Planning and Environment
NSW Government

Submission into the Narrabri Gas Project

Thank you for this opportunity to make a submission to the Narrabri Gas Project.

I work in the field of biodiversity and ecology and I also have an interest in speoleology, ground water and ground water dependant ecosystems and in particular stygofauna which are the small organisms that live within groundwater. Stygofauna is a field of science for which the New South Wales government is falling far behind other states in Australia and the world. I have a bachelor of science, with tertiary studies in the field of biohealth, toxicology and earth sciences and I also have a graduate diploma in Land Rehabilitation. Unconventional gas (UCG) will have an extremely negative and devastating impact on groundwater which will then lead on to have very significant negative impacts on human health and agriculture in rural NSW as well as groundwater dependant ecosystems.

I do not support UCG drilling and fracking in NSW or anywhere else in Australia. The short and long term risks far outweigh any perceived short term benefit which will largely be to foreign owned companies. UCG will leave a long-term, costly and damaging legacy that will continue to burden local communities, the Australian Tax payer and economy into the future due to the infinite ongoing maintenance of tens of thousands of UCG wells and the environmental damage that these leaky UCG wells will cause to both human health and the environment.

There is enough evidence now as to the adverse risk to health, environment, climate change and earthquakes, none of which can be mitigated against, to justify both the NSW and Australian governments to place an outright and permanent ban on all forms of onshore unconventional gas drilling and fracking in NSW and Australia. The NSW Government should also be very concerned about what is going on and being proposed in other states such as Queensland as our groundwater aquifers are linked.

Based on the experience in other parts of the world where the industry is more advanced, including here in Australia and in North America, I do not believe that this industry can co-exist safely with other land uses like farming, conservation, and tourism.

The weight of peer reviewed scientific information about the risks and harms that UCG fracking poses has significantly grown in the last couple of years. I have attached a couple of compendium reports that form a critical part of my submission and I strongly urge you to read these documents carefully as they provide the most up to date information available.

The following is an extract from the COMPENDIUM OF SCIENTIFIC, MEDICAL, AND MEDIA FINDINGS DEMONSTRATING RISKS AND HARMS OF FRACKING (UNCONVENTIONAL GAS AND OIL EXTRACTION) (pages 2-3)

*"First, **growing evidence shows that regulations are simply not capable of preventing harm**. That is both because the number of wells and their attendant infrastructure keeps increasing and, more importantly, because some of fracking's many component parts, which include the subterranean geological landscape itself, are simply not controllable.*

As noted last month in a new study on fracking related air pollution in northeastern Colorado: even though the volume of toxic emissions per well might be decreasing, overall air quality in the shale field continues to deteriorate as the rapid, continuing increase in the number of wells cancels out improvements to air quality brought about by more stringent regulations. See footnote 4. Similarly,the results of a new study from Texas raises the possibility that methane can migrate into aquifers through unseen cracks and fissures in the rock surrounding the wellbore in ways that no cementing and casing protocols, however strictly applied, can prevent. (See footnotes 55 and 56.) New findings from West Virginia show how unmapped, long-abandoned wells, including those drilled generations ago, can become re-pressurized during nearby fracking operations and serve as conduits for the contamination of drinking water.(See footnote 57.) A new study by Princeton researchers working in Pennsylvania found that, many decades after their abandonment, plugged and unplugged wells alike leaked significant amounts of methane into the atmosphere. There are an estimated three million abandoned oil and gas wells in the United States; the locations of many are unmapped and unknown. (See footnotes 265and 266.) No set of regulations can obviate these problems.

*Second, **drinking water is at risk from drilling and fracking activities and associated waste disposal practices.** As documented by the Pennsylvania Department of Environmental Protection in a review of its records, 234 private drinking water wells in Pennsylvania have been contaminated by drilling and fracking operations during the past seven years. These do not include drinking water wells contaminated by spills of fracking waste water or wells that went dry as a result of nearby drilling and fracking activities. (See footnotes 68 and 69.) In California, the injection of liquid fracking waste directly into groundwater aquifers threatens contamination of large numbers of public drinking water supplies. See footnote 78.)*

