

Does the regulatory process in NSW effectively protect significant environmental impacts on water resources?



Does the NSW regulatory regime for onshore petroleum projects effectively protect beneficial water resources from significant environmental impact?

by Marylou Potts  
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## Assumptions

Applicable law is the law in force in NSW in November 2012

CSG means coal seam gas

CSG operations include exploration and production activities

This paper will focus its discussion on the protection of groundwater in relation to the legislation applicable to onshore petroleum operations including:

- Petroleum (Onshore) Act 1991 (NSW) (**Petroleum Act**);
- Environmental Planning and Assessment Act 1979 (NSW) (**EP&A Act**)
- Water Management Act 2000 (NSW) (**WMA**) Water Management (General) Regulation 2011 (NSW) (**WMR**) and the Water Act 1912 (NSW)
- Protection of the Environment Operations Act 1991 (NSW) (**PEOA**)
- Environment Protection and Biodiversity Conservation Act 1999 (Cth) (**EPBC Act**),
- Contaminated Land Management Act 1997 (NSW) (**CLMA**)
- environmentally sustainable development (**ESD**): the precautionary principle and adaptive management;

Attention will also be paid to the recently released:

- Strategic Regional Land Use Package (**SRLUP**) of September 2012
- Aquifer Interference Policy (**AIP**) of September 2012
- *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment 2012 Public Consultation Draft* (**SEPP 2007 amendment**)
- *Environmental Planning and Assessment Amendment (Gateway Process for Strategic Agricultural Land) Regulation 2012 Public consultation draft* (**EP&A Reg amendment**)

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## Executive summary

Many argue the current regulatory process in relation to onshore petroleum projects does not effectively protect beneficial water resources from potential significant environmental impacts. Certainly to date we have little evidence either way.<sup>1</sup>

The environmental effects are beginning to become apparent<sup>2</sup>.

The government, both Federal and State, appears keen to gain the scientific evidence one way or another. However, all its scientific studies, whether done in NSW, Queensland or by the Commonwealth, are funded by industry. As a consequence, the independence and integrity of the evidence, and the ownership and manipulation of the evidence gleaned, is in question<sup>3</sup>.

The Commonwealth government has stepped into the fray. It has passed legislation to amend the EPBC Act requiring the set up of an Independent Scientific Expert Committee to review onshore petroleum and large coal mining projects which may have a significant impact on water.<sup>4</sup> These amendments, however important, are only applicable to matters of national environmental significance.

Both the Commonwealth<sup>5</sup> and the NSW<sup>6</sup> Governments have held inquiries into CSG, both recommending significant changes to the current regulatory environment. The Commonwealth Committee recommended a thorough review of the appropriateness of adaptive management in the context of regulating the CSG industry. This is because there are significant gaps in information regarding cumulative and long term impacts of the industry. The Committee suggests the adaptive management regime is seen as a “catch up” regime.<sup>7</sup> Preston CJ in the NSWLEC has a different view stated in the *Newcastle & Hunter Valley Speleological Society Inc v Upper Hunter Shire Council* [2010] NSWLEC 48 at [184].

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<sup>1</sup> Namoi Water Study was inconclusive both sides claiming victory; AGL CGP, there has been no proper groundwater studies for Stages 1 or 2; Pilliga State Forest has \$20m damage from one PPL 3.

<sup>2</sup> The bubbling gas in the Condamine river is it naturally occurring or a consequence of the Origin Energy CSG pilot wells 1 km away<sup>3</sup>. The arsenic and other heavy metals in the creeks near the Pilliga, are they from farmer's fertilizers<sup>4</sup>, or Eastern Star Gas' (ESG) activities and spills in the Pilliga? Is the shale gas activity in the USA completely different from the unconventional gas extraction industry in NSW<sup>5</sup>? And finally, is what is happening in Queensland very different from what is happening in NSW?<sup>6</sup>

<sup>3</sup> <http://www.gisera.org.au/> funded by APLING; the Namoi Water Study conducted by a supplier of fracking chemicals Schlumberger <http://www.namoicatchmentwaterstudy.com.au/site/index.cfm> and <http://www.slb.com/contact.aspx>, an example of the this issue is seen in the Worley Parsons debacle.

