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Pat Schultz

PAC Bibblewindi and Dewhurst 19/6/16

There are many problems with coal seam gas mining including aquifer contamination and connectivity, also environmental and social issues. I would like to speak on a major problem with coal seam gas mining- 'produced water'.

Any plant or animal which comes in contact with produced water may die. Many reptile and animal carcasses have been found in the produced water holding ponds. When the evaporation ponds were functioning the spray from the ponds killed the trees downwind of the ponds. In The Pilliga there have been at least 20 spills of produced water. In every case all vegetation that came in contact with produced water has died, and rehabilitation of the sites has been very poor. 12 years later there is little tree growth on the produced water spill sites.

Aquifer contamination with produced water has occurred, and with 850 wells is likely to occur again.

The proposed Dewhurst and Bibblewindi wells will extract approximately 1.3 megaletres that is 1,300,000 litres of produced water per day.

At this time Santos have no way of managing this produced water. Without a reverse osmosis plant the option is to truck this water to Newcastle. This is approximately 30-60 truckloads a day depending on the tanker size. Santos traffic and Transport Assessment plan does not include this truck movement. No further work should occur until a reverse osmosis plant is operational.

According to Stuart Khan & Geena Kordek of the School of Civil Environmental Engineering, University of New South Wales in their report 'Coal Seam Gas: Produced Water and Solids' referring to Santos Narrabri operations-

"The ultimate production plan for the project includes the development of up to 850 wells to produce up to 200 terrajoules/day of gas throughout a project life of 25 years. Over this period of time, around 40 GL (that is 40 billion litres) of (produced) water and 500,000 tonnes of salt would be co-produced and require management and/or disposal."

Santos claim that the salt concentration at Narrabri is 21,000mg per litre. They do not appear to have a plan of management for this quantity of salt. Some contaminants in produced water are arsenic, cadmium, chromium, copper, lead, nickel, zinc, mercury and phenol. The salt will be contaminated with these elements making it expensive to purify and most likely unusable for human consumption.

According to Khan & Kordek "naturally occurring radioactive material occur in some locations, radioisotopes such as radium, thorium and uranium may be present in CSG formations. Low levels of this radioactivity can be transferred into produced water. Generally, the radiation levels in produced water are very low and are not considered to pose a significant risk. "

But they are present, and have contaminated the soil in The Pilliga.

The cumulative impacts must be taken of the 850 wells must be taken into account. The future development takes in residential and agricultural land. If the same level of spills and contamination were to occur in agricultural land a farm would be rendered useless.



Should the reverse osmosis plant be constructed at Leewood the water discharged must be rigorously tested before releasing to local farmers or discharging into the Namoi. All contaminants may not be removed by reverse osmosis. I have submitted an attachment of the water testing paid for and carried out by environment groups. No government agency would test the water, it was left up to concerned community members. This is not good enough. The contaminated sample was collected from the water discharged from the previous reverse osmosis plant.

I would like to see weekly testing to ensure the plant is functioning correctly. The testing should be carried out by a government body, self assessment has proven to be unsuccessful. The results must be publicised. Water users have a right to know if their water is being contaminated.

The treated produced water will be released into the Namoi River. The Namoi flows into the Murray Darling river system. The quantity of water being released over the life of the coal seam gas mine will be approximately 40 billion litres. This will flow all the way to all the way to Meningie in South Australia. It could contaminate a lot of agricultural lands, and town water supplies.

I do not believe that the issue of produced water has been adequately addressed by Santos or The Planning and Assessment Commission.





Pilgga Forest spill site

14/APR/2012





Table 1. This table is comparison of two water samples collected from Bohena Creek. The first sample was uncontaminated water collected from Bohena Creek above X Line Rd. The second was collected directly below the reverse osmosis plant. It was contaminated water being discharged into Bohena Creek.

(for those with limited scientific understanding just compare the increase in the last column.)

Compound	Units	Un-contaminated Sample	Contaminated Sample	Number of times higher in contaminated sample
pH Value	pH Units	6.64	8.67	1.3
Electrical conductivity @25 degrees	uS/cm	29	2930	101
TDS	mg/L	19	1900	100
Total hardness as CaCO3	mg/L	<1	299	299
Total alkalinity as CaCO3	mg/L	11	1340	121.8
Chloride	mg/L	2	383	191.5
Calcium	mg/L	<1	67	1
Magnesium	mg/L	<1	32	32
Sodium	mg/L	3	792	264
Potassium	mg/L	3	30	10
Arsenic	mg/L	<0.001	0.021	21
Cadmium	mg/L	<0.0001	0.0004	4
Chromium	mg/L	0.005	0.187	37.4
Copper	mg/L	0.007	0.191	27.3
Lead	mg/L	0.002	0.05	25
Nickel	mg/L	0.001	0.171	171
Zinc	mg/L	0.006	0.094	15.7
Mercury	mg/L	<0.0001	0.0008	8
Fluoride	mg/L	<0.1	1.9	19
Phenol	ug/L	<1	12.5	12.5
2 Methylphenol	ug/L	<1	6.9	6.9
3- & 4 - Methylphenol	ug/L	<2	8.9	4.5
TPH C10-C36 Fraction Sum	ug/L	330	3700	11.2
TRH C10-C40 Fraction Sum	ug/L	190	3770	19.8
Phenol d6	%	17.9	43	2.4
2-Chlorophenol D4	%	36.2	43.6	1.2

Water contamination table and timeline from The Wilderness society booklet The Truth Spills Out.

[http://www.stoppilligacoalseamgas.com.au/wp-content/uploads/2011/12/The Truth Spills Out Final May 2012 without appendices.pdf](http://www.stoppilligacoalseamgas.com.au/wp-content/uploads/2011/12/The_Truth_Spills_Out_Final_May_2012_without_appendices.pdf)





## Soil contamination table from The Wilderness Society publication The Truth Spills Out

Professor Joe Bidwell Professor of Environmental Science and Management at University of Newcastle verified the soil data and described the results as follows:

"Analyses were conducted on three soil samples collected adjacent to the facility and two samples collected from a reference location. Soil samples from the suspected spill zone had higher average pH, electrical conductivity (70 times higher), and levels of sodium (39 times higher), chloride (90 times higher), sulphate, calcium, magnesium, and potassium than reference samples. There were no clear differences in levels of total metals, phenolic compounds, PAHs, total petroleum hydrocarbons or BTEX compounds in soil samples from the two locations".

Table 2. Comparison of contaminated and uncontaminated soil sample results

(for those with limited scientific understanding just compare the increase in the last column.)

Compound	Units	Un-contaminated Sample	Contaminated Sample	Number of times higher in contaminated sample
pH	pH Unit	5.3	9.9	1.9
Electrical Conductivity	uS/cm	11	1690	153.6
Sulphate as SO <sub>4</sub> 2-	mg/kg	6	20.5	3.4
Chloride	mg/kg	<10	850	85
Calcium	mg/kg	<10	80	8
Magnesium	mg/kg	<10	60	6
Sodium	mg/kg	<10	3510	351
Nickel	mg/kg	2	4	2
Zinc	mg/kg	<5	5	>1

<http://www.stoppilligacoalseamgas.com.au/wp-content/uploads/2011/12/The Truth Spills Out Final May 2012 without appendices.pdf>



Left untreated, the produced water is considered too saline to be used beneficially. The salinity of the produced water ranges between 7,000–15,000  $\mu\text{S}/\text{cm}$ . The pH ranges from neutral to alkaline (7–8.5). Low levels of heavy metals are typically present. The produced water is either used for future drilling operations or is transported to the Rosalind Park Gas plant for treatment and storage in a holding dam. The treated water is then sent to a licensed water treatment and recycling facility. At the recycling facility, the treated produced water is mixed with other treated wastewater and may be used beneficially (AGL, 2013c).

Table 3 Operations and produced water from AGLs Camden Gas

Operator	AGL Gas Production (Camden) Pty Ltd.
Location	Sydney basin, NSW.
Status	Production began in 2001 [1]
Production level	Approximately 5% of NSW's gas needs [1].
Number of wells	144 (89 producing gas) [1].
Associated Infrastructure	Rosalind Park Gas Plant for water treatment and storage [1].
<b>Produced water</b>	
Volume	< 4.8 ML Financial Year 2011-12 [1] Northern expansion likely to produce 'a few' ML/year [3].
Flow rate	Approximately 0.01 ML/day (total for all production wells based on yearly volume) [1].
Conductivity	7,000–15,000 $\mu\text{S}/\text{cm}$ [1]
Total Dissolved Solids	Not stated
pH	7–8.5 [1]
Impurities	Low levels of heavy metals [1].
Reuse	Subsequent drilling operations [2].
Storage	At well, farm water tanks or lined drill pits [2]. Transported to Rosalind Park Gas plant for treatment and storage in a holding dam [1].
Identified risks	Overtopping [2].
Risk mitigation	Bundling around drill pits [2]. Monitoring of water level and quality [2].
Treatment	On site at Rosalind Park Gas plant [1, 2]. Treatment method not stated.
Disposal	Treated water is sent to a licensed water treatment and recycling facility [1].
Beneficial use	Potentially from the recycling facility [1].
<b>Pollution incidents (related to produced water)</b>	
17 May 2011	Foam and produced water dispersed within 40 m of a well when a workover crew failed to adjust a fully open degasser choke. No significant harm to the environment occurred. The Office of Environment and Heritage issued a warning letter [4].
<b>Pollution penalties (related to produced water)</b>	
	None identified.

[1] AGL (2013c); [2] AGL (2012b); [3] AECOM (2010); [4] Bloem (2011).

### Santos' Narrabri CSG Project

The Narrabri CSG Project produces gas from pilot appraisal at the Bibblewindi, Bohena and Dewhurst CSG pilot operations in the Pilliga Forrest (Gunnedah Basin). Most of this gas is currently used to generate electricity at the Wilga Park Power Station. Approval for this project was awarded to Eastern Star Gas in December 2008. However, since November 2011, the Narrabri CSG Project has been managed and operated by Santos Ltd. At that time, Santos withdrew the Eastern Star Gas approval and sought a renewed approval for the project appraisal.



In 2009, the Narrabri CSG Project included three key production assets, namely the Bibblewindi CSG Pilot (12 wells), the Bohena CSG Pilot (three wells) and a Bibblewindi lateral pilot (six wells). At that time, all water and gas produced from the three pilots was gathered for storage in lined evaporation ponds or was treated, reused and/or stored (Eastern Star Gas, 2009). At that time, Eastern Star gas had completed a pilot water treatment project at Bibblewindi, indicating that reverse osmosis treatment was capable of providing the project with significant reductions in saline water storage requirements. With treatment recoveries exceeding 70% and treated water TDS below 250 mg/L, it was proposed to expand the treatment capacity to permit the extension Narrabri CSG Utilisation Project with the disposal of up to 1 ML/day treated produced water into Bohena Creek (Eastern Star Gas, 2009). Reverse osmosis concentrates would be transferred to lined holding ponds. Approvals to extend the discharge of treated water to Bohena Creek were granted in 2010 and further in 2011 (Santos Limited, 2012a).

In June 2011, approximately 10,000 litres of untreated saline water leaked from a pipe near the reverse osmosis plant at Bibblewindi. Operations at the Bibblewindi Water Management Facility were subsequently suspended. Santos is currently undertaking a \$20 million rehabilitation of the Bibblewindi Water Management Facility site. The plant was decommissioned and removed from the site in December 2012. The three storage ponds located at the Bibblewindi facility were also found to be unsuitable for long term use and Santos has commenced their removal and subsequent rehabilitation of the site. A number of other storage ponds in the Pilliga, including at Bohena have already been removed and site rehabilitation initiated.

Santos is now constructing a new reverse osmosis water management facility adjacent to the Pilliga on the Santos-owned property 'Leewood' (RPS Australia East, 2012). The Leewood Water Management Facility includes a 300 ML pond for storage of untreated produced water and a second 300 ML pond for storage of concentrated reverse osmosis brine (Santos Limited, 2012a). A smaller pond will store the desalinated produced water prior to discharge to surface water or beneficial use, such as irrigation. Santos has stated that it is not feasible to hold the water in tanks because hundreds of tanks would be need to be erected (RPS Australia East, 2012). The first stage of the Leewood Water Management Facility will involve transferring about 150 ML of brine that is currently stored in the Bibblewindi ponds (RPS Australia East, 2012).

During 2013, Santos gained approval to reinstate the CSG pilot operations at Bibblewindi, along with the construction of additional pilot wells, and operate the expanded pilot for up to three years (RPS, 2013). At each well, the produced water will be pumped through the water gathering system to Bibblewindi Water Transfer Facility via the existing flow line. The Bibblewindi Water Transfer Tank located at the Bibblewindi Water Transfer Facility will be used to provide a short buffer (up to 24 hours) prior to the produced water being pumped to the Leewood Produced Water Facility via the Leewood Water Pipeline. Once at the Leewood Produced Water Facility, produced water will be stored in one of the 300 ML ponds (RPS, 2013).

The ultimate production plan for the project includes the development of up to 850 wells to produce up to 200 terrajoules/day of gas throughout a project life of 25 years. Over this period of time, around 40 GL water and 500,000 tonnes of salt would be co-produced and require management and/or disposal.





