

Comment on the Department of Planning, Industry and Environment's

Response to the Independent Planning Commission Questions

Seeking 'Additional Materials' for Santos' Narrabri Gas Project

Question 1, Ecologically Sustainable Development

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August 21, 2020

Thank you, Independent Planning Commissioners (IPC), for the opportunity to 'Comment' on the Department of Planning, Industry and Environment's (DPIE, or Department) '*Response to Independent Planning Commission [IPC] Questions*' provided to the Commission on 14 August, 2020. May I commend you on your choice of 'Questions' for which you are seeking 'Additional Material'.

I will focus on the IPC's first question: '*whether and how the Department considers that the Project (if approved) would be Ecologically Sustainable Development (ESD) and what principles and programs of ESD have been implemented in the Department's assessment of the Project and the Department's recommended conditions of consent*'? My *Presentation* (Fleming, 2020 a) to the IPC Hearing (24 07 2020), and subsequent IPC submission (Fleming, 2020b), highlighted Santos' failure to address ESD in significant sections of their EIS.

Expertise

My Ph.D. is in Chemistry. I have worked in industry, analysing boiler water for saline contamination, to identify boiler failure from corrosion, similar to what will occur with CSG well casings, and tubes. Tertiary teaching has included environmental and pollution studies. As the elected Chairperson for two large tertiary educational institutions' OHS Committees, I have considerable experience in risk management procedures.

My Presentation to the IPC Hearing (Fleming, 2020 a) considered the eventual corrosion of well casings as an example of Santos' failure to acknowledge established science principles (if their project was to be approved). The breach of several ESD Laws was identified.

My submission to the IPC (Fleming, 2020 b) expanded from the important corrosion issue to incorporate the six original issues identified in my DPIE submission (Fleming, 2017). All issues identified ESD failures, whilst one also breached an OHS Law.

This **Comment to the IPC** will address DPIE's apparent complicit actions in supporting the Narrabri Gas Project whilst Santos fails to address our ESD Laws, clarification for which is sought through the IPC, '*Additional Materials*', *Question 1*.

Safety of Santos' Narrabri CSG Proposal

To be acceptable, an EIS must be scientifically **SAFE** in its operational environment. Implementation of the proposed '**SANTOS NARRABRI GAS PROJECT** cannot be scientifically safe in its sensitive Narrabri environment.

Introduction

(Please note: Page numbers for references to the Department's Response include David Kitto's attached introductory letter, as well.)

The DPIE's Response to the IPC *Question 1*, 'Additional Materials' for Santos' Narrabri Gas Project, is disappointing, for it fails to address the issues being sought by the IPC. The response is couched in general terms, which is consistent with the format of ESD Laws, themselves. The *Response* provides little of the detail, which was requested in *Question 1*. Instead, the *Response* is set within a cloak of NSW Administrative Regulations and Laws mystique. This does not assist the reader's understanding of DPIE's *reasons* for their decisions for ESD compliance claims.

DPIE identifies **Intra-generational Equity**, and **Inter Species Equity**, but fails to relate how Narrabri Gas project satisfies ESD. Instead, the Department has, without justification, 'concluded that the Narrabri Gas Project represents ESD' (p3)!

Inter-generational Equity is treated little better. Its three sub-Principles are identified, but the significance of each for the Santos Narrabri Gas Project is not detailed. The Department simply 'concluded that the Narrabri Gas Project is consistent with the principle of intergenerational equity as it can be carried out in a way that would maintain the health, diversity and productivity of the environment now and into the future; and that it would promote the social and economic welfare of the current generation without imposing any significant burdens on individuals or groups within the existing local or regional community and without compromising the needs of any future generations.'

The DPIE identified **Effective Integration of Economics, and Environmental Consideration in Decision Making Processes** as a key driver for the Department in its detailed assessment of the merits of the Narrabri Gas Project (Page 2). Little detail to justify the claim was contained in the *Response* itself and the *Reference* to which the reader was referred, *the Narrabri Gas Project* (NSW Department of Planning, Industry and Environment, 2020), did not appear to deliberately relate to ESD throughout the *Document*.

DPIE's *Response* fails to mention that ESD can also be achieved by implementing the **Principles of ESD**. However, the Department does refer to the **Precautionary Principle, Improved Valuation, Pricing and Incentive Mechanisms**, the **Polluter Pays** and **User Pays Principles**, and **Conservation of Biological Diversity and Ecological Integrity**. Little detail of how these ESD Principles apply to the Narrabri Gas Project is included in the DPIE *Response*. This was very disappointing for it fails to address the IPC Question.

