the thought of **Interconnectivity of the Coal Seams**.

So if this is correct then what about the waters of the Aquifers in the Great Artesian Basin and the Coal Seams? Can the Aquifers have a fault in them, allowing water from above to replenish the waters removed below?

#### Contamination by Chemicals, Drilling Fluids, Coal Seam Gas Water.

I draw your attention to the following ESG REF's on the subject of how they decommission Drill Ponds.

From the Dewhurst-8 Lateral Production Pilot REF, June 2009 (page 56), Attachment 6 and from the REF, 2008 Narrabri Coal Seam Gas Lateral Program – Lateral Production Pilot A, amended 25/07/08 page 43, (Attachment 7)

These are just samples of the REF's that explain ESG's method of filling in a Drill Fluid Pit. The method used is simple:

1. Pump off as much of the fluid that contains drilling chemicals and the salty coal seam water as the pump can remove
2. Roll out the plastic liner, leaving the drill cuttings soaked in drilling chemicals and salts from the coal seam water behind
3. Fill in the pit, thus sealing the contaminated cuttings below ground to leach into the water table.

If ESG was removing these contaminated cuttings, then there would be a grey trail from every site, due to the tipping trucks not being water tight, thus any fluid can leak out. There are no grey fluid trails visible so the conclusion is that the contaminated cuttings are left on site. If the contaminated cuttings are removed from the site then where is the approved lined dumping site for this material and where is this mentioned in REFs?

I have included some photographs that show the salt build-up around the pond edges. These ponds are all unlined and these salts and chemicals have and will find their way into the water table and aquifers. There also photos showing dead and dying trees and sterilised soil that can only have occurred if the drilling fluid and coal seam water cocktail were allowed to be spilt onto the ground and hence enter the Aquifer System. These photos show a range of abuse of Licence PEL238 conditions over 10 years and are from Bohena 2, Bohena 7, Dewhurst 10 to Bibblewindi West 22 and Bibblewindi 16. (Attachment 8).

As for contamination from the chemicals, I have included some photos of Sodium Chloride and Potassium Chloride as found at the site Bibblewindi West 22 in 2009. The stacks are in the open and some of the bags are split and spilling (just after these photos were taken we had 15mm of rain). (Attachment 9).

Also included are a series of photographs taken in December 2009 showing the drill pits at Dewhurst 8, 16H, 17H and 18H over-flowing. The over flow occurred twice, and thus the ponds were washed out twice, this water entered Jack's Creek and hence the Namoi River. (Attachment 10).

I have also included photos of the Culgoora-2 overflow of December 2010. This site was built in a flood way and had 300 mm of water covering the whole site, thus the Drilling Pit was washed out and all the chemicals contained also washed out. There are photos that show pallets of chemicals, Potassium Chloride, Sodium Chloride, still in water. These chemicals and drill pit contents would have ended up in the Namoi River or leaching into the ground off-site, and thus entering the Aquifer systems. (Attachment 11).

As a final example of contamination, I include a press release from Eastern Star Gas concerning a spill that occurred in February 2010 into a creek known as Mollee Creek. An attempt to clean-up the spill had been made, however drilling fluid being water with chemicals in suspension, soaked quickly into the ground, taking much of the chemicals and salt (sodium chloride) with it, this in turn will enter the Aquifer system. (Attachment 12).

Potassium Chloride carries a warning from the supplier Rheochem in the Material Safety Data Sheet, section 12: **Limited ecotoxicity data was available for this product at the time this report was prepared. Ensure appropriate measures are taken to prevent this product from entering the environment.** (Attachment 13)

All these warnings, and yet, on Culgoora-2 there were 17 tonnes of Potassium Chloride. The overflowing pits at the various sites still had a percentage Potassium Chloride in them, the Mollee Creek spill contained Potassium Chloride and all the unlined pits as per Attachment 8 had Potassium Chloride, and this Chemical is used in vast quantities as a drilling aid. Potassium Chloride is readily dissolved in water, so once it is spilt it travels into the Aquifer system readily and never leaves the system once the chemical is below root level. **Too much Potassium Chloride will kill plant, animal, aquatic and terrestrial, as well as human life.**

As a committee it is important to examine all the impacts of Coal Seam Gas Mining. The impact ESG's operations are having on my wife and me is very stressful in that we don't know what the future holds regarding how much our property is going to be affected by the proposed development of Coal Seam Gas Mining. As ESG has never directly approached us, we have always initiated contact with minimal to nil reciprocity; we have found the whole situation to be mentally draining and stressful and extremely time consuming as it has taken my wife and I away from our farm duties.