**Table 4 Operations and produced water from Santos' Narrabri CSG Project**

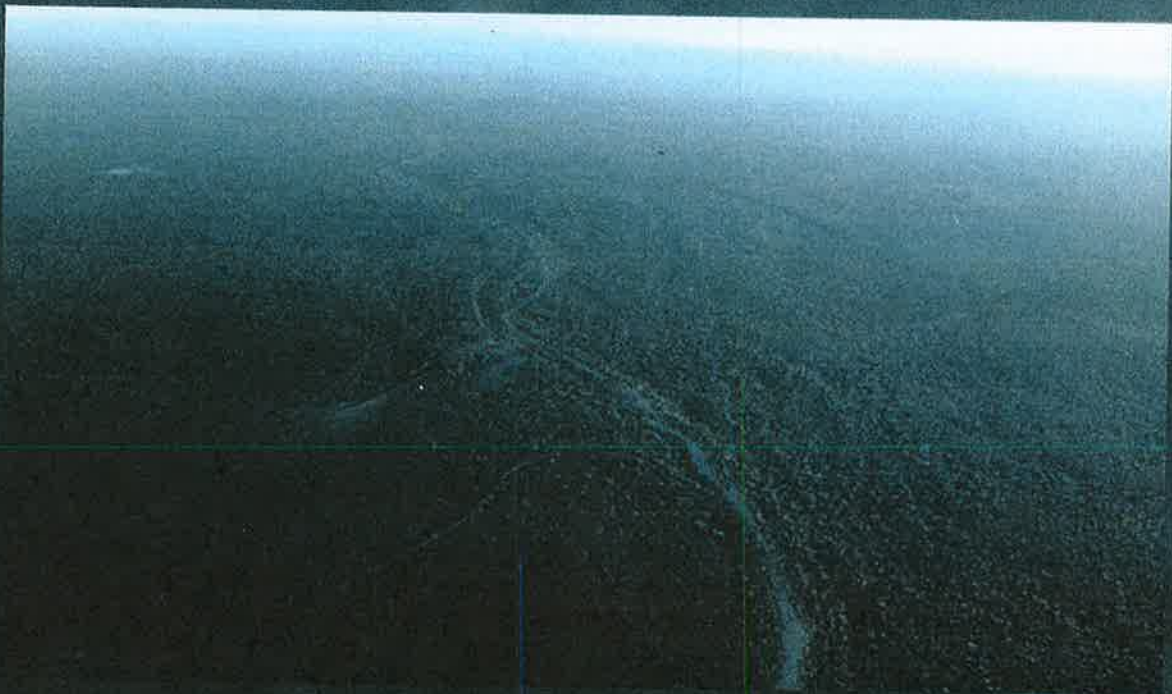
Operator	Santos Ltd (from 17 November 2011). Former operator Eastern Star Gas (ESG) Ltd [2].
Location	Gunnedah basin, NSW.
Status	Pilot appraisal began in 2008. Operations shutdown in Dec 2011. Recommencement expected in 2014.
Production level	The full production level of the Narrabri CSG Project is 200 TJ/day.
Number of wells	Appraisal: 12 pilot wells expected within PEL 238 [2]. Will also re-enter three existing wells, drilled by ESG, to allow lateral drilling. Production: approx. 850 wells (or 425 well sets) will be drilled.
Associated Infrastructure	2009–2011: Bibblewindi Water Management Facility located in the Pilliga, including 3 x ponds and water treatment plant [1]. Under construction 2013: Leewood Water Management Facility located adjacent to the Pilliga, including 2 x 300 ML produced water and brine ponds. Proposed plans for a reverse osmosis plant, brine concentrator, and brine crystalliser [1].
Produced water	
Flow rate	1500 ML/year based on a 25-year average (higher flows in early production). Predicted for Leewood [1]: Year 0–1 = 0.7ML/day; Year 2–3 = 1.3 ML/day.
Conductivity	Not stated
Total Dissolved Solids	14,500 - 31,000 mg/L [1; 6].
pH	7 - 8.5 [1].
Impurities	Heavy metals [1], boron, fluoride.
Reuse	Some onsite reuse for CSG operations (dust suppression, drilling makeup water)
Storage	Under construction: 2 x 300 ML produced water and brine ponds [1; 6].
Identified risks	Overtopping [1]. (note: NSW Dam Safety Committee endorsement of design).
Risk mitigation	Tank: Earthen bund (geosynthetic clay liner) of 110% volume (55 ML). Ponds: Earthen embankment capped with gravel. Lined with a polyethylene (plastic) geomembrane liner, underlain by a leak detection system, underlain by a secondary liner of smooth clayey subgrade [1].
Treatment	Planned for 2015 but not yet approved, reverse osmosis desalination and brine concentration and crystallisation [1].
Disposal	Disposal to surface waters [6].
Beneficial use	Possible future use primarily for irrigation, and lesser for dust suppression, drilling and emergency firefighting [6].
Pollution incidents (related to produced water)	
2009–early 2011	Multiple leaks and spills at the Bibblewindi Water Management Facility (see details from page 54) [3].
Sometime in 2010	An unknown volume of produced water overtopped a tank at the Bibblewindi Water Management Facility and spilled into the Pilliga and an ephemeral watercourse that was flowing at the time [4].
25 June 2011	A water transfer pipeline cap burst causing water to spill within the besser block wall surrounding the Bibblewindi Water Management Facility. An estimated 10 kL of produced water with TDS 16,000 mg/L spilled over about 420 m leaving a black residue. About 3 kL was recovered. Soil testing detected elevated levels of salinity and sodium and some vegetative dieback occurred. Testing concluded that the black residue did not represent a health risk according to sensitive land use criteria. Operations at the Bibblewindi Water Management Facility were suspended following the incident [4].
Pollution Penalties (related to produced water)	
March and November 2010	Produced water from Bibblewindi Water Management Facility was discharged into Bohena Creek. The EPA fined Eastern Star Gas 2 x \$1,500 for water pollution under section 120 of the <i>Protection of Environment Operations Act 1997</i> (NSW) [5].
December 2011	Formal warning to Santos for water pollution from a discharge event containing high levels of ammonia [5].

[1] RPS Australia East (2012); [2] RPS Australia East (2013); [3] Santos Limited (2012b); [4] Golder Associates (2012); [5] NSW Environment & Heritage (2012); [6] Santos Limited (2012a).



# **The Plundering of Pilliga & Leard Forests and the Surrounding Farmlands**

**Coal & Coal Seam Gas Mining**



**Pat Schultz**



I wrote this booklet to inform people about these issues

## Acknowledgements

Thank you to the countless people who have helped me put this book together. To the members of Armidale Action on Coal Seam Gas, National Parks Association (Armidale), Frontline Action on Coal (FLAC) and the Wilderness Society. I would also like to thank my husband Allen for the coffees and meals he made for me while I wrote, and for suggestions in simplifying language.

Thanks to Tony Pickard a farmer near the Pilliga Forest, for imparting an enormous amount of knowledge on coal seam gas mining in The Pilliga and surrounding farmlands. Thank you to Murray Drechsler (Muzz), long time protector of the environment and stalwart at Leard Forest FLAC camp. We learned so much about mining together, and ran the tag-along-tours of Pilliga and Leard Forests. We will continue to do so.

Thanks to Cliff Wallace, a farmer and the original lone protester at Maules Creek. Recognising the reluctance to allow him to begin irrigation farming close to the proposed mines, he began to protest against the destruction of Leard Forest long before the rest of us knew of the problem. Thank you for welcoming me to your home, and explaining the history of your water bores and the projected impacts to the ground water in the vicinity of the Maules Creek mines.

Sincere thanks to Phil Sparks for allowing me to use the information in his Off-sets Power Point presentation to complete the Leard section of the book, and for checking for accuracy.

Ros Druce for sharing her concerns about community impacts, and her photos.

Finally to Frances Letters for making this book readable with her excellent editing.

Pat Schultz  
Date 12/6/2014

Draft copy

Not for  
publication at  
this time.

It is still being checked  
by a solicitor + editor

Thank you  
Pat Salve



Murray Drechsler (Muzz)



## Foreword

I first met Pat in the early 1990's when we were both working with people with intellectual disabilities in Armidale. She was a tireless supporter of the rights of those people. And as a union rep she was a fighter for the employees of the organisation.

Pat is a passionate, committed person. This is no better illustrated than with her commitment to remove mining companies from sensitive environments of the Pilliga and Leard Forests in North West NSW.

Pat is a lover of the natural environment and an active bush walker. She is determined to save sensitive habitats from the bulldozer.

On several occasions Pat has stood as a Greens candidate for parliament for the Greens local, state and Federal governments.

Pat is a high energy action person and mobiliser of protest support.

This book gives simply understood and valuable information on the mining and CSG activities in this area of NW NSW from the anti-mining perspective. It also provides valuable general tourist information for that area.

Tony Sevil  
Artist  
Uralla NSW



*Pat Schultz*



## Self-guided Pilliga and Leard Forest Tours

### **\*THREE DAY TOUR \*NOMADS TOUR \*ONE DAY TOUR**

The aim of these tours is to educate, and to highlight the dire impacts of coal seam gas mining and coal mining in our country.

Tag-along-tours will continue. Contact Pat or Muzz for details.

#### **Contacts:**

Pat Schultz 0428 725 852 email [pat.schultz@bigpond.com](mailto:pat.schultz@bigpond.com)

Pilliga Protection Camp 0458 642 495. Phone prior to leaving home.

Leard FLAC Camp Muzz 0418 754 869 Cliff 0467 972 735.

**Refuel in Coonabarabran and Narrabri. In Baradine fuel is only available during business hours. There is no fuel available in Pilliga township.**

Always carry plenty of drinking water when touring in The Pilliga

In winter be prepared for cold frosty mornings

Pack warm clothing /cool clothing / wet weather gear.

## Three Day Discovery Tour

### Day 1

8.30am Leave Pilliga township.

Bring packed lunch, snacks, drinks, plenty of water, hat and sunscreen.

### Day 2

Check out Gwagebar. Barnaby Joyce, MP for New England, has his 'weekender' near here.

See [Map A – Touristic Pilliga](#). Visit Pilliga Forest Discovery Centre at Baradine, collect maps and leaflets.

11.30am Leave Baradine and travel 33 km on unsealed road 50 minutes to Dandry Gorge.

12.30pm Lunch and walk at Sculptures in the Scrub at Dandry Gorge in The Pilliga Forest.

3.00pm Leave Dandry Gorge for the Sandstone Caves, distance 90km and 1¼ hr travel time

See [Map B – Pilliga gas sites](#). Camp at Pilliga Pottery or Pilliga Protection Camp.

Pilliga Pottery offers meals and accommodation or camping. The Pilliga Protection Camp moves from time to time as required, and may be closed. Camp phone: 0458 642 495.

You may be driving up to 320km by the end of the day!!

### Day 3

8.30am Depart. Bring lunch, snacks, drinks, plenty of water, hat & sunscreen.

If camp members are available as tour guides, tour the coal seam gas fields, see drilling rig and production wells

See [Map B – Pilliga gas sites](#). Visit spill at Bohena 7 on Newell Hwy (see [Bohena 7 – Spill site with tree kill and contamination](#))

See [Map B – Pilliga gas sites](#). Visit Leewood on Newell Hwy (see [Leewood](#)).

**Refuel at Shell service station on Newell Highway.** Have your lunch here.

See [Map C – Leard Forest, FLAC](#). Visit Front-line Action on Coal (FLAC) camp at Cliff Wallace's farm: Wando, Black Mountain Creek Road, Maules Creek.

Tour the Leard Forest, discover views of Whitehaven Coal Mine with Muzz or an activist.

Leard FLAC Camp: Muzz 0418 754 869 Cliff 0467 972 735.

Camp at Wando, bring your own food and camping gear. Communal dinner, or cook your own.

## Nomads Discovery Tour

Camp at Pilliga Hot Bore Baths for some time prior to the tour. A pleasant place to relax, with free camping.

### Day 1

Camp at Pilliga Hot Bore Baths or stay at Pilliga Hotel.

### Day 2

8.30am Leave Pilliga township.

Bring packed lunch, snacks, drinks, plenty of water, hat and sunscreen.

Check out Gwagebar. Barnaby Joyce, MP for New England, has his 'weekender' near here.

See [Map A – Southern Pilliga](#). Visit Pilliga Forest Discovery Centre at Baradine, collect maps and leaflets.

11.30am Leave Baradine and travel 33 km on unsealed road 50 minutes to Dandry Gorge.

12.30pm Lunch and walk at Sculptures in the Scrub at Dandry Gorge in The Pilliga Forest.

Consider camping here for one night.

### Day 3

See [Map A – Touristic Pilliga](#). Visit the Salt Caves and Fire Tower (see [The Fire Tower, Salt Caves and the Aloes](#))

See [Map B – Pilliga gas sites](#). Leave for the Sandstone Caves, distance approx 90km--1¼ hr travel time.

See [Map B – Pilliga gas sites](#). Camp at Pilliga Pottery or Pilliga Protection Camp (see [Pilliga Pottery, Coonabarabran](#) and [Pilliga Protection Camp, Moveable](#))

Pilliga Pottery offers meals and accommodation or camping. The Pilliga Protection Camp moves from time to time as required, and may be closed. Camp phone: 0458 642 495.

### Day 4

8:30am Depart. Bring lunch, snacks, drinks, plenty of water, hat & sunscreen.

If camp members are available as tour guides, tour the coal seam gas fields, see drilling rig and production wells.

See [Map B – Pilliga gas sites](#). Visit spill at Bohena 7 on Newell Hwy.

See [Map B – Pilliga gas sites](#). Visit Leewood on Newell Hwy (see [Leewood](#)).

Refuel at Shell service station on Newell Highway. Consider having your lunch here.

See map C. Visit Front-line Action on Coal (FLAC) camp at Cliff Wallace's farm, Wando, Black Mountain Creek Road, Maules Creek.

Tour the Leard Forest, discover views of Whitehaven Coal Mine with Muzz or an activist.

Leard FLAC Camp: Muzz 0418 754 869 Cliff 0467 972 735.

Camp at Wando, bring your own food and camping gear. Communal dinner, or cook your own.

You may camp at both Leard and Pilliga camps as long as you wish. There is the option to participate in actions to stop coal and coal seam gas mining.

Visit the many tourist attractions and beautiful places in the region.

## One Day Discovery Tour

Bring lunch, snacks, drinks, plenty of water, hat & sunscreen.

See [Map C – Leard Forest, FLAC](#)

Visit Front-line Action on Coal (FLAC) camp at Cliff Wallace's farm, Wando, Black Mountain Creek Road, Maules Creek. If possible stay overnight at Leard Camp prior to the tour.

Tour the Leard Forest, discover views of Whitehaven Coal Mine with Muzz or an activist.

Leard FLAC Camp: Muzz 0418 754 869 Cliff 0467 972 735.

### **Refuel at Shell service station on Newell Highway.**

Leave the Shell service station on Newell Highway. Travel 22km on Newell Highway towards Coonabarabran. Turn left into Old Mill Rd, to Santos property Leewood

See [Map B – Pilliga gas sites](#). Visit Leewood on Newell Hwy (see [Leewood](#))

See [Map B – Pilliga gas sites](#). Visit spill at Bohena 7 on Newell Hwy (see [Bohena 7 – Spill site with tree kill and contamination](#))

See [Map B – Pilliga gas sites](#). Visit Pilliga Protection Camp if possible (see [Pilliga Protection Camp, Moveable](#))

The Pilliga Protection Camp moves from time to time as required, and may be closed.