A detailed comparison was drawn between the *six pivotal issues*, originally submitted to the DPIE, together with their operative ESD Laws, and the DPIE *Response* to ESD, on the same issues, for such detail was sought by the IPC, *Question 1*. This detail is contained in *Table 1, Appendix 1. For continuity and ease of reading, this significant comparison has been included as Appendix 1.*

Discussion

Table 1 demonstrates that from a review of six scientific principles applied in the Narrabri Gas Project will fail a number of ESD, as well as an OHS Law, if the Narrabri Gas Project should be approved for implementation.

In comparison, DPIE reports that following its evaluation of the same project *‘its detailed assessment and subject to the recommended conditions, the department has concluded that the Narrabri Gas Project represents ESD’* (page 3).

Two assessor results from considerations of the same proposed implementation strategy, have two very different outcomes! There is an obvious reason for the discrepancy. The two assessors are measuring two different aspects of the same system! Both are possibly correct for what each is measuring.

Table 1 considers the **actual** response by nature, and its natural rock strata, water layers, fossil fuels, related gaseous sources, and well casings in the proposed Narrabri Gas Field, over time.

The DPIE, is assessing Applicant compliance to a strict set of socially and legally constructed Administrative standards, hoops the Applicant is required to ‘jump through’. These sociologically developed Laws, Regulations and Rules are based on **people**, and **their** interactions. These Administrative Laws, Regulations and Rules might be important for Administrators, but they are irrelevant for measuring change in the natural world!

The aims of both sets of Laws, Regulations and Rules are very different in time scale, outcomes and purpose. Natural change **WILL** occur over time. Sociological change will only occur if the change is desired by the powerbrokers of the time, often for power and profit motives for the power brokers themselves.

In his *Presentation* at the IPC Hearing, 10 08 2020 and *IPC Question 1 Response, 14 08 2020*) Kitto indirectly confirms his, and his Department’s preferred dependence on sociological and economic benefits following the implementation of a particular Application. These benefits and burdens are defined in NSW and Department Laws, Regulations, and Rules. Being socially derived, they are largely **independent** from actions in our **natural world**. However, **when any change occurs on earth the affected components will act in such a way as to reverse the imposed change** (or minimise the effect of the imposed change). (This is a ‘rough’ translation of the *Natural Law of Equilibrium*). **We make a change on earth, the earth will react to reverse that change.** We extract water and CSG from a mine, natural equilibrium (dynamic equilibrium) induced in the affected land will try to reverse the change. **THIS DYNAMIC EQUILIBRIUM WILL OCCUR**, regardless of socially derived Civil, State and Department Regulations, Laws and Rules! These socially derived Laws, Regulations and Rules do not generally reflect our natural Laws. **Nature has been here for a long time. Nature will still be here long after *Homo sapiens* have departed from the earth. To delay our departure we need to work *with* nature, not against it.**

It is not the natural science laws that are the problem, here. Rather, it is our civil and administrative laws under which DPIE operates and administers its social requirements, which are the problems!

Our DPIE Administrators appear to have addressed the Narrabri Gas Project only from their socially developed Administrative Requirements, and not from the *natural science Principles*, and *Laws*, which have been determined by scientists through years of experimental research- chemistry, physics, geology, geophysics hydrology, and many more. Clearly, it is time that our Civil and Administrative Laws were upgraded to complement these findings, **yes: work with, our Laws of Nature!**

*For example, the Code of Practice for Coal Seam Gas (DPIE Response, Page 9) is described as a ‘best practice framework’ (NSW Resources and Geoscience, 2012). Unfortunately, these guidelines are general and administrative guidelines, and do not consider the long-term degradation of well casings and their concrete shields beyond decommissioning and abandonment. If the wells are left *in situ* following their abandonment, 100% of these wells will fail over time. Contamination of breached strata will be a natural consequence. The implementation of this ‘best practice’ framework is **designed to fail intra-generational Equity, inter-generational Equity, and Inter-species Equity**. And if this breakdown should occur in 50, or 100, or 300 years time following abandonment, who will be responsible to pay the **ESD Polluter Pays Principle** penalty? **Without ownership of pollution established *into the future*, at the time of *Determination*, our valuable ESD Laws will be bypassed, as has been outlined in this example.***

Commissioners, the Department (page 4) claims that speakers at the IPE *Hearing* ‘*focused primarily on some scientific uncertainties associated with the assessment, without providing any new information that materially changes the Departments’ assessment of the uncertainties*’.

You heard, and have access to, my *Presentation* to the IPC, (Fleming, 2020 a) and the message I shared is 100% chemically accurate – i.e. 100% of these wells will fail *over time* as their protective concrete shielding cracks and steel casings rust. Every well will fail resulting in contamination of all strata, the surface soil and atmosphere (Table 1, #1). We know this from fundamental chemistry principles. If the Department had seriously considered my *Presentation*, they could **NOT** have written that ‘*the Department does not believe there is any evidence available to support a conclusion that the project would result in serious or irreversible environmental damage, or even poses a credible threat of such damage occurring*’.