We have invested both time and money on improving our property which we had hoped to pass on to family members, however, due to the uncertainty surrounding the possible effects of Coal Seam Gas Mining and the inability of governments to make decisions regarding this industry and adequate compensation choices to landholders we are in a constant state of limbo and have seen the property values decline.

With regard to the economic benefits for the local business community, a quick personal survey indicated that while some businesses may benefit, the majority will not, as the attitudes of the miner seems to favour importing technology and material from outside the Shire. Also, there is a trend for the farm worker to seek better pay and conditions within the Coal Seam Gas industry and hence the agricultural industry is losing its workforce. As a side note, when overseeing the area from lookouts located at Mount Kaputar and Sawn Rocks, the view now includes open cut coal mines and coal seam gas pads. This will eventually affect the tourism in the local area.

With regard to property rights it appears that there is no fixed basis in government policy or in Petroleum (Onshore) Act for adequate compensation for inconvenience or loss of productivity caused by Coal Seam Gas Mining, unlike the Coal Industry which has established principles in dealing with these matters. It all seems to be left up to the strength of character and negotiating skills of the landowner versus the Coal Seam Gas Miner. As a result of this unbalance in the system the landowner will always come off second best. The landowner's rights should be protected by government's legislation.

## Conclusion

As has been put in the above any introduced change to the natural established existing order in the past has had consequences that are now well evident and permanent (dead trees and ground around Bohena and other wells). The introduced alkaline waters will travel quickly and spread fast in the surface waters, and who knows will even dissipate at a fast rate, but it is the alkaline waters that enter the slow moving ground water aquifer system that is the problem. Once the alkaline waters enter the aquifer systems there is no ability to remove them, hence, these aquifers become the bank to supply the surface waters with a highly alkaline water recharge, either through pumping or through the natural process of interchange.

The effect on the towns and communities and the food and agricultural producers that rely on this water will be devastating.

This will not happen overnight and the effect may not be fully felt for 20 years or more, but if alkaline water, the by-product of Coal Seam Gas Mining, is introduced into the water supply chain, then the long term viability of this Basin and all the water supply areas that may have Coal Seam Gas Mining in their region, is bleak indeed.

We know too little of the long term effects of this finite Coal Seam Gas Resource, it is non-renewable, but does contain many unanswered questions.

This will not be a one off, for already the water introduced into Bohena Creek is having an effect on the environment with its introduced rising water levels in a naturally dry area. This area is acid soil and Eastern Star Gas is introducing alkaline treated coal seam gas water, so something will change. **You cannot mix acid with alkaline and not have a reaction.** The effect that this introduced alkaline water will have on the waters of the various naturally occurring alkaline aquifers, where the level of alkalinity is relative to the depth, increases the levels of alkalinity all the way through the complete water chain, thus having an effect on the entire viability of the Namoi River water system, the Barwan River systems and basin, the Darling River systems and hence the Murray Darling Basin affecting social, environment, food production, land use and the hence the individuals and communities that depend on these river and basin systems for their very existence.

There are various studies still being undertaken, ie the Namoi Water Study, and these should be taken into consideration when making any decisions regarding Coal Seam Gas Mining in the Murray Darling Basin.

I have not singled out Eastern Star Gas; however, as they are the only Coal Seam Gas Miner going into production in the whole of the Murray Darling Basin system at this time, the experiences with this company are relevant to your inquiry.

What has been provided here to back up my comments is but a small percentage of a photographic and video collection on the activities of the Coal Seam Gas Miner, Eastern Star Gas. If you require any further photographic or video documentation please do not hesitate to contact me.

For extra background information please refer back to submissions to The Effects of Mining on the Murray Darling Basin of September 2009 (Submissions 77, 77r and the Reply to 77r – Attached).

Yours sincerely,

Anthony J Pickard