*Third, **drilling and fracking emissions often contain strikingly high levels of benzene.** A potent human carcinogen, benzene has been detected in the urine of well pad workers (at levels known to raise risks for leukemia), in private drinking water wells contaminated by fracking operations, and in ambient air at nearby residences. In some cases, concentrations have far exceeded federal safety standards. Such exposures represent significant public health risks. (See footnotes 3–8, 12, 57, 174.)*

*Fourth, public **health problems associated with drilling and fracking are becoming increasingly apparent**. Documented indicators variously include increased rates of hospitalization, ambulance calls, emergency room visits, self-reported respiratory and skin problems, motor vehicle fatalities, trauma, drug abuse, infant mortality, congenital heart defects, and low birth weight.(See footnotes 192–205.)*

*Fifth, natural **gas is a bigger threat to the climate than previously supposed**. Methane is not only a more potent greenhouse gas than formerly appreciated, real-world leakage rates are higher than predicted. Within the last five months, multiple teams of independent scientists have published data on fugitive emissions that, all together, call into question earlier presumed climate benefits from replacing coal with natural gas. Further, evidence increasingly suggests that the natural gas abundance brought by fracking is slowing the*

transition to renewable energy and is thus exacerbating, rather than mitigating, the climate change crisis. (See footnotes 313–318.)"

The compendium also summarizes the risks and harms in the executive summary as follows

Executive summary (pages 7 – 11)
Evidence of risks, harms, and associated trends demonstrated by this Compendium:

· ***Air pollution*** *– Studies increasingly show that air pollution associated with drilling and fracking operations is a grave concern with a range of impacts. Researchers have documented dozens of air pollutants from drilling and fracking operations that pose serious health hazards. Areas with substantial drilling and fracking build-out show high levels of ozone, striking declines in air quality, and, in several cases, increased rates of health problems with known links to air pollution. Air sampling surveys find exceedingly high concentrations of volatile organic compounds, especially carcinogenic benzene and formaldehyde, both at the wellhead and at distances that exceed legal setback distances from wellhead to residence. In some cases, concentrations exceeded federal safety standards by several orders of magnitude.*

· ***Water contamination*** *– Emerging science confirms that drilling and fracking inherently threaten groundwater. In Pennsylvania alone, more than 240 private drinking water wells have been contaminated or have dried up as the result of drilling and fracking operations over a seven-year period. A range of studies from across the United States presents strong evidence that groundwater contamination occurs and is more likely to occur close to drilling sites. The nation's 172,000 injection wells for disposal of fracking waste also pose demonstrable threats to the drinking water aquifers. Disposal of fracking waste in sewage treatment plants can encourage the formation of carcinogenic byproducts during chlorination. Overall, the number of well blowouts, spills and cases of surface water contamination has steadily grown. Meanwhile, the gas industry's use of "gag orders," non-disclosure agreements and settlements impede scientific study and stifle public awareness of the extent of these problems.*

· ***Inherent engineering problems that worsen with time*** *– Studies and emerging data consistently show that oil and gas wells routinely leak, allowing for the migration of natural gas and potentially other substances into groundwater and the atmosphere. Recent research suggests that the act of fracking itself may induce pathways for leaks. Leakage from faulty wells is an issue that the industry has identified and for which it has no solution. For instance, Schlumberger, one of the world's largest companies specializing in fracking, published an article in its magazine in 2003 showing that about five percent of wells leak immediately, 50 percent leak after 15 years and 60 percent leak after 30 years. Data from Pennsylvania's Department of Environmental Protection (DEP) for 2000-2012 show over nine percent of shale gas wells drilled in the state's northeastern counties leaking within the first five years. Leaks pose serious risks including potential loss of life or property from explosions and the migration of gas or other chemicals into drinking water supplies. Leaks also allow methane to escape into the atmosphere, where it acts as a powerful greenhouse gas. There is no evidence to suggest that the problem of cement and well casing impairment is abating. Indeed, a 2014 analysis of more than 75,000 compliance reports for more than 41,000 wells in Pennsylvania found that newer wells have higher*

leakage rates and that unconventional shale gas wells leak more than conventional wells drilled within the same time period. Industry has no solution for rectifying the chronic problem of well casing/cement leakage.