Camp phone: 0458 642 495 (Phone to check camp location.)

See [Map B – Pilliga gas sites](#). If possible, and if camp members are available, tour the coal seam gas fields, see drilling rig and production wells.

See [Map A – Touristic Pilliga](#). Visit Fire Tower and Salt Caves (see [The Fire Tower, Salt Caves and the Aloes](#))

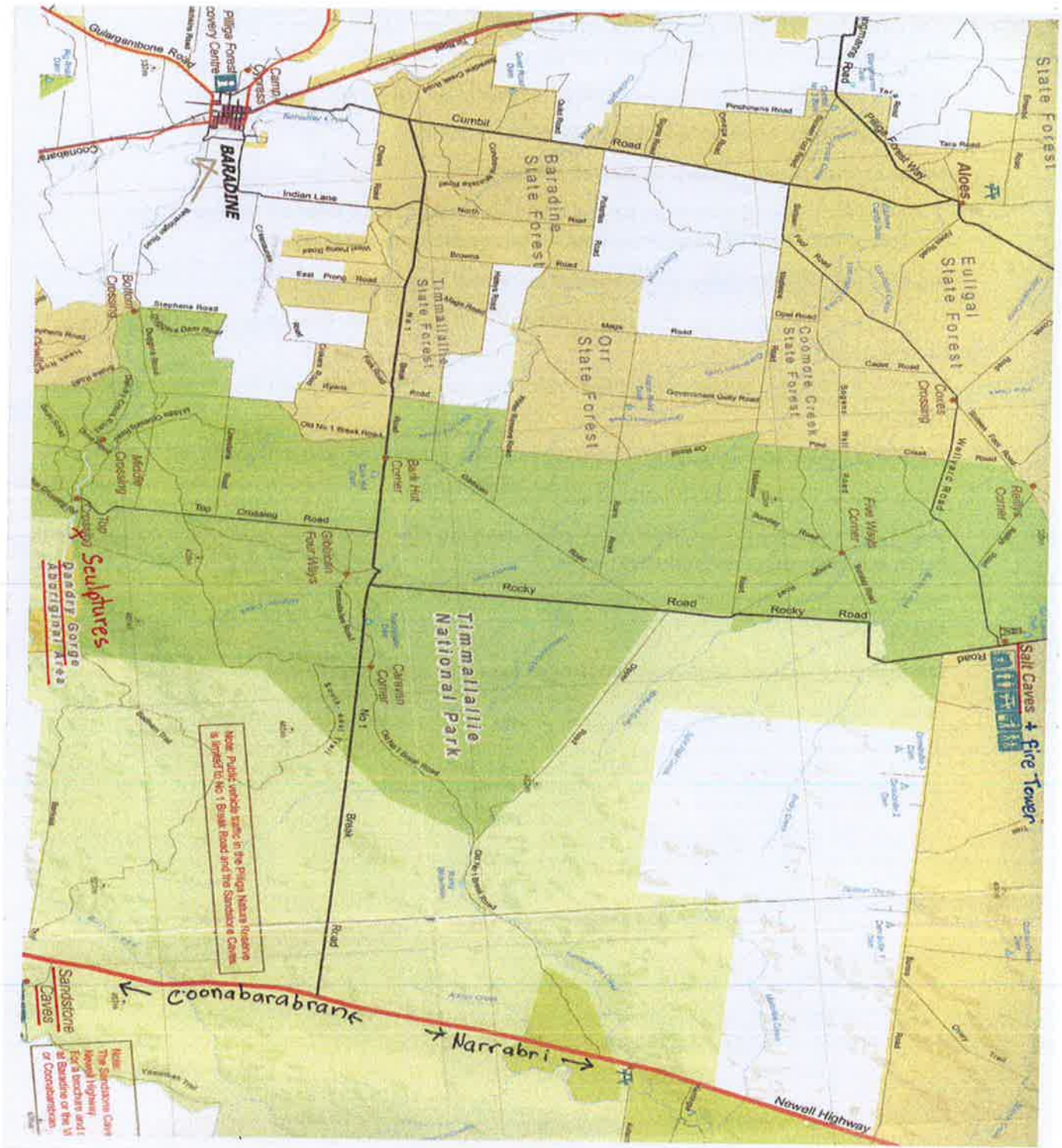
See [Map B – Pilliga gas sites](#). Visit Sandstone Caves (see [Sandstone Caves](#))

Depart via Coonabarabran



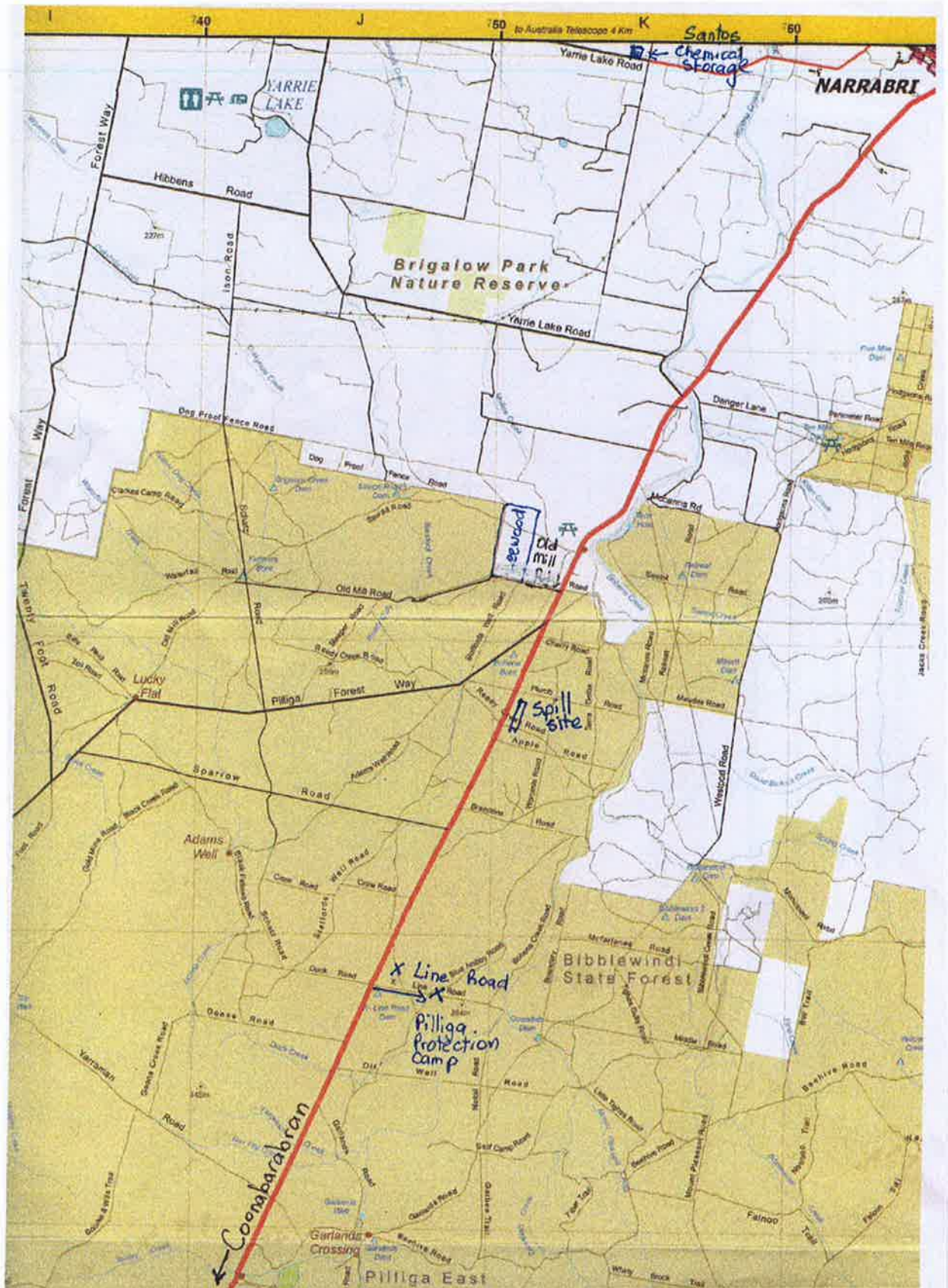
# Maps

## Map A – Touristic Pilliga



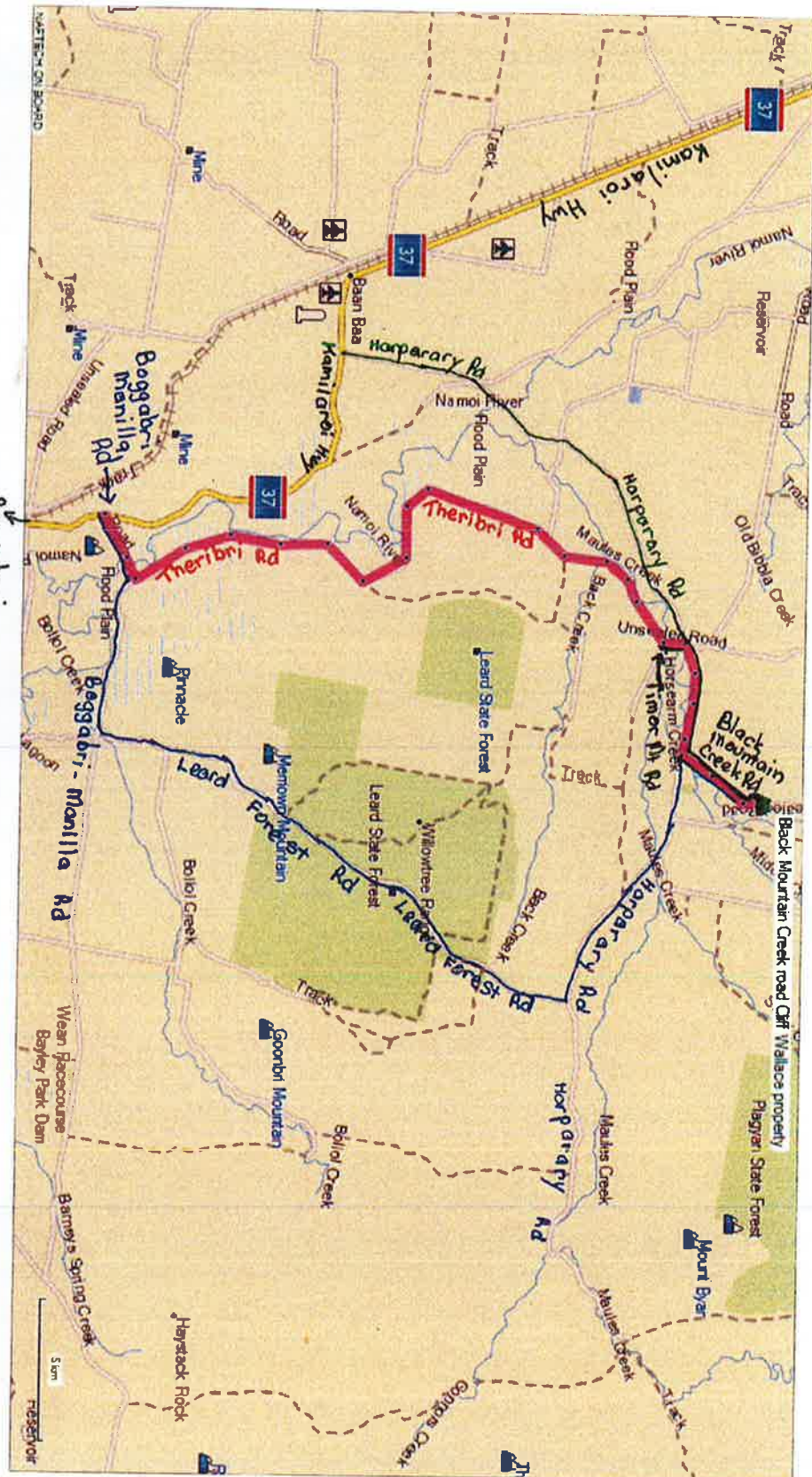


## Map B - Pilliga gas sites





## Map C - Leard Forest, FLAC



### Directions to FLAC camp on Cliff Wallace's farm 5 Km down Black Mountain Creek Road, Maules Creek.

Three ways to get to the Front Line Action on Coal (FLAC) camp from Gunnedah or Narrabri on the Kamilaroi Hwy. Check directions on Whereis or use GPS.

1. Turn off at the Manilla/Boggabri Road (sign posted Manilla), go via Theribri Road, Maules Creek, The shortest, fastest way from Gunnedah.
2. Turn into Harparary Rd, Maules Creek (sign posted Harparary Rd) about 3km from Baan Baa towards Gunnedah. Least dirt road, not much longer than Theribri Rd from Gunnedah. Shortest way from Narrabri.
3. Turn off at the Manilla/Boggabri Road (sign posted Manilla). Go via Leard Forest Rd, Maules Creek. A little slower, more dirt road, but travel through Leard Forest and see the mines as you travel to the Front Line Action on Coal (FLAC) camp.

# The Pilliga

## Cultural activities

### Pilliga Bore Baths



Stay overnight in Pilliga, and soak away your aches and pains in the Pilliga Bore Baths. The constant water temperature of 37 degrees is very relaxing, and the therapeutic value of the mineral-rich water has long been recognized.

The waters of Pilliga Bore Baths are threatened by coal seam gas mining, as are all the aquifers. Enjoy the Wetlands walk from the bore baths to the town. Lots of birds and kangaroos. Have dinner at Pilliga Pub.

### Gwabegar

Gwabegar is pronounced Wobby-gar

Directions from Pilliga to Barradine via Gwabegar

Distance: 70km Time: 50min (approx) mostly unsealed road

1. From Pilliga Bore Baths turn left onto Pilliga-Narrabri Rd, Pilliga 0.4km
2. Turn left onto Pilliga-Gwabegar Rd, signposted Barradine, 31.6km. Stop and check out Gwabegar.
3. Continue along Gwabegar-Baradine Rd, Gwabegar 36.4km
4. Continue along Railway St, Baradine 0.2km
5. Continue along Castlereagh St, Baradine 0.2km
6. Turn right onto Darling St, Baradine 0.6km
7. Turn right onto Wellington St, Baradine 0.1km
8. Arrive at Forest Discovery Centre, 50 Wellington St, Baradine, NSW 2396

Barnaby Joyce, MP for New England, purchased land close to the township of Gwabegar, 30km from Pilliga on the Baradine Road. His campaign manager in the federal election was ex-deputy Prime Minister John Anderson, who was formerly the CEO of Eastern Star Gas (ESG). ESG performed the exploration mining in the Pilliga. When questioned on owning this land, Barnaby first said it was his "weekender", he then said he planned to grow crops. It is very poor farmland, suitable only for goats. Check it out on your way to Barradine. Some suspicious people may even suspect the coal seam gas underground attracted Barnaby to Gwabegar!!!