It is essential that an Applicant resolve the definitive science principles involved in a project, **before** attempting to meet the socially derived Administrative Requirements. This does not appear to have been required by DPIE in the Narrabri Gas project in its proposed, sensitive mining site. This omission has resulted in the significant ESD failures identified in *Table 1, Appendix 1*. **DPIE’s response to the IPC Question 1, is, therefore, INVALID.**

Specific Comments on DPIE's *Response to Ecologically Sustainable Development*

P3 The Department emphasises '*a whole range of economic social and environmental matters in a wholistic way*'. The Department has claimed this, but does not show **how** this will be achieved through implementation of the Santos Project.

P3 The heading for this section is '*Project Represents ESD*'

All 5 dot points are statements with NO justification.

I believe that without justification, the DPIE is in breach of ESD Law: **Distributive Justice**, for the reader is not afforded **Procedural Justice** – *a fair result reached by a fair process*.

Dot Point 3 *Would not cause serious or irreversible environmental damage.*

This claim by DPIE is untrue, as detailed in Table 1 (#1, #3, #4, #6).

Dot Point 5 *...required to fully rehabilitate the site following operations*

This DPIE claim is untrue as detailed in Table 1 (#1, #3, #6).

The Department does require Narrabri Gas Project's methodology to include above surface rehabilitation, but DPIE requirements fail to address below surface rehabilitation (NSW Resources and Geoscience, 2012). The shrinking, cracking and dissolving of the concrete shielding and plug, together with the corrosion of the well casing, provide a funnel for gas and fluid movement from the targeted coal seam, to intermingle and contaminate all strata, including the atmosphere. The methodology contained in the Code of Practice for CSG Well Integrity is flawed, for ESD will be compromised.

The Water Assessment Panel's (WAP) lack of data and its 'preferred wishes' have no bearing on the real, long-term outcomes of a gas field (Fleming, 2020). Given time, these natural corrosive actions will occur in **ALL ABANDONED WELLS**. The problem is not in the known science principles involved, but in NSW Governments own policies, and regulations for CSG mines, as well as present CSG monitoring policies and records that have led to the lack of reliable data over time. These **Departmental failures require significant revision before further mining, including Santos' Narrabri Gas Project, is approved in NSW**. Santos' EIS claim and the Departments approval of '*International Best Practice*' is only a pseudonym for maximising the mining Applicant's profits. It makes no sense of what happens in the real world, as illustrated in Table 1, Appendix 1.

It is clear that the failure of 100% of wells, over time, **is a natural outcome of CSG mining**. This result **will** breach **intra-generational equity, interspecies equity**, with early leakages failing **intra-generational equity**. **Conservation of quality** will be breached as well as '*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*'.

Commissioners, how can the DPIE justify their claim that the ‘Department has concluded that the Narrabri Gas Project represents ESD’ when it actually fails to meet ESD Laws and Principles? This claim is unjustifiable! These known science Laws and principles must be acknowledged, pre-determination!

P3 The Precautionary Principle

#1 The DPIE’s conclusion that the ‘*Narrabri Gas Project would not cause any serious or irreversible environmental damage, and consequently that it did not trigger the first of the pre-conditions for the precautionary principle to be triggered*’ is flawed! Table 1, Appendix 1, clearly confirms that DPIE has not seriously considered the scientific outcomes, should the Narrabri Gas Project’ be implemented.

#2 One would assume the Applicant must provide complete data for its total mining program before the Application can be considered for approval. Table I, #2, #3 and 5 (Appendix 1), confirm this has not been required for Santos’ Narrabri Gas Project. That the Department considers there is limited data available on the deeper geological strata confirms that they are not in a position to ‘pass judgement’ on the Narrabri Gas Project Application. The ‘*Department has recommended conditions*’ to be observed **whilst** gas extraction is undertaken. These ‘*conditions*’ *should be unnecessary if the Application is fully prepared and documented, pre-Determination!* The application would, therefore, appear to be incomplete, which is consistent with the findings tabulated in Table 1, #2, #3 and #5 (Appendix 1). The *Precautionary Principle* can only be minimised when all data is available.

The exclusion of data in the Narrabri Gas Project EIS, identified in Table 1, #2 and #5 (Appendix 1), prevents communities from participating meaningfully in decision-making, **clearly failing Procedural Justice and Recognition Justice Legislation.**

P4 I believe the three Dot Points are seriously erroneous.