· ***Radioactive releases –*** *High levels of radiation documented in fracking wastewater from shale raise special concerns in terms of impacts to groundwater and surface water. Studies have indicated that the Marcellus Shale is more radioactive than other shale formations. Measurements of radium in fracking wastewater in New York and Pennsylvania have been as high as 3,600 times the United States Environmental Protection Agency's (EPA) limit for drinking water. One recent study found toxic levels of radiation in a Pennsylvania waterway even after fracking wastewater was disposed of through an industrial wastewater treatment plant. In addition, the disposal of radioactive drill cuttings is a concern. Unsafe levels of radon and its decay products in natural gas produced from the Marcellus Shale, known to have particularly high radon content, may also contaminate pipelines and compressor stations, as well as pose risks to end-users when allowed to travel into homes.*

· ***Occupational health and safety hazards*** *– Fracking jobs are dangerous jobs. Occupational hazards include head injuries, traffic accidents, blunt trauma, burns, toxic chemical exposures, heat exhaustion, dehydration, and sleep deprivation. As a group, oil and gas industry workers have an on-the-job fatality rate that is 2.5 times higher than the construction industry and seven times that of general industry. A new investigation of occupational exposures found high levels of benzene in the urine of workers on the wellpad, especially those in close proximity to flowback fluid. Exposure to silica dust, which is definitively linked to silicosis and lung cancer, was singled out by National Institutes for Occupational Safety and Health as a particular threat to workers in fracking operations where silica sand is used. At the same time, research shows that many gas field workers, despite these serious occupational hazards, are uninsured or underinsured and lack access to basic medical care.*

· ***Public health effects, measured directly*** *– In Pennsylvania, as the number of gas wells increases in a community so to do rates of hospitalization. Drilling and fracking operations are correlated with elevated motor vehicle fatalities (Texas), self-reported skin and respiratory problems (southwestern Pennsylvania), ambulance runs and emergency room visits (North Dakota), infant deaths (Utah), birth defects (Colorado), and low birthweight (multiple states). Benzene levels in ambient air surrounding drilling and fracking operations are sufficient to elevate risks for future cancers in both workers and nearby residents, according to new studies.*

· ***Noise pollution, light pollution and stress –*** *Drilling and fracking operations and ancillary infrastructure expose workers and nearby residents to continuous noise and light pollution that is sustained for periods lasting many months. Chronic exposure to light at night is linked to adverse health effects, including breast cancer. Sources of fracking-related noise pollution include blasting, drilling, flaring, generators, compressor stations and truck traffic. Exposure to environmental noise pollution is linked to cardiovascular disease, cognitive impairment, and sleep disturbance. Workers and residents whose homes, schools and workplaces are in close proximity to well sites are at risk from these exposures as well as from related stressors. A UK Health Impact Assessment identified stress and anxiety resulting from drilling-related noise—as well as from a sense of uncertainty about the future and eroded public trust—as key public health risks related to fracking operations.*

· ***Earthquake and seismic activity*** *– A growing body of evidence, from Ohio, Arkansas, Texas, Oklahoma and Colorado, links fracking wastewater injection (disposal) wells to earthquakes of magnitudes as high as 5.7, in addition to "swarms" of minor earthquakes and fault slipping. Many recent studies focus on the mechanical ability of pressurized fluids to trigger seismic activity. In some cases, the fracking process itself has been linked to earthquakes and seismic activity, including instances in which gas corporations have acknowledged the connection. In New York, this issue is of particular concern to New York City's aqueduct-dependent drinking water supply and watershed infrastructure, as the New York City Department of Environmental Protection (NYC DEP) has warned repeatedly, but similar concerns apply to all drinking water resources. The question of what to do with wastewater remains a problem with no viable, safe solution.*

· ***Abandoned and active oil and natural gas wells (as pathways for gas and fluid migration)*** *– Millions of abandoned and undocumented oil and gas wells exist across the United States, according to the U.S. Department of Energy. All serve as potential pathways for pollution, heightening the risks of groundwater contamination and other problems when horizontal drilling and fracking operations intersect with pre-existing vertical channels leading through drinking water aquifers and to the atmosphere. New research from Pennsylvania shows that, cumulatively, abandoned wells are a significant source of methane into the atmosphere and may exceed cumulative total leakage from oil and gas wells currently in production. No state or federal agency routinely monitors methane leakage from orphaned and abandoned wells. Industry experts, consultants and government agencies including the U.S. Environmental Protection Agency, the U.S. General Accounting Office (now the Government Accountability Office), Texas Department of Agriculture, New York State Department of Environmental Conservation, Pennsylvania Department of Environmental Protection, Illinois Environmental Protection Agency and the British Columbia Oil and Gas Commission have all warned about problems with abandoned wells due to the potential for pressurized fluids and gases to migrate through inactive and in some cases, active wells.*