### The Pilliga Forest Discovery Centre, Baradine

Phone: 02 6843 4011

Open 9am-5pm weekdays; 10am-5pm weekends.

50-58 Wellington Street, Baradine NSW 2396

Discover the hidden secrets, history and Aboriginal cultural heritage of the Pilliga Forest. Excellent displays and gift shop. Get your Pilliga maps, and leaflets about Sculptures in the Scrub, The Salt Caves and Fire Tower, and the Sandstone Caves. Talk to the rangers about directions and road conditions (unsealed roads may be impassable after rain).





## Sculptures in the Scrub

Dandry Gorge, Top Crossing Rd, Timmallallie National Park



These five impressive artworks are made from bronze, stone and stainless steel, with the largest creation standing at 3.5 metres. The sculptures were funded by the Gawambaraay Pilliga Co-management Committee. The sculptures have been strategically placed at Dandry Gorge to provide an opportunity for visitors to view them against the beautiful vista of the Dandry Gorge and the ruggedness of the Pilliga scrub. Each sculpture is the result of an artist collaborating with local Aboriginal Elders and young people



on a piece that tells a story of local Aboriginal history and culture. A well formed 3km circuit track takes you to the sculptures and through the gorge.

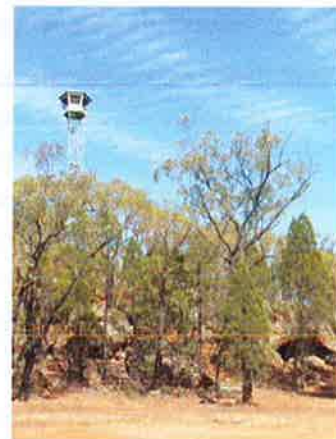
Facilities include walking tracks, picnic area, and free gas BBQs, toilets and camping area. Good place to have a picnic lunch or to camp. Water tanks onsite, but they may be empty.

## The Fire Tower, Salt Caves and the Aloes

The Aloes is a lovely picnic area on the site of an historic homestead that contains several relics including the graves of early pioneers. It is one of a number of areas within the Pilliga Forest that has koala colonies, so if keep your eyes peeled you may be lucky enough to spot a few. Adjacent to the Aloes is a wide, sandy creek in which native trees abound.

According to legend, the Salt Caves were once 30 metres deep, and salt hung in columns like stalactites from the roof. Animals were often seen licking the salt and local Aboriginal and pioneer women collected it to cure their meat.

A new fire observation tower is situated on top of the caves, which is used by the NSW National Parks and Wildlife Service to monitor conditions. It is possible to climb this tower, where you will be rewarded with spectacular views over the Pilliga Forest. There is a picnic area with free gas barbecues, toilets and several picnic shelters. A gentle 1km stroll takes you to the Salt Caves Dam which, when full of water, attracts many species of birds and wildlife.



*The Fire Tower*

## Sandstone Caves



From the Newell Highway the caves are signposted "Yaminbah Track". To protect the caves they are **not** signposted "Sandstone Caves".

From Coonabarabran, travel approximately 35km on the Newell Highway. Turn right onto the Yaminbah Track (not well signed).

From Narrabri, travel 8 km from the No 1 Break Road (well signed) on the Newell Highway. Left turn onto the Yaminbah Track (not well signed).

The Sandstone Caves are a series of cathedral-type caves that have formed over thousands of years through the weathering of the fragile sandstone.



The Sandstone Caves are a special place for the Gamilaraay people and a good place to experience Aboriginal culture in the Pilliga Nature Reserve. Please respect the site and the wishes of the Aboriginal community in the care and management of the place. All plants, animals and rock features in the Pilliga Nature Reserve are protected.



A 1.7km medium-grade walk begins at the car park with a sign welcoming you to Gamilaraay country, and takes you through a picturesque part of the forest to the impressive sandstone hills. The numerous caves along the walk vary in size and colour, and some contain Aboriginal rock engravings.

## Gas Fields

See [Map B – Pilliga gas sites](#). Camp at Pilliga Pottery or Pilliga Protection Camp

Camp phone: 0458 642 495

If camp members are available as tour guides, tour the coal seam gas fields, see drilling rig and production wells.

Note that the camp moves from time to time, and may be closed, so phone ahead to check location. Visitors are very welcome. Meet with activists. Communal dinner, or cook your own. Campsite has long-drop toilet, shower, kitchen, drinking water (though please fill your own drinking water containers prior to arrival) and usually communal meals in the evening. Camping is free, and campers are encouraged to help with the running of the camp and campaign activities.

If possible tour the coal seam gas fields, see drilling rig and production wells with camp members as guides at the Pilliga Protection Camp.

## Bohena 7 – Spill site with tree kill and contamination

See [Map B – Pilliga gas sites](#)

Driving towards Narrabri. From X-Line Road (well signed), on the Newell Highway drive 11km. Stop at Plumb Rd, just past the 30km to Narrabri road sign (N30) (note there is not a car park or lay-by: just pull over). Visit Bohena 7. There is a serious spill and tree kill site on the right hand side (east) through the road-side trees. The capped well at Bohena 7 will most likely be drilled as a production well, as part of the 850 proposed wells for the Pilliga gas fields.



*Bohena 7 unlined pond, June 2013*

Looking through the fence you will see the seriously polluted evaporation pond area which has been drained and filled in. This was an unlined 'produced water' pond. The well site is a poorly constructed rehabilitation area with contaminated soil still remaining. On this site, the pond walls failed and the 'produced water', containing pollutants, spilled over the forest floor killing trees and undergrowth over an area approximately 500x200m. This spill was never reported to the Department of Trade, Investment and Regional Development (DTIRIS). Santos and the NSW government deny its existence.

In an attempt to rehabilitate the site, Santos have spread gypsum, knocked down the dead trees, spread mulch and perhaps planted trees. They have installed water tanks and irrigation hoses and

sprinklers. Santos are watering the site, hoping to flush the saline water and contaminants from the soil to the Namoi River or down into the Great Artesian Basin, which is replenished from this area. There is a risk of serious contamination of the Great Artesian Basin and the river systems.

## Leewood

See [Map B – Pilliga gas sites](#)

The Leewood property is land privately owned by Santos, approximately 24km from Narrabri on the Newell Highway. Santos intends to use it to build a new gas recovery, water treatment and water distribution centre for the coal seam gas mining in the Pilliga State Forest.

At the time of writing, Santos has a development application before the Narrabri Council to put the water treatment facility there. Santos cannot start the production phase of coal seam gas without this water treatment facility. There are parallel pipes for gas and 'produced water' from the production wells at Bibblewindi in the Pilliga to the Leewood facility. From the Leewood facility the gas line then goes to Wilga Park electricity power station. It will most likely connect with northern lines going to Abbott Point, Queensland, or to Newcastle for export.

On the western side of Leewood there is a pile of earth. This soil was removed from the Bohena 2 and Bohena 4 sites, then dumped there. It is contaminated, and Santos plan to put an administration building on top of it. The ponds are at the back of Leewood, where environmentalists cannot collect water samples.



*Aerial view of the produced water holding pond at Leewood*

Santos security people usually film and intimidate anyone viewing the site. It is legal to view the site through the fence.

### Refuel at Shell service station on Newell Highway

Consider having your packed lunch here or buy lunch at the Shell Roadhouse.

See [Map C – Leard Forest, FLAC](#). Visit the FLAC camp at Cliff Wallace's farm Wando, Black Mountain Creek Road, Maules Creek. Tour the Leard Forest, and discover views of the Whitehaven Coal Mine with Muzz or an activist.

Camp at Wando, bring your own food and camping gear. Meet the activists. Communal dinner, or cook your own.

Leard FLAC Camp: Muzz 0418 754 869 Cliff 0467 972 735

## Boggabri area

### Dripping Rock

Dripping Rock is a waterfall significantly more impressive than its name indicates. Surrounded by lush forests of Melaleucas, a short stroll from the carpark (follow the track markers) reveals a large rock pool at the base of the Dripping Rock cascades. This is an idyllic spot for a picnic or just to sit and listen to the hypnotic splash of water, melodious birdsong and wind in the trees. Dripping Rock can be difficult to find, so please pick up a map from the Visitor Information Centre or Boggabri Museum.



Reached by a 4WD track with many creek crossings.

### Drovers' Camp, Boggabri

Annual event around April 24th

Boggabri Showground, Kamilaroi Highway, Boggabri.

This two day event includes a big campfire, camp oven cooking, shearing demonstrations, tours of the district, bush poets, craft stalls, whip cracking, antique machinery display, bush band, plus much more. And most importantly, get to know the locals.

Unpowered site \$15.00, powered site \$25.00

### Fishing around Maules Creek

*Some fishing spots*

Boggabri/Gunnedah Road	6km south of Boggabri on Gunnedah Rd
Iron Bridge On Manilla Road	7km north & east of Boggabri
The Rock, Boggabri	Roadside 10km north of Boggabri
Henriendi Reserve	12km south & east of Baan Baa
Harpary Bridge	13km east of Baan Baa on Maules Creek Road
Tarriaro Reserve	15km east of Narrabri on Maules Creek/ Old Gunnedah Road
Tarriaro Bridge	14km east of Narrabri, off Maules Creek Road
The Picnic area	Along Maules Creek Road



## More things to do around The Pilliga

For those who have more time, **especially Nomads**, some other attractions are:

### Yarrie Lake



A natural lake 25 min from Narrabri.

Camping \$15 day, teeming with kangaroos, yabbies and birdlife.

A circular lake, three kilometres in diameter, Yarrie Lake is perched on the edge of the vast Pilliga scrub, providing a haven for countless species of birds and animals. Visitors to the lake reported that they had counted 60 species of birds late one afternoon. The perfect saucer

shape of the lake is thought to have been formed by the landing of a meteor many years ago ... whether or not this is true is still a mystery!

### Narrabri CSIRO Australia Telescope



Located about 25 km west of Narrabri, on Yarrie Lake Rd

Public are welcome. Admission is free.

These six gleaming white dishes are the most powerful radio telescope in the southern hemisphere. There is a Visitors Centre where you can view the telescope. There are also a number of displays, both internal and external, plus an audiovisual presentation. There is a barbeque area available for public use. The visitors centre is at the edge of a dry woodland. Kangaroos and galahs are plentiful; occasionally emus, echidnas and koalas.

### Kaputar National Park



*Sawn Rocks in Mount Kaputar National Park*

Roughly one hour's drive from Narrabri. Be awed by towering forests, breathtaking rock formations and stunning scenery at Mount Kaputar National Park. Take in the views from the park's lookouts, have a picnic, barbecue, or stay overnight in the campground or cabin accommodation. Bring binoculars to enjoy bird watching, or to search for possums and greater gliders after dark. For a more adventurous trip, walk one of the park's many tracks, or go for a mountain bike or horse ride through the spectacular landscape.

### Warrumbungle National Park



*View from Whitegum Lookout*

Whether you're into camping, walking, bird watching, or even into astronomy, Warrumbungle National Park, near Coonabarabran in NSW, is a great place to visit.

The main features of the Warrumbungle mountains are a series of huge jagged outcrops in a roughly circular pattern, surrounded by hilly bush and woodland forest. Dykes, domes and plugs left from ancient eroded volcanoes are common. The Grand High Tops is a volcanic remnant. These vents and rocky formations are all named- Beloungery Spire, Split Rock, Crater Bluff, the Breadknife and Mount Exmouth.

## Accommodation, Food, Water, Fuel and Maps

**Always carry sufficient drinking water when travelling in the Pilliga;** it stretches over 1 million acres, with little surface water. The Pilliga relies on underground aquifers.

Refuel in Coonabarabran and Narrabri. **Fuel at Baradine Service Station is available only during business hours. There is no fuel available in Pilliga township.**

**Maps** – it is recommended that you purchase a map. Available at The Pilliga Forest Discovery Centre, Barradine, and at the Tourist Information Centre in Narrabri.

*The Pilliga Forest*, published by NSW National Parks and Wildlife, costs around \$8.

National Parks and other Reserves of the Pilliga Forest is available free-of-charge.

### The Pilliga Pub, Pilliga

Phone: 02 6796 4320

The Pilliga Pub serves good meals. They have two family rooms available, and breakfast is included. Single \$45, Double \$50.50, Triple \$65.50, four people \$75.50, five people \$85.50. There is also a corner shop/coffee shop in town. No fuel available.

For more information on pub accommodation, visit:  
[http://www.visitnarrabri.com.au/index.cfm?page\\_id=1085&page\\_name=Pilliga%20Pub](http://www.visitnarrabri.com.au/index.cfm?page_id=1085&page_name=Pilliga%20Pub)



### Pilliga Hot Bore Baths, Pilliga

Free camping is available at The Pilliga Hot Bore Baths. Flush toilets and hot shower available (bore water, not suitable for drinking). Bring drinking water.

### Baradine

Two pubs, two coffee shops and an IGA supermarket. Water is available at Forest Discovery Centre. Fuel during business hours.

#### Baradine Hotel

Phone: 02 6843 1649 23 Wellington Street, Baradine 2396

**Double \$55-60 Family \$70 Single \$40 Twin \$50-55. Breakfast included.**

#### Camp Cypress, Baradine

Phone 02 6843 1035 Lachlan St, Baradine 2396

Camp Cypress offers quality accommodation, from **air conditioned cabins** \$33 (single) - \$77 (double) per night, to **backpacker style** accommodation

**Powered site** \$25 per night and unpowered camp sites \$19 per night (double charges for extra persons).

For more information, visit: [www.campcypress.com/](http://www.campcypress.com/)





## Pilliga Pottery, Coonabarabran

Phone: 02 6842 2239

28km north of Coonabarabran. **Do not use a GPS to find Pilliga Pottery – it will not get you there!** Check website for directions or follow clearly marked road signs.