Again, the reader is not afforded **Procedural Justice** for there is no justification for the DPIE’s conclusion.

P5/6 The eleven dot points are wildly fallacious!

Without justification, such erroneous claims are unhelpful!

Dot Point 1

I believe the stated reason in Dot Point 1 is incorrect. (Davey and Fisher, 2019)

- a** Santos and its Consortium constructed two gas trains at their Gladstone International Gas Terminal, when they only had access to sufficient gas to maintain one gas train.
- b** Santos and its Consortium over sold their available gas at a cheap price to international customers.
- c** Santos and its Consortium needed more gas to meet its NSW obligations.
- d** Santos and its Consortium pressured the NSW Government to permit the Consortium to provide Narrabri Gas to NSW gas consumers at a high cost price to avoid running out of cheap gas for their international contracts.

Questions.

Why should NSW gas consumers pay for Santos and its Consortium's error, whether deliberate, or otherwise?

Why should Santos and its Consortium sell the cheap gas to international customers and reserve the expensive gas for NSW Industries and private consumers?

Why should NSW industries be required to pay high gas prices to make products whilst their international competitors using cheap Australian gas to produce the same product and sell them at a lower international market price?

Commissioners, if you are able, I would appreciate answers to the above three questions.

Dot Point 6 *All the land disturbed by the project would be progressively rehabilitated to a high standard and returned to its previous owner, or the state.*

Commissioners, What is a 'high standard'? The Code for Practice for CSG Well Integrity (2012) also fails to provide definitive guidelines for this phrase. Without definitions for undefined phrases, the EIS must surely be incomplete!

With 100% of well casings fractured, and the land contaminated, at some time in the future, how can the land be 'returned to its previous use'?

Dot point 7 *'All the gas wells would be plugged and abandoned strictly in accordance with the Well Integrity Code*

Commissioners I have already identified that the Well Integrity Code is flawed. Without reference to the science principles imposed, the Narrabri Gas Project is designed, and administered, to fail!

P6, 7 and 8 principally outline the NSW Government's, and Department's policies on carbon emissions and climate change. Little reference is made to ESD so that the section is largely irrelevant to the IPC stimulus *Question*. Therefore, I will not respond to these pages.

P9 refers to two ESD Principles which are outside my skills area. I offer no comment on page 9 questions.

The Department makes many erroneous claims of Narrabri Gas Project's compliance with ESD, other State Laws, and Government Policies. The Department provides NO justification for their supportive claims which includes 'working under the DPIE's imposed conditions, Santos will meet acceptable standards that are ESD compatible'!

Conclusion

The Department of Planning, Industry, and Environment is a NSW State Government Department charged with carrying out the wishes and *Policies* of the NSW Government. The Department and its members are therefore not free to exercise independent judgement in their adjudications. The Department appears to be willingly complicit in its support for the Narrabri Gas Project's Application, to ensure the achievement of the NSW Governments goal of establishing a NSW State gas supply.

The Department's *Response* to IPC's *Question 1* fails to address the IPC question, directly. The Department makes many claims of compliance by the Narrabri Gas Project to the ESD laws, but fails to justify these claims. Details are not provided for how the Department considers that the project, (if approved) would be ESD compatible. The Department does not include principles and programs of ESD, nor the Department's recommended conditions of consent with detailed justification in the Department's assessment of the Project. Pages 6, 7, and 8 are more related to Government and DPIE *Policies* and *Procedures*, with only an occasional fleeting reference to ESD compliance, and then with no justification.

In contrast, Table 1 (Appendix1) clearly demonstrates that the Narrabri Gas Project does NOT satisfy ESD laws! Administrative procedures are developed by people, for people, and their administration. **Present Administrative procedures DO NOT REFLECT NATURAL EQUILIBRIUM REACTION FORCES caused by affected components of the earth reacting to reverse any imposed change on the earth.** Unless the Department requires measurements to establish a baseline, and monitor for these changes, DPIE will not have the data be able to justify compliance claims.

The DPIE's *Response* to *Question 1* exposes the Department for what it is – a loyal Government Department doing its 'job' to support the Government achieve Government Policies and Goals. The Department's conclusion that the Narrabri Gas Project is *Fit for Purpose*, and *the project is in the public interest and is approvable subject to strict conditions* (NSW Department of Planning, Industry and Environment, 2020) are political statements which cannot be justified on well versed scientific grounds! Until the Department monitors the action of the Earth's environment in established scientific terms, and applies ESD compliance to the scientifically obtained results, the Department will not be able to justify their outlandish claims of ESD compliance included in their *Response* to IPC, *Question 1*). ***THE NARRABI GAS PROJECT'S APPLICATION MUST BE REJECTED FOR IT IS NOT ESD COMPLIANT!***

Requested Action

Commissioners, acting in your roles, *in loco parentis*, for communities now and in the future, and here I refer to both human and non-human communities, I urge you to recommend to the Government in the strongest possible terms, the rejection of this unsafe, unpopular, unfit for purpose, Narrabri Gas Project, which is clearly not in the public interest.