· ***Flood risks –*** *Massive land clearing and forest fragmentation that necessarily accompany well site preparation increase erosion and risks for catastrophic flooding, as do access roads, pipeline easements and other related infrastructure. In addition, in some cases, operators choose to site well pads on flood-prone areas in order to have easy access to water for fracking, to abide by setback requirements intended to keep well pads away from inhabited buildings, or to avoid productive agricultural areas. In turn, flooding increases the dangers of unconventional gas extraction, resulting in the contamination of soils and water supplies, the overflow or breaching of containment ponds, and the escape of chemicals and hazardous materials. In at least six of the past ten years, New York State has experienced serious flooding in parts of the state targeted for drilling and fracking. Some of these areas have been hit with "100-year floods" in five or more of the past ten years. Gas companies acknowledge threats posed by flooding, and the New York State Department of Environmental Conservation (DEC) has recommended drilling be prohibited from 100-year flood areas; however, accelerating rates of extreme weather events make existing flood maps obsolete, making this approach insufficiently protective.*

· ***Threats to agriculture and soil quality –*** *Drilling and fracking pose risks to the agricultural industry. In California, fracking wastewater illegally dumped into aquifers has threatened crucial irrigation supplies to farmers in a time of severe drought. Studies and case reports from across the country have highlighted instances of deaths, neurological*

disorders, aborted pregnancies, and stillbirths in cattle and goats associated with livestock coming into contact with wastewater. Potential water and air contamination puts soil quality as well as livestock health at risk. Additionally, farmers have expressed concern that nearby fracking operations can hurt the perception of agricultural quality and nullify value-added organic certification.

· ***Threats to the climate system –*** *A range of studies has shown high levels of methane leaks from gas drilling and fracking operations, undermining the notion that natural gas is a climate solution or a transition fuel. Major studies have concluded that early work by the EPA greatly underestimated the impacts of methane and natural gas drilling on the climate. Drilling, fracking and expanded use of natural gas threaten not only to exacerbate climate change but also to stifle investments in, and expansion of, renewable energy.*

· ***Inaccurate jobs claims, increased crime rates, threats to property value and mortgages and local government burden*** *– Experiences in various states and accompanying studies have shown that the oil and gas industry's promises for job creation from drilling for natural gas have been greatly exaggerated and that many of the jobs are short-lived and/or have gone to out-of-area workers. With the arrival of drilling and fracking operations, communities have experienced steep increases in rates of crime – including sex trafficking, sexual assault, drunk driving, drug abuse, and violent victimization, all of which carry public health consequences, especially for women. Social costs include strain on law enforcement, municipal services and road damage. Economic analyses have found that drilling and fracking operations threaten property values and can diminish tax revenues for local governments. Additionally, gas drilling and fracking pose an inherent conflict with mortgages and property insurance due to the hazardous materials used and the associated risks.*

· ***Inflated estimates of oil and gas reserves and profitability*** *– Industry estimates of oil and gas reserves and profitability of drilling have proven unreliable, casting serious doubts on the bright economic prospects the industry has painted for the public, media and investors. Increasingly, well production has been short-lived, which has led companies drilling shale to reduce the value of their assets by billions of dollars, creating shortfalls that are largely filled through asset sales and increasing debt load, according to a recent analysis by the US Energy Information Administration.*

· ***Disclosure of serious risks to investors*** *– Oil and gas companies are required to disclose risks to their investors in an annual Form 10-K. Those disclosures acknowledge the inherent dangers posed by gas drilling and fracking operations, including leaks, spills, explosions, blowouts, environmental damage, property damage, injury and death. Adequate protections have not kept pace with these documented dangers and inherent risks.*

· ***Medical and scientific calls for more study and more transparency*** *– With increasing urgency, groups of medical professionals and scientists are issuing calls for comprehensive, long-term study of the full range of the potential health and ecosystem effects of drilling and fracking. These appeals underscore the accumulating evidence of harm, point to the major knowledge gaps that remain, and denounce the atmosphere of secrecy and intimidation that continues to impede the progress of scientific inquiry. Health professionals and scientists in the United States and around the world have urged tighter regulation of and in some cases, suspension of unconventional gas and oil extraction activities in order to limit, mitigate or eliminate its serious, adverse public health hazards.*

Source: Concerned Health Professionals of New York. (2014, December 11). Compendium of scientific, medical, and media findings demonstrating risks and harms of fracking (unconventional gas and oil extraction) (2nd ed.).