**Camping:** Two people \$15, Single \$8, Child \$5.

**Rooms:** Two people \$95-\$140. \$25 per extra person. \$30 per bed share rooms on tours.

Self cater for all or some of your food, or eat at the Blue Wren Café. They sell: breakfast, lunch, packed lunches, dinner, snacks; tea, coffee, soft drinks and alcohol.

**Activities include:** bird watching tours, horse riding and pottery lessons.

To see just how lovely it is, visit:

<http://www.pilligapottery.com.au/accommodation-farm-stay-bed-and-breakfast.html>



## Pilliga Protection Camp, Moveable

Camp phone: 0458 642 495.

The campsite moves or closes. Phone to check camp location prior to leaving home. Large areas in The Pilliga do not have a mobile phone signal.

Bring your own camping gear, camping is free in Pilliga Forest. Long-drop toilet, bush shower, camp kitchen, usually communal meals, and drinking water. A local farmer fills the water tank regularly with drinkable bore water, Please fill your own containers with drinking water prior to arrival if possible, Pilliga bore water is safe for drinking, but does not taste drinkable.

## Leard Forest FLAC Camp, Maules Creek

Contact Muzz 0418 754 869, or Cliff 0467 972 735

'FLAC' stands for 'Frontline Action on Coal'.

See [Map C – Leard Forest, FLAC](#). Approximately 65km from the Shell roadhouse. Located at Cliff Wallace's Farm, Wando, Black Mountain Creek Road, Maules Creek. Bring your own camping gear. There is free camping at Cliff's place. Chemical toilets, bush shower, camp kitchen, lots of excellent drinking water available from Cliff's water bore. There are usually communal dinners, or cook your own.

## Narrabri

Narrabri has a wide variety of restaurants, variety of accommodation, 24hr fuel station, several supermarkets, and a good shopping centre.

## Some facts about coal seam gas mining in The Pilliga

*Santos continually claims that coal seam gas mining is safe. This has not proven to be true in The Pilliga, or elsewhere. Here is an explanation of some terms and processes used in coal seam gas mining, and facts about contamination.*

### 'Produced Water'

The 'produced water' is brought to the surface as a by-product of gas extraction. It must be removed from the coal seam to allow the gas to flow. 'Produced water' varies greatly in quality from area to area, but always contains undesirable concentrations of dissolved substances such as salts, naturally present chemicals, heavy metals and radionuclides.



*Produced water ponds Pilliga Forest*

Tests carried out on soil and 'produced water' samples from holding ponds and spill sites in the Pilliga forest have shown elevated levels of chloride and barium, arsenic, lithium, boron, cyanide and lead. 'Produced water' is so saline that it will kill any plants that come into sustained contact with it. Kangaroos, frogs, wallabies, goannas and turtles have died in the Pilliga, either drowned in evaporation ponds or poisoned by drinking the 'produced water'.

Managing 'produced water' is a major problem in coal seam gas mining. Some methods are to process it further to remove the saleable salts (and this has problems), or to reinject the concentrate back into the coal seam-- again with problems. Santos management have suggested that they will treat the 'produced water' in the new reverse osmosis plant, and may give it to farmers for irrigation. It is questionable whether the reverse osmosis plant can remove all contaminants and heavy metals.

### Spills of produced water, soil contamination and surface water spills



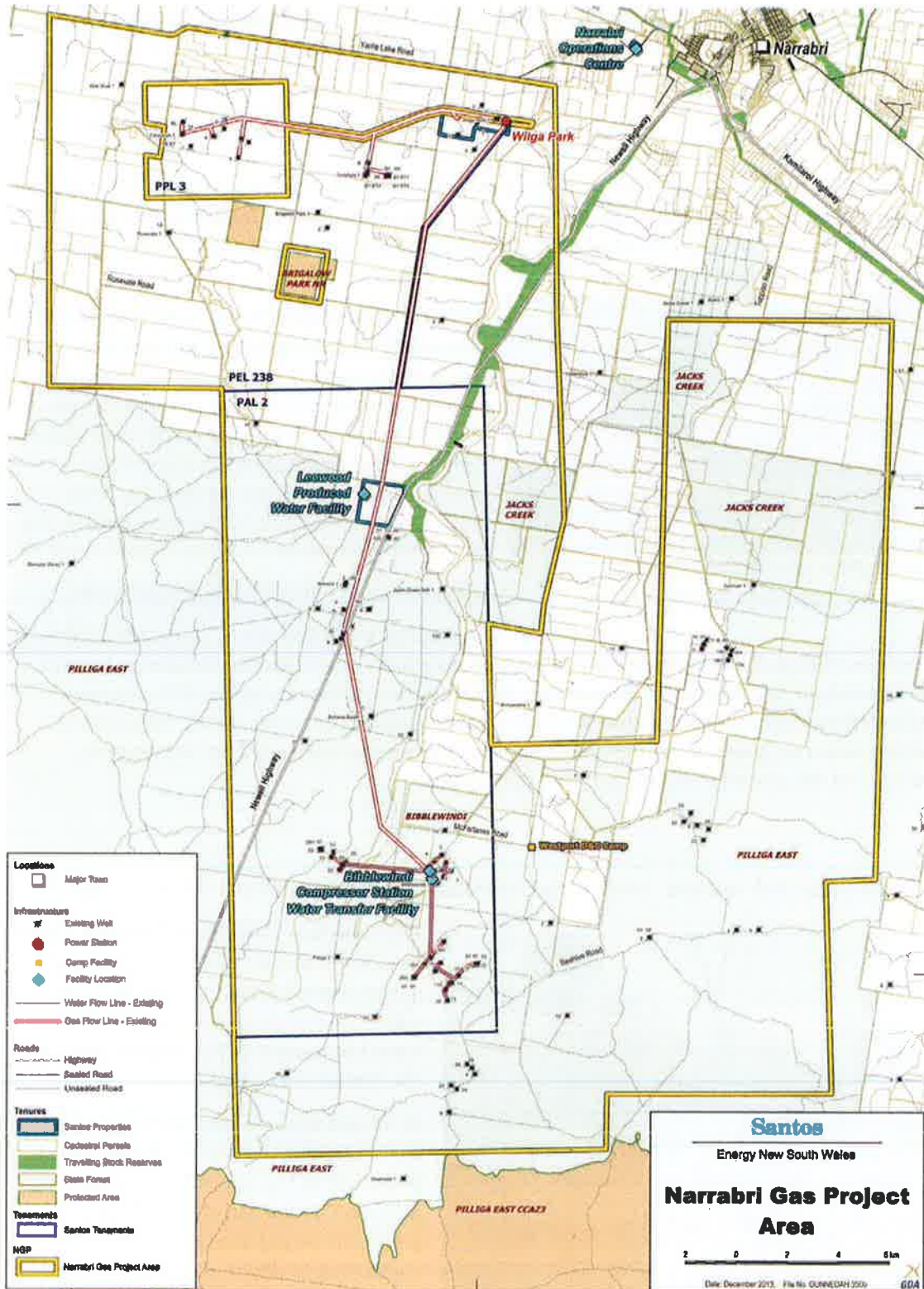
*Vegetation killed by a produced water spill*

From the late 1990s to the present there have been at least 16 spills or leaks of contaminated water, usually of 'produced water' and drilling chemicals. A number were not reported. The largest spill is at the Bibblewindi site.

At all spill sites, Santos has knocked down the trees killed by the 'produced water' and covered the spill area with gypsum, pine bark and wood chips. Although some grass and shrubs are surviving, trees are continuing to die on the contaminated sites. Rehabilitation of most sites has failed.

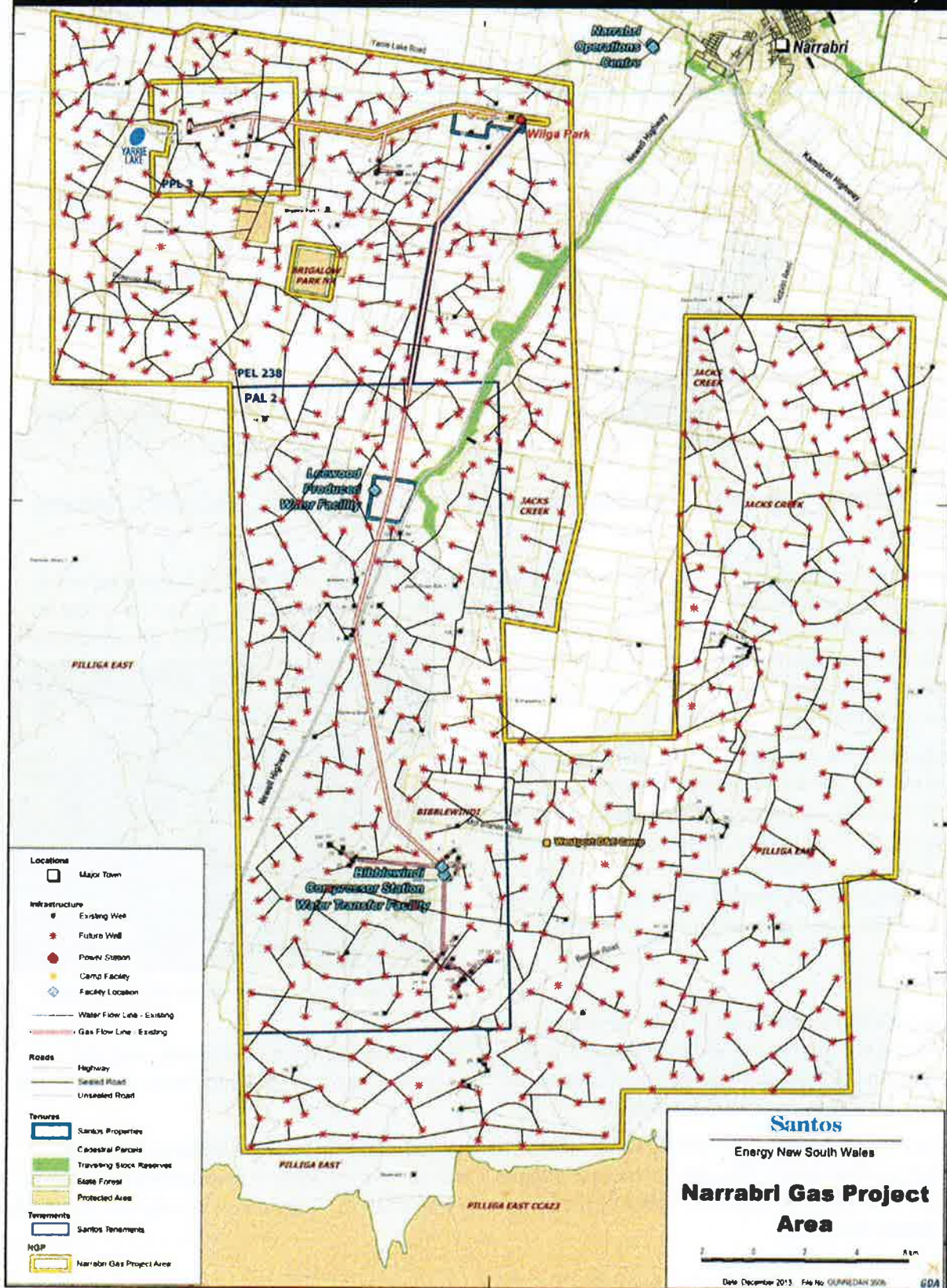
## Santos Lease Area

Comparison of Santos lease area and the same map with artists impression of the projected the 850 production CSG well and pipelines waiting approval.





Future impression of the **850 PLANNED COAL SEAM GAS WELLS** for the Santos Narrabri Gas Project



## Great Artesian Basin and higher aquifers

Tony Pickard met with Santos representatives. They said that they intend to release the sodium from the spills in The Pilliga to the surface and wash it away with water, so they are spreading gypsum. At the site Bohena 7 it may be possible to see the contamination where the salt has come to the surface. This is occurring because the gypsum is releasing salt from the clay barrier underneath.

Santos hopes they have applied enough gypsum to alter the clay structure, and intend to keep altering it to allow the water to flow through. Santos is only than creating a hole in the clay barrier that protects the southern recharge zone. This will allow the highly toxic, saline water and pollutants to enter the Great Artesian Basin (GAB). The natural filtration is being broken down. The gypsum holds the passages open, allowing contaminated water to reach the Great Artesian Basin.

There are some natural holes in the clay barrier where tree roots grow through. This allows surface water to reach the GAB. Gypsum breaks down the clay barrier which protects the GAB, and allows saline water through.

Santos was not supposed to irrigate or to plant trees, instead to leave the land to regenerate naturally. They are now irrigating in an attempt to grow trees to disguise the contamination. The irrigation will bring the salt to the surface.

## Evaporation ponds, 'produced water' holding ponds, unlined storage ponds

The use of evaporation ponds to store drilling water was banned in NSW in 2011. 'produced water'-holding ponds are still legal (they look exactly the same as evaporation ponds, and do the same job, but without the spraying of water into the air to aid evaporation). Santos is draining the ponds in the Pilliga and is building four 300-million-litre water-holding ponds near the proposed water treatment plant at their property, Leewood.

Bohena 2 was the site of a large spill in 2000. When the holding pond was decommissioned in 2013 it was full of 'produced water' contaminated with drilling chemicals. This must be put into a registered landfill site. The state government gave Eastern Star Gas permission to bury the drill cuttings in the disused drill ponds. The liners were taken to a landfill in



*Unlined produced water holding pond*

Narrabri.

It is not known where much of the 'produced water' from the drill ponds and wells has gone. There have been many spills from the ponds, and also tree deaths and dieback downwind from the spray off the ponds. Frogs, turtles, kangaroos, wallabies and goannas were seen dead in the ponds.

Several of the evaporation ponds were unlined, allowing seepage into the groundwater and the Great Artesian Basin. The site on the tour Bohena 7 was an unlined pond. It was there from 2005 to 2013, when Santos filled it in. This was the last pond to be filled in. There are now only two dams left at Bibblewindi.

## Groundwater (aquifer) contamination

In polluted stock and domestic bores the water may smell like rotten eggs. When-ever Santos has been confronted with bore contamination close to areas of their operation, they have always said that it wasn't their actions that caused contamination, or that the damage is minimal.

From Sydney Morning Herald 7/3/14:



A coal seam gas project operated by energy company Santos in north-western NSW has contaminated a nearby aquifer, with uranium at levels 20 times higher than safe drinking water guidelines, an official investigation has found.