REFERENCES

Cook, P. 2020 *Post Production / Decommissioning Risks Associated with Long Term Well Integrity*, NSW inter-department correspondence, 07 08 2020.

Davey, A. and Fisher, R. 2019 *Report on the Narrabri Gas Project*, Pegasus Economics, ACT.

Fleming, K. 2020 Comment on **Cook, P.** 2020 *Post Production / Decommissioning Risks Associated with Long Term Well Integrity*, NSW inter-department correspondence, 07 08 2020, included with **Fleming, K.** 2020 b *Written Submission in Support of Informed Objection to Narrabri CSG Project*, August 9, 2020.

Fleming, K. 2017 *Objection to Santos Narrabri CSG Proposal*, 2017

Fleming, K. 2020 a *Independent Planning Commission Public Hearing Objection Presentation Santos Narrabri CSG Proposal*, July 19, 2020.

Fleming, K. 2020 b *Written Submission in Support of Informed Objection to Narrabri CSG Project*, August 9, 2020.

Kitto, D. 2020 *Independent Planning Commission's Live Hearing with the Department of Planning, Industry and Environment, NSW Government*, 01 08 2020, 3.15pm.

Santos, 2017(a) *Narrabri Gas EIS, Chapter 12, Section 12.4.2*, page 12-23

Santos, 2017(b) *Narrabri Gas EIS, Appendix F, Sections 8-9*

Santos, 2017(c) *Narrabri Gas EIS, Chapter 4, Section 4.6.1*, page 31-32

NSW Department of Planning, Industry and Environment 2020 *Narrabri Gas Project*, dpie.nsw.gov.au

NSW Department of Planning, Industry and Environment 2020 *Narrabri Gas Project Response to Independent Planning Commission Questions, 14 August, 2020*

NSW Resources and Geoscience 2012, *Code of practice for CSG well integrity*, https://www.resourcesandgeoscience.nsw.gov.au/data/assets/pdf_file/0006/516/174/Code-of-Practice-for-Coal-Seam-Gas-Well-Integrity.PDF

Preston, B (Chief Judge of the NSW Land and Environment Court) 2017 *What's Equity Got To Do With The Environment*, Sir Frank Kitto PC AC KBE KC Public Lecture, UNE.

Schwager, K. 2017 *Narrabri Gas Project Development Application and Associated EIS*, Santos.

APPENDIX 1

Comparison of *six pivotal issues* with their operative ESD Laws compared with NSW Department of Planning, Industry and Environment's *Response to IPC Question 1*.

Table 1. Comparison of *six pivotal issues* with their operative ESD Laws compared with NSW Department of Planning, Industry and Environment's *Response to IPC Question 1*.

| #1 | Corrosion of Iron and Steel | Comments / ESD Laws | DPIE Justification |
|----|--|---|---|
| | <p>Iron and steel, in the presence of water, oxygen and saline catalysts, will readily oxidise the iron component of the steel alloys used in the well casings and tubes.</p> <p>Protective coverings such as paint, galvanising, concrete shielding and sacrificial electrodes, without regular maintenance, reapplication, and replacement, will only delay corrosion failure.</p> <p>Concrete shielding will shrink and crack over time</p> <p>Corrosion of proposed plant and infrastructure, and this includes the CSG well casings and tubes, will ensure the failure of 100% of wells over time.</p> | <p>Fundamental Chemistry Principles.</p> <p>Corrosion of iron and steel is a predictable, natural occurrence.</p> <p>Fundamental Chemistry Principles.</p> <p>Many industries (e.g. paint, sacrificial electrodes) exist to facilitate delaying iron corrosion, but only whilst maintenance is active.</p> <p>Fundamental Geophysics</p> <p>Fundamental Chemistry Principles.</p> <p>Corrosion of iron and steel is, a predictable, natural occurrence.</p> | |
| | <p>Clean-up of the below ground infrastructure on the site appears left to future generations to deal with.</p> | <p>Out of sight does not mean concrete shielding shrinking and cracking stops, corrosion stops and pollution transfer stops!</p> <p>Leaving site clean-up for later generations to implement <i>clearly</i> fails the Polluter pays Principle, inter-generational Equity, and interspecies Equity</p> | <p>No Department ESD implications noted.</p> |

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| | ESD Laws. | |
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Santos’ failure to commit to **removing subsoil infrastructure** (e.g. well casings) or **managing the Narrabri CSG mining area into the future**, following the active life of the gas field, is unacceptable, for it breaches the **Polluter Pays Principle** the **inter-generational Equity Principle, and interspecies Equity Principle**! It is necessary, but by no means sufficient for Santos to fully clean up, seal, and **manage all plugged and abandoned wells into the future**, as well as all subsoil contamination and rock strata fractures.