This report forms part of my submission, please print the report attached to the link

http://concernedhealthny.org/compendium/.

All of these issues need to be adequately addressed before any unconventional gas developments occur

I would also like to direct the committee's attention to the very comprehensive report prepared for New York State that lead to them placing a ban on further UCG fracking. FINAL SUPPLEMENTAL GENERIC ENVIRONMENTAL IMPACT STATEMENT ON THE OIL, GAS AND SOLUTION MINING REGULATORY PROGRAM. Regulatory Program for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs. Volume 1: Final Supplemental Generic Environmental Impact Statement Volume 2: Response to Comments. May 2015

An excerpt from the executive summary states

"On December 17, 2014, New York State Department of Health (NYSDOH) advised the Department of Environmental Conservation that there are several potential adverse environmental impacts that can result from high-volume hydraulic fracturing which may be associated with adverse public health outcomes. These impacts include:
1) air impacts that could affect respiratory health due to increased levels of particulate matter, diesel exhaust, or volatile organic chemicals;
2) climate change impacts due to methane and other volatile organic chemical releases to the
atmosphere ;
3) drinking water impacts from underground migration of methane and/or fracturing fluid chemicals associated with faulty well construction or seismic activity;
4) surface spills potentially resulting in soil, groundwater, and surface water contamination;
5) surface water contamination resulting from inadequate wastewater treatment;
6) earthquakes and creation of fissures induced during the hydraulic fracturing stage; and
7) community character impacts such as increased vehicle traffic, road damage, noise, odor complaints, and increased local demand for housing and medical care.
NYSDOH concluded that "until the science provides sufficient information to determine the level of risk to public health from HVHF to all New Yorkers and whether the risks can be adequately managed … HVHF should not proceed in New York State.""

This report forms part of my submission, see attached link: http://www.dec.ny.gov/energy/75370.html

1. it has been demonstrated that the development of the associated infrastructure of unconventional gas development, including pipelines and access tracks and roads, results in subtle changes to the surface hydrology which can have dramatic adverse impacts on the ecology and productivity of the landscape. These subtle changes are often over looked

2. Don't waste our precious water on UCG fracking!

What seems to have been forgotten in the UCG debate is the fact that Australia is the driest continent on the planet. Water is the most precious resources we have, not UCG! 2.

3. The Narrabri Gas Project has a long history of spills and leaks of toxic CSG water—Santos cannot be trusted to manage the project safely

Santos has already contaminated a freshwater aquifer in the Pilliga with uranium at levels 20 times higher than safe drinking water guidelines, as well as lead, aluminium, arsenic and barium[2]. In addition, there have been over 20 reported spills and leaks of toxic CSG water from storage ponds, pipes and well heads. Santos cannot be trusted.

4. Human health is compromised by coal seam gas

A range of hydrocarbons and volatile organic compounds can be released into the air from coal seam gas operations, including flaring of gas wells. The effects of volatile organic compounds vary, but can cause eye, nose and airway irritation, headache, nausea, dizziness and loss of coordination[4]. These impacts have been documented in human populations nearby to existing gasfields in Queensland, Sydney and in America.

Very few studies into the health impacts of unconventional gas have been undertaken in Australia yet but this particular independent study in the Tara region of Queensland raises some serious concerns. A summary of the finding within the report Symptomatology of a gas field . -An independent health survey in the Tara rural residential Estates and environs APRIL 2013, Geralyn McCarron MB BCh BAO FRACGP is shown below:"

Thirty five households in the Tara residential estates and the Kogan/Montrose region were surveyed in person and telephone interviews were conducted with three families who had left the area. Information was collected on 113 people from the 38 households.
82. 58% of residents surveyed reported that their health was definitely adversely affected by CSG, whilst a further 19% were uncertain. The pattern reported was outside the scope of what would be expected for a small rural community. In all age groups there were reported increases in cough, chest tightness, rashes, difficulty sleeping, joint pains, muscle pains and spasms, nausea and vomiting. Approximately one third of the people over 6 years of age were reported to have spontaneous nose bleeds, and almost three quarters were reported to have skin irritation. Over half of children were reported to have eye irritation. A range of symptoms were reported which can sometimes be related to neurotoxicity (damage to the nervous system).