It is the first confirmation of aquifer contamination associated with coal seam gas activity in Australia – a blow to an industry pushing state and federal governments for permission to expand.

Santos was fined \$1500 by the NSW Environment Protection Authority, which posted a media release on its website on February 18, without identifying the nature of the contamination.

The SMH went on to quote a Santos spokesman:

Mr Gifford said the metals are “not additives” and occur naturally in the surrounding soil and water.

“However, the leaking pond has mobilised the elements and moved them into the aquifer, increasing their concentrations,” he said. “Importantly this water is not used for livestock, irrigation or human consumption.”

The \$1500 fine “reflects the level of environmental impact, which was small”, he said.

## The reverse osmosis plants

Environment groups raised money and had the water from the old reverse osmosis plant tested (see attachment). This water was being discharged into Bohena Creek. The supposedly pure water contained arsenic, lithium, boron, cyanide and lead. It also contained levels of ammonia high enough to kill fish.

A similar plant will be built on Leewood, on private land purchased by Santos. Santos security will prevent the collection of water samples close to the reverse osmosis plant by environmental groups.

Santos claims that the new plant will purify the ‘produced water’. Santos is planning to give this water to farmers for irrigation, or release it into the Namoi River. Santos cannot guarantee that they can remove the heavy metals and contaminants.

The Pilliga has acid soils. Treated CSG water from the reverse osmosis plant which was released into Bohena Creek was alkaline. This changes the soil pH.

The effect that this introduced alkaline water will have on the aquifers is not known. It may affect the entire viability of the Namoi River and the basins, and hence the Murray Darling Basin and the connected social, environment, food production and land use, and the communities that depend on these water sources for their very existence.

### Timeline:

- ▶ On 15 December 2011, following the results of water testing, Santos shut down the reverse osmosis plant in the Pilliga. They later described the reasons for this as follows: “ ... because of various concerns about the water treatment plant. Scaling back operations and ceasing operation of the water treatment plant pending a full review of its adequacy and integrity.”
- ▶ 23 December 2011 – NSW DTIRIS (Department of Trade, Investment and Regional Development) advise environmental groups that no water samples were collected from creek discharge due to the fact that the Santos reverse osmosis plant was 'malfunctioning'.



*Contaminated water released into Bohena Creek*

Table 1. This table is comparison of two water samples collected from Bohena Creek. The first sample was uncontaminated water collected from Bohena Creek above X Line Rd. The second was collected directly below the reverse osmosis plant. It was contaminated water being discharged into Bohena Creek.

(for those with limited scientific understanding just compare the increase in the last column.)

Compound	Units	Un-contaminated Sample	Contaminated Sample	Number of times higher in contaminated sample
pH Value	pH Units	6.64	8.67	1.3
Electrical conductivity @25 degrees	uS/cm	29	2930	101
TDS	mg/L	19	1900	100
Total hardness as CaCO3	mg/L	<1	299	299
Total alkalinity as CaCO3	mg/L	11	1340	121.8
Chloride	mg/L	2	383	191.5
Calcium	mg/L	<1	67	1
Magnesium	mg/L	<1	32	32
Sodium	mg/L	3	792	264
Potassium	mg/L	3	30	10
Arsenic	mg/L	<0.001	0.021	21
Cadmium	mg/L	<0.0001	0.0004	4
Chromium	mg/L	0.005	0.187	37.4
Copper	mg/L	0.007	0.191	27.3
Lead	mg/L	0.002	0.05	25
Nickel	mg/L	0.001	0.171	171
Zinc	mg/L	0.006	0.094	15.7
Mercury	mg/L	<0.0001	0.0008	8
Fluoride	mg/L	<0.1	1.9	19
Phenol	ug/L	<1	12.5	12.5
2 Methylphenol	ug/L	<1	6.9	6.9
3- & 4 - Methylphenol	ug/L	<2	8.9	4.5
TPH C10-C36 Fraction Sum	ug/L	330	3700	11.2
TRH C10-C40 Fraction Sum	ug/L	190	3770	19.8
Phenol d6	%	17.9	43	2.4
2-Chlorophenol D4	%	36.2	43.6	1.2

Water contamination table and timeline from The Wilderness society booklet The Truth Spills Out. <http://www.stoppilligaalseamgas.com.au/wp-content/uploads/2011/12/The Truth Spills Out Final May 2012 without appendices.pdf>

## Aquifer connectivity

Aquifer connectivity is the connection of aquifers of different depths. In nature these aquifers are safely separated by geological structures. With coal seam gas mining, drilling occurs directly through freshwater aquifers, including the Great Artesian Basin, then into the seriously contaminated gas wells up to 1 km under-ground. The freshwater aquifers are peppered with holes. Metal pipes and cement are in place to harvest the gas and prevent aquifer connectivity.

Metal casings will rust and cement will break down in contact with the saline 'produced water'. This will occur in working wells or in 'plugged' wells over the next 30 years. The cement used by Santos to plug exploratory wells in the Pilliga Forest is chalky when mixed with 'produced water'. I have collected cement samples on sites with plugged exploratory wells.

Plugged wells – end of life for mining. Filled with concrete.

Capped wells – usually exploration wells, temporarily sealed for later use.

Santos current wells and lease area

## Drilling Chemicals

Previously potassium chloride was the main drilling chemical used. Now due to the salinity problems associated with it, potassium sulphide has been substituted. However, if this proves unsatisfactory, drillers might revert to potassium chloride.

ESQ product Material Safety Data Sheet, Section 12: Ecological Information (Attachment 13) refers to potassium chloride:

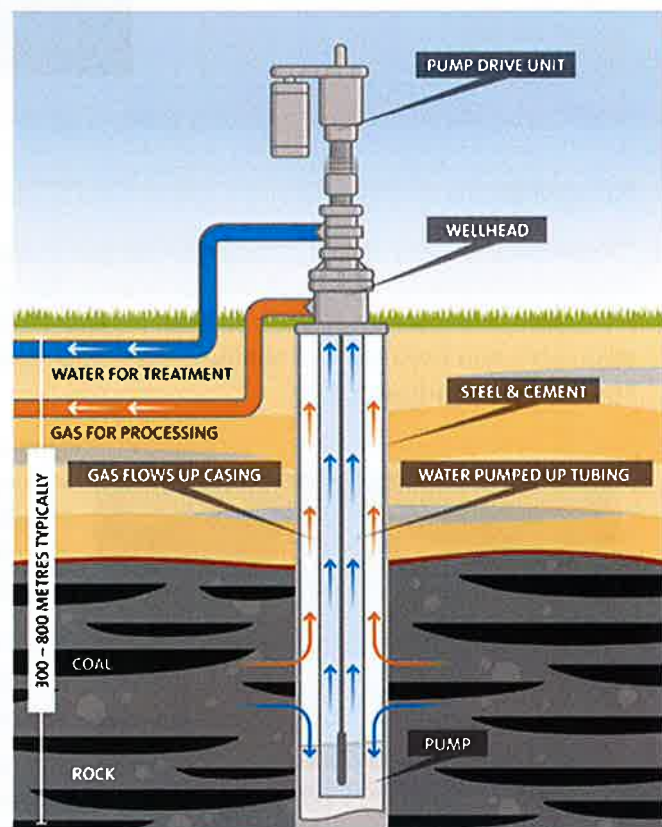
'Environment: Limited ecotoxicity data was available for this product at the time this report was prepared. Ensure appropriate measures are taken to prevent this product from entering the environment.'

According to a senior hydro & environmental consultant with the company SRK Consulting, "from nothing to 100% of drilling fluids can be lost". But he thinks they would "probably lose at least 50% of their fluid on a drilling program targeting permeable formations with water in them."

Potassium chloride has the ability, if the intake is sufficient, to kill a human. As the coal seam gas companies will not release any data about the amount used per well, nor what percentage of this chemical is 'lost' whilst drilling a well, the water table and aquifers could contain lethal doses. Once in the water table there is no way of removal, and no way of knowing who will be affected until it happens.

## Sulphur-reducing bacteria and other bacteria

Sulphur Reducing Bacteria (SRB) and other anaerobic bacteria can be brought to the surface in coal seam gas mining. Biocides are used to control SRB and other co-produced bacteria. Domestic water wells and aquifers contaminated with SRB and other bacteria are unusable for the foreseeable future.



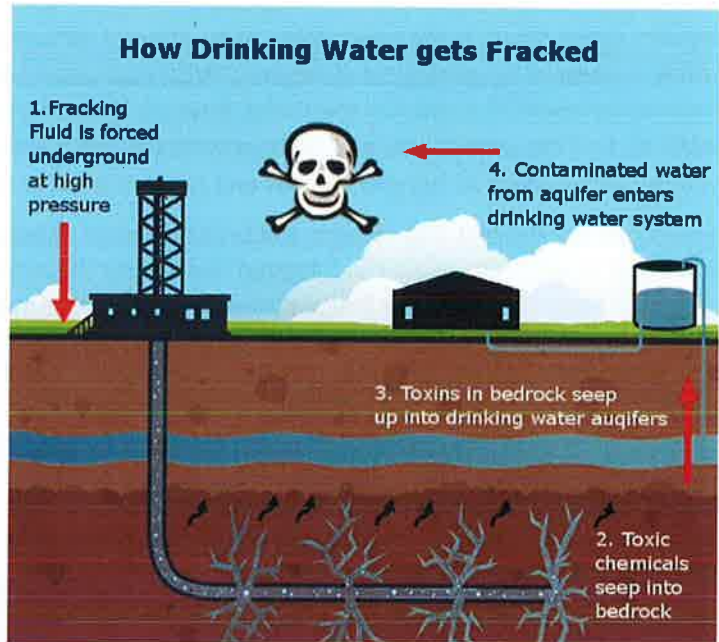
Well diagram



## Fracking

Eastern Star Gas used hydraulic fracturing (fracking) in The Pilliga around the year 2000 on at least 15 occasions. They have not used fracking since then. At this time there is no fracking happening in the Pilliga. Santos says they do not have any plan to resume it. (Not now anyhow). It is likely they will frack the wells in a few years time when the gas flow slows.

Fracking increases the risk of contamination of aquifers, as the process fractures the rock barrier and allows chemicals and gas to seep through the rock.



## Stygofauna

“Stygofauna are tiny aquatic creatures that live in groundwater (aquifers). The group is made up of a range of different species, such as crustaceans, fish, snails and beetles. They are colourless and translucent: we can see all their internal organs. They are also typically blind or without eye structures, and have low metabolisms that allow them to survive for months in dark, barren environments without a meal.



*Pilliga Stygofauna. Photo Peter Serov*

Three new species, two types of mite and one type of worm, were recently discovered in the aquifers in the Pilliga. Although they are miniscule (1 mm – 2 mm), they feed on bacteria and help to maintain water chemistry and keep groundwater clean.

They also keep flow-ways open through their burrowing activities, which then helps surface water, such as rivers and streams, to run smoothly.

Stygofauna are not only cleaners, they are also excellent markers for water quality, as they generally live in unchanged environments.”

<http://www.australiangeographic.com.au/news/2013/08/bizarre-new-species-stops-pilliga-mining/>

## Endangered and vulnerable species

The Pilliga Forest contains at least 300 native animal species, and more than 230 species of birds. At least 22 are endangered, including the Pilliga Mouse, Glossy Black Cockatoo, Squirrel Glider, Koala, Black Striped Wallaby and Rufus Bettong. There are at least 900 plant species, including many that are under threat.

There are also healthy populations of koalas and emus. Should the forest be cleared in a checkerboard fashion for wells, pipes and roads, some of these species will become locally extinct.

## Radioactive isotope caesium 137

A bright red box found at the Santos drill site contains the radioactive isotope Caesium-137, which can be deadly at high exposure levels.

Cs-137 is commonly used in the mining and construction industries to detect liquid flows in pipes, tanks or bore holes dug for coal seam gas exploration.

The box was spotted just weeks after the discovery that in 2012 a leaking storage pond resulted in high levels of uranium, barium and other elements in an aquifer. Community members say they have never seen any reference to Cs-137 in the reams of planning documents relating to Santos' proposed \$2 billion project at Narrabri.



Enquiries to Santos requesting a copy of any approvals relating to the isotope were referred on to the Office of Coal Seam Gas, and from there to the NSW Environment Protection Authority.

Inquiries to the EPA revealed that the contractor was Halliburton Australia Pty Ltd.

In a statement, a Santos spokesperson told The Northern Daily Leader that storage and handling of Cs-137 at its drill sites in the Pilliga were in compliance with the Radiation Safety Act and Radiation Safety Regulation. 'Uranium is naturally occurring in the soils surrounding our operations,' the Santos spokesperson said.

Local farmer Tony Pickard said he did not believe there was adequate security around the box.

## Self-regulation

The government departments that are overseeing the Pilliga CSG mining seem to have blurred responsibilities. Self-regulation is not working. The EPA (Environment Protection Authority) and DTIRIS (Department of Trade, Investment and Regional Development) originally the departments responsible. As of late 2013, the Office of Coal Seam Gas is responsible.

## Jeremy Buckingham

Biblewindi 23: Jeremy Buckingham filmed a coal seam gas well hissing gas. He reported the leak to Minister Chris Hartcher. Eastern Star Gas and Minister Hartcher accused the environment groups of sabotage.

## Pilliga gas ownership

Eastern Star Gas has been the primary operator since 2002. In mid-November 2011 Santos took over 100% ownership of the operation. Prior to this, Santos held a 35% interest in the operation in PEL 238 and a 20% share in Eastern Star Gas.

## Activities under the exploration licence (not a production licence)

The operations in the mining lease areas PEL238 and PAL2 to date, although only qualifying as



“exploration”, have also involved:

- ▶ the construction and management of a gas-fired power station at Wilga Park;
- ▶ the development and management of five pilot production fields, encompassing 35 production bores;
- ▶ the construction and management of 13 major water treatment dams/ impoundments and numerous drill ponds;
- ▶ the construction and management of 56.6km of gas and water-gathering pipelines;
- ▶ the construction and operation of one reverse osmosis unit, now dismantled;
- ▶ the discharge of treated ‘produced water’ into the Bohena Creek (part of the Murray-Darling Basin);
- ▶ the bulldozing of numerous roads and tracks to facilitate the above;
- ▶ the drilling of production wells;
- ▶ development of facilities at Leewood, storage pond and reverse osmosis pond; and
- ▶ producing electricity from a gas fired power station at Wilga Park.