The DPIE fails to comment on this critical omission.

| #2 | Planned siting of wells incomplete | Comments / ESD Laws | Santos’ Justification |
|----|---|--|--|
| | The Narrabri Gas EIS does not include a detailed well site plan for the entire field . | <p>Without a plan for the entire field, Santos is in no position to evaluate, <i>a priori</i>, the personal, social and environmental effects of their proposed EIS. Members of the community are also prevented from evaluating the array and effects it might impose on them, or their community.</p> <p>This uncertainty fails the ESD precautionary Principle, as well as the intra- and inter-generational equity Principles.</p> | <p>No Department ESD implications noted for this issue.</p> |

The **non-inclusion of a complete well site plan in Santos’ EIS prevents** the DPIE from evaluating, *a priori*, the full Santos’ proposal. Santos’ failure to provide the complete well site plan also prevents the present community from **‘fairly’ assessing and commenting on the proposed complete plan**. **Equity** is therefore prevented as it is not possible to achieve a **‘fair result reached by a fair process’!** The principles of equity are again compromised, failing the three Equity Principles (**intra-generational, inter-generational, and inter-species Equities**), and *‘The right to development must be fulfilled so as to equitably meet development and environmental needs of present and future generations’* (Rio Declaration, on the Environment and Development, 1992).

The DPIE fails to comment on this serious omission.

| #3 | Rock strata above the coal seam will be fractured | Comments / ESD Laws | DPIE Justification |
|----|--|---|---|
| | <p>The planned wells in the Narrabri Gas EIS will pass through several different rock strata. Each layer possesses different properties, porosities, water contents and pressures. All layers above the targeted coal seam will be breached to enable access to the desired coal seam. The integrity of each of these layers, including the capping layer retaining the gas within the coal seam, the significant recharge conduit for the Great Artesian Basin, and higher aquifers, as well as the intervening rock strata, will be fractured.</p> <p>Faulting is present in the Jurassic and Permian deposits. Santos acknowledges the risk, although its significance is played down, in its Narrabri Gas EIS and Supplementary materials (Santos, 2017(a)).</p> <p>When pressure is released from the coal seam, not only is the coal seam split further, liberating the adsorbed coal seam gas, but the isolating cap rock and the rock layers it supports will also fracture, permitting interchange of liquids and gases between the</p> | <p>Basic geological, geochemical and hydrological principles.</p> <p>Establishment of the extent of faulting is incomplete. The failure of Santos to determine the true extent of faulting, <i>pre-determination</i>, fails the necessary baseline requirements, pre-determination. As a result, the Precautionary Principle is compromised. Fairness and justice cannot be obtained. intra-generational, and inter-generational Equities are breached.</p> <p>The contamination of strata, including aqueous layers, above the targeted coal seam fail the ESD Principles of inter- and intra-generational, and inter-species equity, the Polluter Pays Principle, and the Precautionary</p> | <p>No Department ESD implications noted for this issue.</p> <p>No Department ESD implications noted for this issue.</p> |