http://www.ntn.org.au/wp/wp-content/uploads/2013/05/Symptomatology-of-a-gas-field-An-independent-health-survey-in-the-Tara-rural-residential-estates-and-environs-April-2013.pdf

This independent report by Dr Geralyn McCarron also shows that the Queensland Government Health Report titled 'Coal seam gas in the Tara region: summary risk assessment of health complaints and environmental monitoring data report' has no credibility at all. She states that "*The Queensland government undertook minimal non-systematic environmental sampling, and relied mainly on inadequate industry commissioned data. The investigation of patient symptoms was grossly underfunded and understaffed, with no medical staff actually visiting the site. Only 15 people were examined clinically. Positive findings of volatile chemicals were dismissed, despite the fact they are potentially capable of causing health impacts, especially over long periods of time.*" The Queensland government report also refers to only 7 documents none of which refer to the health issues related to UCG being found in America. The Queensland Report also makes the statement the "A range of information available to the Department of Health up to February 2013 was used for the assessment. As further information becomes available over time, it will require specific evaluation. That may necessitate amendment to this assessment." As my submission demonstrates there is now a wealth of research into the adverse health impacts of UCG and it is long overdue for the Queensland Government to review and amend their Health Report. The Queensland Government Health Report should therefore not be used as evidence in the current Victorian Government inquiry.

There is a great deal of research and investigation currently going on in America at present and I would like to direct the committee's attention to the following document 'Towards an understanding of the environmental and public health impacts of shale gas development: an analysis of the peer-reviewed scientific literature, 2009-2014' **"***which is a new working paper analysis from the energy science organization, PSE Healthy Energy. Covering a wide range of outcomes—air pollution, water contamination, and public health—the PSE Healthy Energy analysis* ***is a statistical evaluation of the approximately 400 peer-reviewed studies to date on the impacts of fracking.***

Among the key findings:

- *96% of all studies published on health impacts indicate potential risks or adverse health outcomes.*
- *87% of original research studies published on health outcomes indicate potential risks or adverse health outcomes.*
- *95% of all original research studies on air quality indicate elevated concentrations of air pollutants.*
- *72% of original research studies on water quality indicate potential, positive association, or actual incidence of water contamination.*
- ***There is an ongoing explosion in the number of peer-reviewed publications on the impacts of shale or tight gas developments: approximately 73% of all available scientific peer-reviewed papers have been published in the past 24 months, with a current average of one paper published each day."***

http://www.ernstversusencana.ca/wp-content/uploads/2014-11-26-PSE-Scientific-Database-Analysis-and-Appendix.pdf

In support of the health issues associated with UCG, I would also like to provide the following quotes from scientists studying the issues of UCG

Anthony Ingraffea, PhD, Dwight C. Baum Professor of Engineering, Cornell University, said, "*In 2008*, when New York State first declared a moratorium on fracking, only six peer-reviewed papers on the health and environmental impacts had been published. Now there are more than 400, and the vast majority show a clear and present danger. What's more, many problems are unfixable by regulations of any kind. It was a wise governor who said 'wait' in 2008*. And it is wise to continue to wait."*

Sheila Bushkin-Bedient, MD, MPH, of the Institute for Health and Environment at the State University of New York, and Concerned Health Professionals of New York, said**,** "*In compiling hundreds of important scientific, medical, and media findings about drilling and fracking, we found many areas of serious concern to public health, water, the environment, and economic vitality. Science is still catching up to the rapid expansion of fracking, but what we know already is deeply disconcerting. The vast majority of studies show that fracking cannot be done safely, without harm to people and the environment."*