## Soil contamination table from The Wilderness Society publication The Truth Spills Out

Professor Joe Bidwell Professor of Environmental Science and Management at University of Newcastle verified the soil data and described the results as follows:

"Analyses were conducted on three soil samples collected adjacent to the facility and two samples collected from a reference location. Soil samples from the suspected spill zone had higher average pH, electrical conductivity (70 times higher), and levels of sodium (39 times higher), chloride (90 times higher), sulphate, calcium, magnesium, and potassium than reference samples. There were no clear differences in levels of total metals, phenolic compounds, PAHs, total petroleum hydrocarbons or BTEX compounds in soil samples from the two locations".

Table 2. Comparison of contaminated and uncontaminated soil sample results  
(for those with limited scientific understanding just compare the increase in the last column.)

Compound	Units	Un-contaminated Sample	Contaminated Sample	Number of times higher in contaminated sample
pH	pH Unit	5.3	9.9	1.9
Electrical Conductivity	uS/cm	11	1690	153.6
Sulphate as SO4 2-	mg/kg	6	20.5	3.4
Chloride	mg/kg	<10	850	85
Calcium	mg/kg	<10	80	8
Magnesium	mg/kg	<10	60	6
Sodium	mg/kg	<10	3510	351
Nickel	mg/kg	2	4	2
Zinc	mg/kg	<5	5	>1

[http://www.stoppilligacoalseamgas.com.au/wp-content/uploads/2011/12/The Truth Spills Out Final May 2012 without appendices.pdf](http://www.stoppilligacoalseamgas.com.au/wp-content/uploads/2011/12/The_Truth_Spills_Out_Final_May_2012_without_appendices.pdf)

# Leard State Forest

## Open cut mining

In open cut mining all vegetation is removed, including endangered plant species and old growth and habitat trees with breeding hollows. Trees are chipped or sold as saw logs.

The top soil is removed and stockpiled to be replaced after mining.

“Rock covering the coal seam (the overburden) is blasted and removed by large draglines and/or electric or hydraulic shovels and trucks. The use of advanced methods where the upper section of overburden is removed by bucket wheel excavator followed by a truck and shovel operation that removes more overburden before the deeper overburden is stripped by dragline.



Black coal may be used without any processing other than crushing and screening to reduce the rock to a useable and consistent size. However, it is often washed to remove pieces of rock or mineral that may be present. This reduces ash and improves overall quality. Washing involves immersing the crushed coal in a liquid of high specific gravity in which coal floats and can be recovered while the heavier rock and minerals sink and are discarded.”

[http://www.australianminesatlas.gov.au/education/fact\\_sheets/coal.html](http://www.australianminesatlas.gov.au/education/fact_sheets/coal.html)

How did the mines get approval to destroy Leard State Forest?



*Leard State Forest*

### They promised to:

- ▶ Purchase offset properties for conservation
- ▶ Regenerate habitats on those properties
- ▶ Plant corridors of trees to link remnants
- ▶ Rehabilitate mine overburden
- ▶ Regenerate grazing/cropping paddocks
- ▶ Use artificial habitats – logs and hollows

These measures definitely will not compensate for the loss of Leard State Forest

## Biodiversity

Leard Forest is the single largest remnant of native vegetation in the heavily-cleared Liverpool Plains. The Forest is an 8000ha biodiversity hotspot, identified as a Tier 1 Biodiversity Area by the NSW Government in the draft New England-North West Strategic Regional Land Use Plan (SRLUP). The SRLUP states that Tier 1 areas “cannot sustain any further loss” and are “critical to biodiversity persistence”. The forest is of significance for its biological values. It contains White Box, Yellow Box and Blakely’s Red Gum woodland, and Weeping Myall woodland.



In Leard Forest 395 plant species have been identified. These include tall old trees with hollows, and

a wide variety of flowering trees, shrubs, wildflowers, grasses and other plants which are food for all manner of animal life such as birds and insects. In the forest is one of the largest intact stands of Grassy White Box Woodland left in Australia, with over 100 hollows per hectare recorded. Hollows are required by many Australian birds, mammals (including bats), reptiles, frogs and invertebrates for nesting and roosting.

Leard Forest contains 1,167 hectares of Grassy White Box Woodland which is listed nationally as a Critically Endangered Ecological Community by The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). The 1100 ha White Box to be cleared is irreplaceable. Only 0.1% is left intact nationwide.

Leard is an important stepping stone refuge between Pilliga & Nandewar ranges.

## Aboriginal heritage

According to the Namoi Valley Independent (17<sup>th</sup> Dec 2013) Whitehavens actions have 'angered the traditional Gomeroi people, who yesterday joined the protest.

Whitehaven has employed various groups to search and salvage artifacts on the mine site and has also carried out consultation, however in July, the company came under fire over claims it had "disrespected cultural issues". At yesterday's protest, Gomeroi and traditional elders, and community elders again took aim at Whitehaven.

"There's been desecration of our burial sites because we've been denied access to the area (Vellyama burial grounds) to conduct ceremony before ground penetration radar is used," the group said in a statement.'

On 19 January 2014 Margo Kingston reported in her web blog: coal mining company Boggabri Coal 'defaced a sacred Scar Tree while bulldozing for a coal rail line, a joint venture with Whitehaven Coal. They painted two white stripes on the wood inside the tree's "scar", wood traditional used by Aborigines to make canoes'.



*Defaced scar tree*

## Great Artesian Basin and the water and the water table

Leard State Forest is in the southern recharge area for the Great Artesian Basin. There is a high risk of contamination from mining activities and the disturbance of the over-burden.

The mines will also have the potential to cut into aquifers and tributaries to the aquifers, slowing the underground water flow.

The impacts of the mines water use and the lowering of the water table have not been fully considered. The lowered water table will affect farmers' water supply and the vegetation of the remaining forest.

- "Biodiversity impacts on a unique suite of aquatic invertebrates which live in the Maules Ck aquifer, known as stygofauna, that are sensitive to changes in water depth and chemistry.
- The proposed diversion of 3km of Goonbri Creek, a system in high ecological condition, by the Tarrawonga Coal Mine.
- Dramatic changes to drainage and landform, including the possible creation of 'final voids' which are hundreds of metres deep."

<http://www.maulescreek.org/approvals-process/>

According to Frontline Action On Coal (FLAC):

'In 2011, two dams broke, spilling contaminated pit water into the Namoi River after a flood.



Whitehaven copped two \$1800 fines. Boggabri Coal was given permission to do pump contaminated water into the Namoi during a rain event. A local farmer's crop was destroyed, and when he complained, he was told by the company that it was just "something you'll have to get used to."  
<http://frontlineaction.wordpress.com/2013/04/05/day-244-a-tale-of-two-corporations/>

Whitehaven's new coal mine already has a license to access at least 3 billion litres (3,000ML) of water per year to function. This will be taken from the nearby Namoi River.

## Threatened (endangered or vulnerable) species.

Leard State Forest has 26 threatened animal and plant species.

### Vulnerable Fauna:

Glossy Black Cockatoo



*Glossy Black Cockatoo*

Turquoise Parrot

Hooded Robin

Square-tailed Kite

Brown Tree-creeper

Speckled Warbler

Grey-crowned Babbler

Little Lorikeet

Varied Sittella



*Speckled Warbler.*  
*Photo Ros Druce*

Barking Owl

Masked Owl

Black-necked Stork

Diamond Firetail

Painted Honeyeater

Black-chinned Honeyeater

Little Eagle

Spotted Harrier

Eastern Cave Bat

Eastern Bent Wing Bat

Little Pied Bat

Dwyer's Large-eared Pied Bat

Yellow-bellied Sheathtail Bat

Corben's Long-eared bat



*Yellow-bellied Sheathtail Bat*

Koala

Squirrel Glider

Pale-headed Snake

Stoney bush-pea - *Pultenaea setulosa*

*Pomaderris queenslandica*

*Tylophora linearis*



*Turquoise Parrot*

### Endangered ecological community:

Grassy White Box Woodland

### Migratory Species:

Satin Flycatcher

White-throated Needletail

Rainbow Bee-eater

### Not recorded but suitable habitat present:

Regent Honeyeater

Swift Parrot

Spotted-tail Quoll



*Stoney bush pea. Photo Ros Druce*

## Native Vegetation Act and offsets



*Degraded offset property proposed for regeneration of CEEC*



*Whitebox grassy woodland in Leard Forest*

The Native Vegetation Act 2003 prohibits farmers clearing Grassy White Box Woodland of this quality on their farms. Mines have exemption from this Act.

The three mines will cumulatively clear at least 3447ha, of which 1181 hectares is Box-gum CEEC, irreplaceable mature forest. 40 - 50% of Leard State Forest will be destroyed.

The purchase of farmland with small disturbed patches of remnant vegetation is being used to offset the impacts to the Leard Forest. However independent ecologists have found they do not match the same vegetation types and condition of woodland found in the Leard Forest. The majority of the differences are due to the fact that the bulk of the offsets are in a different bioregion at a much higher altitude.

A large section of the area mapped as critically endangered ecological community (CEEC) on the Wirradale and Mt Lindesay offset properties has been independently assessed. The independent assessment found the descriptions of vegetation and habitat to be incorrect – i.e. not the same CEEC and unsuitable habitat for many of the woodland threatened species that require offsets, or areas of immature regrowth would take over 100 years to be similar to Leard. Large areas of the vegetation mapping of the off-sets has been found to be wrong. 95% of the high altitude remnants are Stringybark open forest, only 2 -5% was found to be the critically endangered ecological community that it was claimed to be.

The mapping and description of the low elevation offsets adjoining the forest were also found to be false. The property 'Kelso' was described as 324 ha of high quality habitat for threatened species, it was found to be 263ha of very poor quality habitat.

The Stringybark open forest sections of the offset properties are claimed to provide habitat for woodland birds, when in fact they are mostly unsuitable habitat, particularly for the nationally endangered Swift Parrot and Regent Honeyeater.

The same Stringybark open forest Offsets are claimed to be suitable habitat for the vulnerable Corben's Long-eared and Little Pied bat, both won't occur in such forest, their preferred habitat is Box – Ironbark woodlands at low elevations like the woodland in Leard Forest, both will decline.



*The Eastern Pygmy Possum.  
Photo Phil Sparks*



Those same Stringybark open forest offsets are also marginal habitat for the vulnerable Squirrel Glider and Koala. Squirrel Gliders prefer Box – Gum woodland like Leard State Forest with lots of hollow trees >100 per ha, and the Stringybark communities are marginal habitat for the Koala.

The vulnerable Yellow-bellied Sheath-tail Bat will decline due to loss of woodlands & trees with hollows.

Two nationally threatened species to be impacted have not even been considered for impact or offsets, those are *Tylophora linearis* and Dwyer's Large-eared Pied Bat.

What's left of the forest adjoining the mines is considered to be a refuge for threatened fauna, however most fauna will vacate the forest due to the effects of mine lights at night, noise (machinery and blasting), and the fragmentation of the forest.

Maules Creek mine EIS states that they will plant wild life corridors linking the remnants of the locality to what is left of the forest. A nice idea, however those trees will take over 100 years to mature to be effective habitat for threatened species. Meanwhile the forest will be destroyed in 25 years.

Boggabri Coal proposes a corridor from its eastern offset properties to Leard State Forest. Again a nice idea, however those trees will only be tall shrubs when Leard State Forest has been cleared. Of great concern is the acceptance that the proposed planting of trees and shrubs will recreate the White box woodland destroyed, those areas will never have the same diversity of plants and animals that occur in the forest. There will be a huge time lag of 200 years between the loss of the mature forest and possible regeneration of similar forest as offset.

That time lag will mean all species will decline, threatened species most dramatically.

There is a simplistic assumption that displaced fauna will move to find suitable habitat, however for less mobile species there won't be corridors for pathways, and if they could get there those habitats and territories would already be occupied.

## Regeneration

Whitehaven are not required to fill the void as their profit levels are very low. They will leave the forest fragmented, and with two big holes in the ground forever.

The overburden hills will be regenerated using topsoil from the forest and a few of the local tree and shrub species are planted.

Regeneration won't recreate the Leard Forest woodland or its diversity of plants (395 species) and habitats.

In the long term the revegetation of the overburden will probably die, as has been observed in the Hunter Valley at the Ravensworth mine. Environmental weeds have already invaded the regeneration areas, they will prevent the regeneration of native ground cover plants. Weeds will continue to infest both revegetation and conservation areas.



*Boggabri Mine Regeneration Area  
invaded by Tall Rhodes Grass,  
an environmental weed*



## Employment and community issues

- ▶ The three mine claims many direct construction jobs and hundreds of permanent positions. In 2013 Boggabri and Tarrawonga mines laid off 140 workers because of a coal downturn. Job security for workers is low.
- ▶ Most workers are fly-in fly-out, not local people.
- ▶ Local businesses have lost long-term skilled employees, especially trades people. They can't afford to pay mine wages, and have to increase charges to rural customers.
- ▶ There is an influx of mining employees with high wages, and mining companies rent premises for contractors and employees. In mining towns local people, especially the elderly on fixed incomes are being forced out of rental accommodation some local residents even are being forced to leave their communities.
- ▶ Mines use donations to communities to buy public approval. Like \$6 million for roads, \$5 million to upgrade the airport, \$2.5 million towards the town's aquatic centre and \$1.6 million to upgrade the Boggabri Caravan Park and swimming pool.
- ▶ With the expansion of coal mining come dramatic changes to communities, their lifestyles, and their health.
- ▶ Mines employ only 2% of Australia's workforce.
- ▶ The mining industry in Australia is 83% foreign owned.

Those exposed to coal dust suffer health issues.

## Loss of property value of farms close to the mines

Farms neighbouring the mines, or in the path of the infrastructure have been bought for very high prices by the mines.

Those left out of this deal live with coal dust pollution and blasting fumes with the long term risk health risks. With the lowered water table water requiring deepening of bores and possible water contamination from the mines. Also noise, dust, vehicles, night lights from 3 or 4 mines 24 hours per day. Property values for these farms have plummeted. Banks are hesitant to loan them money.

## Toxic dust and fumes from blasting

Blast fumes are the gases that may be generated during blasting.

Some of these gases can affect health, including oxides of nitrogen [nitric oxide (NO) and nitrogen dioxide (NO<sub>2</sub>)]. NO<sub>2</sub> is the more toxic of the two. They are typically a reddish/orange cloud — NO<sub>2</sub> is what gives the cloud this colour and the colour becomes deeper with higher concentration. Blast fumes also have a pungent odour and taste.