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| | <p>supra-rock layers, the ground surface and the atmosphere.</p> <p>Inadequate Baseline data in the Santos’ initial EIS, and Supplementary materials prevents monitoring changes over time.</p> <p>Inadequate Baseline data in the Santos’ initial EIS, and Supplementary materials prevents monitoring changes over time.</p> <p>a. Effect on liquid gurgitation Mixing of waters between the surface, subterranean aquifers and coal seams will occur as waters percolate through the fractured rock strata.</p> | <p>Principle, incorporated in our Laws</p> <p>The contamination of strata, including aqueous layers, above the targeted coal seam fail the ESD Principles of inter- and intra-generational, and inter-species equity, the Polluter Pays Principle, and the Precautionary Principle, incorporated in our Laws</p> <p>Recent work by the CSIRO has confirmed the region of Santos’ Narrabri CSG Proposal lies entirely within the GAB ‘intake’ region (Currell, 2018). To check for contamination issues, a wide range of variables, including geochemical, microbiological, and hydrological controls, recharge rates, water flow paths and rates, CO₂ concentrations, presence of other contaminants and their concentrations, and pressures, are only a few of the essential variables to be traced. These Baseline Data monitorings must be available <i>pre-determination</i> to ensure the intra-, and inter-generational Equity Principles are not compromised.</p> <p>Contamination of the surface, each aquifer, and the coal seam will result. The three Principles of ESD, intra-, inter-generational and inter-species Equity, as well as</p> | <p>No Department ESD implications noted for this issue.</p> <p>No Department ESD implications noted for this issue.</p> <p>No Department ESD implications noted for this issue.</p> |
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|--|--|---|---|
| | <p>b. Effect on gaseous movement The pressurised coal seam gas will be forced upwards through the fractured rock strata along the pressure gradient towards lower surface pressures.</p> <p>c. Effect on surface environment Fugitive gas and liquids, as well as solid and liquid spills, are spread by wind, rain and physical movements (e.g. truck tyres).</p> <p>d. Effect on environmental (including human) health The release of fugitive gas and waters from the coal seam will contaminate all subterranean and surface aquifers, soils and the atmosphere.</p> | <p>the Precautionary Principle and Polluter Pays Principle, will be violated.</p> <p>Physical Principles predict the movement of gases and liquids along existing pressure gradients. Without strategies to avoid contaminations from occurring, <i>pre-determination</i>, the three Principles of ESD, intra-, inter-generational and inter-species Equity, as well as the Precautionary Principle and Polluter Pays Principle will be violated.</p> <p>Contamination of the surface, each aquifer, and the coal seam by fugitive gas is a predictable and significant outcome. Without the identification of strategies to prevent the occurrence and dispersal of these contaminates the three, <i>pre-determination</i>, the Principles of ESD, intra-, inter-generational and inter-species Equity, as well as the Precautionary Principle and Polluter Pays Principle will be violated.</p> <p>The release of fugitive gas and waters from the coal seam are predictable occurrences. Fugitive gas contains carcinogens, teratogens and other poisonous substances, which will affect humans, other animals, and plants, as well as non-human and non-plant species.</p> | <p>No Department ESD implications noted for this issue.</p> <p>No Department ESD implications noted for this issue.</p> |
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| | Without strategies identified, <i>pre-determination</i> , to prevent dispersal of contaminants to subsurface strata and aquifers, and from entering the atmosphere, the three Principles of ESD, intra-, inter-generational and inter-species Equity , as well as the Precautionary Principle and Polluter Pays Principle , will be violated. | No Department ESD implications noted for this issue. |
|--|--|---|

Santos' failure to acknowledge the significance of their proposed CSG extraction for humans, other animals, plants, and non-animals and plants species conflicts with our Government's Laws, particularly the **Principles of ESD inter- and intra-generational Equity, Inter-species Equity** and the **Precautionary Principle** and **Polluter Pays Principle**. The Rio Declaration '*The right to development must be fulfilled so as to equitably meet development and environmental needs of present and future generations*' will also be breached. Santos' proposed methodology is not only unsafe in terms of scientific Principles, but also unacceptable in the Narrabri operational environment in Legal terms.

The DPIE fails to comment on this serious omission.

| #4 | High Spill Rates during pilot Study | Comments / ESD Laws | DPIE Justification |
|----|--|--|---|
| | Santos has reported 20 spills from only 50 wells sunk during the pilot plant stage conducted in the Pilliga State Forest. (North West Alliance, undated). The escape of ' <i>Produced Water</i> ' from these spills contaminates the surface soils with foreign chemical substrates and concentrations. Some of these contaminants would be deliberately added to the well by the company during CSG extraction, others released from within the pressurised, fractured coal seam. These contaminants may include carcinogens, teratogens, and poisonous substances, such as | If 5% of wells are predicted to leak in the first year, and all others to fail sometime in the future, the procedure cannot be safe. A failure risk of 100% over time is predictable and totally unacceptable in the sensitive Narrabri environment. Santos' spill rates fail the Principles of ESD intra- and inter-generational Equity, and inter-species Equity , as well as the Precautionary Principle, the Polluter Pays Principle, and the Rio Declaration's 'The | No Department ESD implications noted for this issue. |

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| | benzene, toluene, xylene, ethyl benzene, uranium compounds, lead compounds and cadmium compounds. | <i>right to development must be fulfilled so as to equitably meet development and environmental needs of present and future generation</i> '. | |
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Without regular maintenance into the future, the **failure of 100% of wells over time** is a **natural consequence** of corrosion of iron and steel in the presence of water, oxygen and saline catalyst. **Santos' projected procedure is designed to fail!** This is fundamental Chemistry!

This is not an acceptable risk. To expect present and future communities to accept these failures, and at the same time have the environment flourish, without deleterious feedback mechanisms, is **naive**.