Yuri Gorby, PhD, the Blitman Chair in Environmental Engineering at Rensselaer Polytechnic Institute, who has investigated the impacts of drilling and fracking in Pennsylvania and West Virginia, said, "*The rapidly emerging science on drilling and fracking increasingly confirms many earlier anecdotal reports of harm, including serious health ailments and water contamination. The science on fracking is still young. We are confident that another three to five years will seal the deal: fracking is an incorrigible danger to air, water, climate and health and cannot be regulated into safety."*

http://www.ernstversusencana.ca/state-of-science-on-harms-by-fracking-to-public-health-and-water-health-professionals-scientists-release-analysis-of-400-peer-reviewed-studies-on-fracking-along-with-major-scientific-compendium

5. The Narrabri Gas Project risks precious water sources, including the Great Artesian Basin—Australia's largest groundwater aquifer

The Narrabri gasfield poses a real risk to our two most precious water resources: the Great Artesian Basin and the Murray-Darling Basin. The area of the Great Artesian Basin with the highest recharge rates is almost entirely contained within the Pilliga East forest. In a worst-case scenario, the water removed for CSG extraction could reduce water pressure in the recharge areas—potentially stopping the free flow of waters to the surface at springs and bores across the whole Great Artesian Basin.[1]

Creeks in the Pilliga run into the Namoi River—a part of the Murray Darling Basin. This system is vulnerable to contamination from drilling fluid spills and the salty treated water produced from the proposed 850 wells.

6. Thousands of tonnes of salt waste will result from the project

Santos has no solution for disposing of the hundreds of thousands of tonnes of salt that will be produced. Between 17,000 and 42,000 tonnes of salt waste would be produced each year. This industry would leave a toxic legacy in NSW.

7. The Gamilaraay Traditional Custodians are opposed

There are hundreds of cultural sites as well as songlines and stories connecting the Gamilaraay to the forest and to the groundwater beneath. Gamilaraay people are deeply involved in the battle against CSG, and have told Santos they do not want their country sacrificed for a coal seam gas field.

8. Farmers and other local community reject the project

Extensive community surveys have shown an average of 96% opposition to CSG. This stretches across a massive 3.2 million hectares of country surrounding the Pilliga forest, including 99 communities. Hundreds of farmers have participated in protest actions unlike any previously seen in the region.

9. The Pilliga is a haven for threatened wildlife

The Pilliga is one of 15 nationally listed 'biodiversity hotspots' and is vital to the survival of threatened species like the Koala, Spotted-tailed Quoll, Black-striped Wallaby, Eastern Pygmy-possum, Pilliga Mouse and South-eastern Long-eared Bat. The forest is home to over 200 bird species and is internationally recognised as an Important Bird Area[2]. The Santos gasfield would fragment 95,000 hectares of the Pilliga with well pads, roads, and water and gas pipelines—damaging vital habitat and threatening the survival of endangered species.

10. Coal seam gas fuels dangerous climate change

Methane is by far the major component of natural gas, and is a greenhouse gas 72 times more powerful than CO_2. CSG fields contribute to climate change through the leakage of methane during the production, transport, processing and use of coal seam gas.

11. The nation's premier optical astronomical observatory is at risk

The Siding Springs Observatory, situated in the Warrumbungles and adjacent to the Pilliga, is under threat from the Narrabri Gas Project due to light and dust pollution[5]. The area has been internationally recognised as a 'dark sky park'[6] and the 50m high gas flares proposed by Santos threaten the viability of the facility.

12. Risk of fires would increase throughout the Pilliga's tinder-box conditions

Methane flare stacks up to 50m high would be running day and night, even on total fire ban days. The Pilliga is prone to severe bushfires. The project would increase ignition sources as well as extracting, transporting and storing a highly flammable gas right within this extremely fire-prone forest.
- See more at: https://www.wilderness.org.au/final-push-pilliga#sthash.Rrd8Xikv.dpuf

UP FRONT NON-REFUNDABLE MAINTENANCE MONEY FOR EACH UCG WELL

If the NSW government still wants to allow the dangerous process of unconventional gas fracking to go ahead then the following measures should be included in legistlation

Prior to each UCG well being drilled a non-refundable amount of money needs to be secured in a special government account that will be used to fund the infinite monitoring and ongoing maintenance costs that each of these well will require. Industry studies show that there is an immediate well failure rate of at least 6%, which increases to a 50% failure rate after 30 years and the failure rate of wells continues to increase over time. No well can be give an infinite 100% guarantee the it will never fail! This non refundable amount of money would need to cover a minimum of 10 repairs sufficiently indexed over a 200 year time frame.