*Yellow cloud (NO<sub>2</sub>) from blasting. Photo Ros Druce*

[http://mines.industry.qld.gov.au/assets/safety-and-health/fume fact sheet 30 8 11.pdf](http://mines.industry.qld.gov.au/assets/safety-and-health/fume%20fact%20sheet%2030%208%2011.pdf)

## Climate change

Maules Creek mine alone is proposed to produce 13 million tonnes of coal per year. Boggabri and Maules Creek mines emissions together produce to approximately 50 million tonnes of CO<sub>2</sub> per year, more than the whole of New Zealand. The three coal mines will certainly contribute to dangerous climate change.

## Cumulative effect of three mines

The agricultural landscape from Caroonna to Narrabri is to become an industrial landscape.

- There are currently six operating coal mines.
- There are five proposed new coal mines including Maules Creek.

The expansion of current operations in Leard Forest includes:

Boggabri Coal plans to expand the open cut mine to approximately 5x5km, clearing 1,900 hectares of native vegetation. Operated by [Idemitsu](#) .

The Maules Creek proposal involves an open cut coal mine, clearing 1,500 hectares, digging pits 320 metres deep, and selling 10.8 million tonnes of coal every year for over 30 years. Proposed by [Aston Resources](#)

Tarrawonga plans to increase their mine by three times. It will expand into Leard Forest and completely adjoin the Boggabri open cut pit, operated as a joint venture between [Whitehaven \(70%\) and Idemitsu \(30%\)](#)

## Road and rail infrastructure

Extensive road, rail and bridge infrastructure is paid for by the taxpayer. There is also deterioration of local roads due to increased heavy transport and traffic. The existing rail infrastructure is also damaged because of constant heavy freight carriages transporting coal.

## Summary of environmental concerns

- Waste water discharge - Boggabri pit waste water discharge has killed trees in Leard State Forest.
- Both State and Federal governments have approved the mines based on false and misleading information, that environmental standard sets a precedence for other mine proposals, future mine extensions into the Leard forest highly likely.
- Conservation agreements on the titles of the offset properties provide no assurance that they will be managed for conservation when the forest has been destroyed and miners have left, agreements are not worth the paper they are written on.
- Allowing the destruction of Leard State Forest including 1,100 ha of CEEC and known habitat for 28 threatened species, sets a terrible precedence for standards for environmental protection nationwide
- The Public must be told about the corruption in the planning and approval process.
- Impacts to wild-life (particularly nocturnal) are not fully considered eg. noise, dust, vehicles, night lights.

## Corruption in the mining industry

According to the guardian, in 2011-2012 Santos gave a total of \$165,829 in political donations to federal and state governments.

Donations by industry, to all political parties – Mining \$433,327, Oil and gas \$303,246.

Total donations received by political parties – Liberal \$5,623,809 National \$470,176 Labor \$3,184,127

<http://www.theguardian.com/news/datablog/2013/may/28/australia-political-donations-parties#table>

There are genuine concerns about the ability of the NSW Government and the Planning Assessment Commission to make unbiased decisions on the proposed coal mines. Strong National Party connections with the Maules Creek Mine, in particular are troubling. Some examples:

Nathan Tinkler founded Aston Resources in 2008 (it was publicly listed in mid 2010) and was

appointed board chairman in November last year. He is also a substantial shareholder.

Aston Resources recently merged with Whitehaven Coal. Nathan Tinkler now has a 20% stake in the \$5.1 billion merger.

Nathan Tinkler has made donations to the National Party at state and federal levels that were not declared to the Planning Department when the development application for the Aston Resources Maules Ck Project was submitted. The matter is subject to investigation by NSW Planning.

Mark Vaile, former Deputy Prime Minister and former leader of the National Party of Australia, has been the Chairman and Deputy Chairman of Aston Resources, and is now Chairman of the merger.

Liam Bathgate is a director of a lobbyist firm (Australian Public Affairs) which has been employed by Aston Resources on the Maules Ck Project. Bathgate is a former chief of staff to Barry O'Farrell (whilst in opposition), and an ex-General Secretary of the NSW National Party.

The Planning Lobbyist Register shows he has contacted the Planning Department a number of times in relation to the Maules Ck Coal Project.

<http://www.maulescreek.org/political-context/>

7 May 2014

ICAC was told that Tinkler's group of companies donated \$20,000 to the National Party after he learned that a National Party minister would be controlling coal loading ports.

**Table 1 – Federal government subsidies to the mining industry**

Subsidy	Year	Source	(\$ million)
Fuel tax credits – mining	2011-12	Taxation statistics 2010-11 (p121)	2,349
Deduction for capital works expenditure	2012-13	Tax Expenditures Statement 2012 B93 (p110) <sup>5</sup>	495
Exploration and prospecting deduction	2012-13	Tax Expenditures Statement 2012 B90 (p108)	550
Statutory effective life caps	2012-13	Tax Expenditures Statement 2012 B91 (p109) <sup>6</sup>	400.5
Capital expenditure deduction for mining, quarrying and petroleum operations	2012-13	Tax Expenditures Statement 2012 B88 (p107)	2
Coal Sector Jobs Package	2011-12	Trade and Assistance Review 2011-12	218.8
R&D tax concessions	2011-12	Trade and Assistance Review 2011-12	370.8
Various budget outlays to mining	2011-12	Trade and Assistance Review 2011-12	110.8
<b>Total</b>			<b>4,496.9</b>



## Suspected sabotage of water bores on Wando

### Idemitsu History

1978 – Opened Australian Office in Sydney

1988 – Acquired Boggabri mine 25% equity (100% in 1991)

Farmer Cliff Wallace discovered a plan to prevent the development of irrigation farming in the Maules Creek area near Boggabri well before the community knew of any mining threat.

In 1993-1994 Cliff employed two private contractors to sink water bores for farm irrigation. They messed up the bore.

Water Resources then attempted to drill the bore. They used extremely large quantities of drilling fluid, a mixture of Barites OD-(Oil Drilling), bentonite and other chemicals. Barites OD is used in drilling for oil, never in drilling water bores. In large quantities bentonite is used to seal leaky farm dams.

The mixture sets in the bores when used in excessive amounts. It sealed off Cliff's bores, preventing the underground water reaching the bores.

Water Resources drilled two test bores and mixed several bags of bentonite and Barites OD in a trough. They poured the mixture into the test bores.

Cliff attempted to fight the destruction of the bores legally, but says that corruption was rife, and there was no way he could win.

Cliff was taken to court for not paying to Water Resources for the failed well drilling. The legal action against Cliff stopped against Cliff's wishes, the case is still pending. Cliff hopes to prove legally that Water Resources caused the damage to his bores.

Cliff purchased his own drilling rig. He drilled several holes near the test bore holes. A proper accurate flow could not be achieved from this location because of the contamination.

Cliff devised a method to decontaminate the site. At great financial cost he hired contractors, one with an excavator and one with a dozer to dig a very large hole, they decontaminate the area. They then screened 70+ truckloads of gravel and rock to use as fill.

This caused him major financial problems. The stress caused him considerable, health and social problems.

But at last the water from this well is pure and clean. He now has a very productive irrigation farm.

Cliff is a determined bloke, and doesn't give in. Those people who thought they could sabotage his water supply underestimated him.

The water is at risk again. The three mines in will cumulatively use large quantities of water mostly for washing coal and settling dust. Idemitsu's mines alone will cause a ground water draw-down of 5-7 meters.

Low water-flows from the direction of the mine, east of Elthin Crossing will trigger the NSW Water Resources water volume monitoring point at Elthin Crossing in Maules Creek. Water Resources will then impose water restrictions on farmers (not the mines), as they do during drought events. Irrigators upstream from the monitoring point will have water restrictions imposed.



*Digging out the polluted well. Note the screened rock ready to push into the hole and Cliff on a board controlling the pipe*



*Cliff Wallace at his farm 'Wando'*

The monitoring point will accurately measure low water levels at Elthin Crossing as the mines have used the water, but there may be plenty of water in the creeks and bores west of Elthin Crossing.

Cliff may have a good flow into his well, with water two meters from the surface, but as he is upstream of the monitoring point he will still have his water use restricted by Water Resources. Irrigation may be permanently restricted to perhaps four hours per day. This is not viable for irrigation farming. Cliff's farm would no longer be financially viable.

### **Leard Pilliga tours and the FLAC camp history**

The first tour was organised by Carmel Flint and members of the National Parks Association Armidale in September 2011. The group was shocked by the damage to the Pilliga Forest. Few people knew of, or had witnessed this devastation. Tony Pickard, Carmel Flint and the Coonabarabran Environment Group appeared to be the only concerned people. We decided that the tours must continue. Getting people to visit this remote forest seemed the only way to save The Pilliga.

Muzz, Tania Marshall and John Simpson were on the April 2012 tour, Tania suggested we drive through Leard Forest. We were again shocked. Leard Forest was being clear-felled and mined.

In 2012 Carmel Flint and Drew Hutten organised a blockade at the Boggabri Coal Mine haul road, Tania participated with the North West Alliance in this first blockade. Tania and Cliff met at the blockade, Cliff offered an invitation to camp on Wando. On 8.5.12 Tania and Muzz took him up on the offer. Muzz packed his Tepee in the Northern Rivers and moved to Wando. Jonathon Moylan from FLAC Newcastle joined Wando camp. In June Muzz, Tania, Cliff, Jono and I got together at cliff's place. We decided on the camp site in Leard Forest, to be closer to the action. I am employed in Armidale and able to offer very limited support. Cliff visited the forest camp almost every day after working on his farm, he set up a tent with 2 beds, he and his dog Charcoal slept at the there many nights, leaving at 2-4am to start again. Muzz and Jono rarely left. Tania, Margie McClean, Barry Griffiths, John Simpson and Scotty and I became regulars at the camp. There were many times when Muzz or Jono were alone in the camp.

Muzz and I teamed up and continued the Leard Pilliga tours. Leard listen-up music festivals brought crowds to Leard Forest. Activists numbers grew, locals met at the camp. The Greens campaigned in parliament. 'Lock the Gate' grew in strength, local farmers became aware of the mining threat. Muzz, Jono, Cliff and the activists occupied the camp in the forest for 560 days. The Wilderness Society set up the protest camp in The Pilliga. On 3.2.14 police closed both Pilliga and Leard forests, supposedly due to fire risk. The Pilliga camp temporarily moved to private property. Cliff invited Leard activists to move back to his farm. Greenpeace helped with infrastructure on Wando.

Narrabri Council has hounded Cliff, but he has refused to evict the activists. It is unlikely the council has legislation to back their intimidation. They cannot stop a farmer having relatives, workers or guests' camp on their land. The council are constantly harassing Cliff. There have been many letters exchanged between Greenpeace and the Narrabri Council. They have inspected the camp kitchen and facilities, and requested development applications, usually unnecessary for a temporary camp. The camp continues.

What Can You Do?

## Keep informed

Frontline Action on Coal (FLAC) – <http://frontlineaction.org>

FLAC Facebook- <https://www.facebook.com/FrontLineActionOnCoal>

Maules Creek Community Council – <http://www.maulescreek.org/>

Facebook – Stop Coal Seam Gas in the Pilliga! <https://www.facebook.com/groups/117313438349153/>  
[www.stoppilligacoalseamgas.com.au](http://www.stoppilligacoalseamgas.com.au)

Lock the Gate Alliance <https://www.facebook.com/groups/gas.alliance/>  
<http://www.lockthegate.org.au>

Leard State Forest organising space – <https://www.facebook.com/groups/168100840051969/>

The Wilderness Society – [www.wilderness.org.au/campaigns/pilliga-forest](http://www.wilderness.org.au/campaigns/pilliga-forest)

Greenpeace-

<http://www.greenpeace.org/australia/en/what-we-do/climate/stop-the-maules-creek-mine/>

## Hold a movie evening. Some suggestions:

MINING THE TRUTH – [www.miningthetruth.org.au](http://www.miningthetruth.org.au)



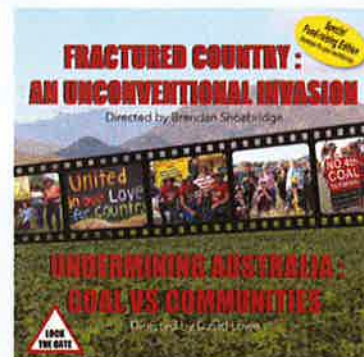
In 2012, 60 young people travelled to mining communities around Australia. They heard from traditional owners, miners, doctors, farmers, parents and others who have experienced the impacts of coal and gas development.

'Mining The Truth' documents their stories.

FRACTURED COUNTRY: An Unconventional Invasion  
Directed by Brendan Shoebidge

UNDERMINING AUSTRALIA : Coal vs Communities  
Directed by David Lowe

Two groundbreaking half-hour documentaries on DVD- about the impacts of coal and unconventional gas mining on Australia. They feature the personal stories of Australians whose lives have been changed forever, and their courageous efforts to protect the country we love.



<http://www.lockthegate.org.au/shop#!/~/product/category=6467277&id=27567957>

## Write letters and do social media

**Write to politicians and newspapers;** local, state and federal.

Include environment ministers, the Premier, the Prime Minister, any newspapers, letters to the editor, articles and photos to newspapers; share on facebook; twitter, join GetUp.



## Protest

Consider protesting, maybe choose to get arrested.



*Kat the daredevil bat.  
Kat dressed as a bat and hung  
up-side-down to depict  
the plight of the endangered bats  
in Leard State Forest*



*Gomerioi people protest against Whitehaven coal,  
July 2013*



*A tripod sitter stopping clearing at Leard Forest*



*If a 63 year old grandmother has to lock  
on to coal seam gas  
equipment in the rain, to stop Santos  
from ruining Great Artesian Basin...  
Australian government is not working*

*Pat locked on to a drill rig moving truck in Pilliga Forest.  
March 2014*





An aerial view of the Pilliga State Forest. Photo: Dean Sewell

*An aerial view of Pilliga State Forest.  
Photo Dean Sewell*

**This book has information about the damage caused to Leard and Pilliga Forests, the water table and our farmlands by coal and coal seam gas mining. It highlights the lack of government regulation, and the failure of self-regulation.**

**It includes suggested self-guided tours, maps and tourist information.**