The spill figures demonstrate that Santos does not have the competence to manage 50 wells safely. **How can Santos legitimately claim competence to manage an extended number of 850 wells, safely?**

Failure of the **Principles of ESD inter- and intra-generational Equity, inter-species Equity**, as well as the **Precautionary Principle** and **Polluter Pays Principle**, places the Santos' Narrabri Gas' unsafe proposal in conflict with our Governments' Laws.

The DPIE fails to comment on this serious omission.

| #5 | MSDS | Comments / ESD Laws | DPIE Justification |
|----|--|---|--|
| | The Narrabri Gas EIS lists a number of substances Santos proposes to use in its drilling programme. Only some of these substances have standard MSDS included in Santos' Narrabri CSG EIS. I have been unable to find MSDS for these and other substances when applied <i>to their particular process</i> for which they have been selected. Without appropriate 'active' MSDS details for each substance, as used, the safety of each chemical in, and following its use, cannot be determined. | These chemicals cannot be assumed safe! The omission of selected MSDS from Santos' Narrabri CSG EIS breaches the State's OHS Act and Regulations! The omission also fails the intra-generational Equity Principle, probably the inter-generational Equity Principle, and the Precautionary Principle. Any company wishing to conduct an activity on campuses for which I was OHS Convenor | No Department ESD implications noted for this issue. No Department ESD implications noted for this issue. |

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| | | would not have been permitted entry to the site! | |
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Without the provision of **All MSDS** in any company’s EIS to support its project’s proposal, and this includes Santos’ Narrabri Gas EIS, the company’s proposal is incomplete and **MUST FAIL** the **NSW OHS Act**, and its **Regulations**. These MSDS omissions would make the implementation of Santos’ Narrabri Gas proposal illegal, and therefore Santos’ Application totally unacceptable. In addition, to be applicable in the sensitive Narrabri Region, the MSDS must be relevant for their **active roles for which they were selected**. Without all active MSDS Santos is in no position to evaluate, *a priori*, **the personal, social and environmental, effects** of their proposed EIS. Failure to include all MSDS, *pre-determination*, **fails the intra-generational Equity Principle, probably the inter-generational Equity Principle, the Precautionary Principle, as well as Distributive Justice.**

The DPIE fails to comment on this serious omission.

| #6 | Water draw-down | Comments / ESD Laws | DPIE Justification |
|----|--|--|--------------------|
| | <p>Santos’ Narrabri Gas EIS has acknowledged surface water drawdown will occur ‘up to 0.5m’ (<i>Santos, 2017(a)</i>), following produced water loss and the removal of CSG from the Narrabri Field. Santos (2017(b)) predicts a maximum Early Permian drawdown of 153m and Late Permian drawdown of 16.4m. Appendix F claims the Great Artesian Basin will experience a drawdown of <0.5m, similar to the water table prediction.</p> <p>Any lowering of the surface water table will affect agricultural use of the land as well as forest growth. When the water table drops below the depth required to support a plant’s root system, all life dependent on that plant will be affected. The plant communities in the Pilliga State Forest, as well as</p> | <p>The water table and Great Artesian Basin figures seem inconsistent with the Permian strata predictions. I have been unable to justify these figures from the limited data available in Appendix F.</p> <p>It is predictable that such action would jeopardise the nationally significant Narrabri ‘food bowl’ in Santos’s proposed project area. Pilliga State Forest will also be affected.</p> <p>If Santos’ Narrabri Gas Proposal is approved,</p> | |

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| | <p>dependant animals, some of which are critically endangered, will also be negatively affected. The EIS claims two endangered species will be affected but appears to ignore other species in the Pilliga State Forest, and elsewhere in the project area (Santos, 2017(c)).</p> | <p>changes to established practices will be experienced in the Narrabri Region, throughout NSW, and our Nation!</p> <p>The ESD precautionary Principle, as well as the intra- and inter-generational, and inter-species Equity Principles together with the Rio Declaration, as well as the Polluter Pays Principle. <i>‘The right to development must be fulfilled so as to equitably meet development and environmental needs of present and future generation’</i>, will be breached.</p> | <p>No Department ESD implications noted for this issue.</p> |
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The Nationally and State significant Narrabri food bowl, Pilliga State Forest and other animal and plant communities, which are dependent on these plants, and water for their survival, will be compromised. When the present water table drops as a result of Santos’ CSG extraction, the **ESD precautionary Principle**, as well as the **intra- and inter-generational, and inter-species Equity Principles together with the Rio Declaration**, *‘The right to development must be fulfilled so as to equitably meet development and environmental needs of present and future generation’*, will be breached. If this occurs at ‘some time in the future’ beyond the life of the gas field (Kitto (2020) claims after 200 years), who will provide the compensation for the failure under the Polluter Pays Principle?

The DPIE fails to comment on this serious omission.