<sup>4</sup> <http://www.environment.gov.au/minister/burke/2012/mr20120127.html>

<sup>5</sup> [http://www.aph.gov.au/Parliamentary\\_Business/Committees/Senate\\_Committees?url=rrat\\_ctte/mdb/interim\\_report/index.htm](http://www.aph.gov.au/Parliamentary_Business/Committees/Senate_Committees?url=rrat_ctte/mdb/interim_report/index.htm)

<sup>6</sup> <http://www.parliament.nsw.gov.au/prod/parlment/committee.nsf/0/29AE48525CF7A7CCA2578E3001ABD1C>

<sup>7</sup> Senate Committee Report Para 1.71 [http://www.aph.gov.au/Parliamentary\\_Business/Committees/Senate\\_Committees?url=rrat\\_ctte/mdb/interim\\_report/c01.htm](http://www.aph.gov.au/Parliamentary_Business/Committees/Senate_Committees?url=rrat_ctte/mdb/interim_report/c01.htm), Telstra Corporation Limited v Hornsby Shire Council [2006] NSWLEC 133

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Certainly, the current regime gives little confidence to the community<sup>8</sup>, who sees these projects as unsafe<sup>9</sup> and demand all activity be stopped until it can be positively shown that it is not unsafe, particularly to beneficial water resources.

The NSW Government in September 2012 finally released its Strategic Regional Land Use Package (**SRLUP**) with the Aquifer Interference Policy (**AIP**) stating that it now had introduced world's best practise to the NSW CSG industry in what it has defined as Biophysical Strategic Agricultural Land (**BSAL**) and Critical Industry Cluster Land (**CICL**). The community argues that this package is wholly ineffective to protect NSW's best agricultural land and wants it scrapped or revised to quarantine such land<sup>10</sup>. The SRLUP is only applicable to petroleum production and only on BSAL or in CICL. Further, there is much latitude currently given to the miners by the Government allowing pilot production under exploration licence terms<sup>11</sup>, completely circumnavigating the rigorous scrutiny applied before petroleum production and the application of the SRLUP and its gateway process.

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<sup>8</sup> ABC 7.30 Report 23 November 2012, Quentin Dempster

<sup>9</sup> ABC 730 Report 23 November 2012

<sup>10</sup> NSW Farmers Association May 1, 2012 Fiona Simpson speech outside parliament, and subsequent NSW Farmers' media releases.

<sup>11</sup> Metgasco, ESG Limited now Santos, contemplation of pilot production in exploration in the recently released Codes of Practice. In the author's view this needs to be challenged. There was an opportunity to do this in the Fullerton Cove case [2012] NSWLEC 207 but it was not taken up by the EDO, however maybe the LEC will address in obiter this issue?

## **1 Introduction**

This paper initially examines the environmental impact of onshore petroleum operations on beneficial water resources<sup>12</sup>. It then considers the regulatory regime in NSW as it applies to protection of water in CSG operations, from the exploration phase through to production.

The paper primarily focuses on the Petroleum Act, Parts 5 and 4 of the EP&A Act, the Water Management Act 2000 (NSW), the SRLUP and the Aquifer Interference Policy in their application to the protection of beneficial water resources.

## **2. CSG environmental impact**

The environmental impacts of CSG exploration and production have become increasingly well documented<sup>13</sup>.

The major concern with onshore petroleum operations is the potentially detrimental effect on beneficial groundwater systems. These effects are not just on the water itself but on the integrity of the geology which retains the groundwater. Depending on the softness of the coal and the surrounding geology, hydrogeology, and hydrological connectivity, the depressurisation process which occurs in CSG drilling and water extraction process in exploration, results in the potential of subsidence in the overlying geology. The screen shot below is a diagram from Dr Ann Young<sup>14</sup> in relation to longwall mining subsidence. The same subsidence and loss of the beneficial water, shown in red, would presumably apply in horizontal drilling and fracking of a coal seam

This subsidence causes faulting and potential (further) connectivity between the overlying aquifers and the coal seam. Coal seams are aquifers, as they generally contain water. This allows for the usually brackish coal seam water, together with any introduced drilling fluids and hydrofracking chemicals, to pollute any overlying aquifer.

The potential impacts of coal seam gas operations on the surrounding groundwater include:

- (a) pollution of groundwater from the heavily salinated CSG water;
- (b) pollution and potential contamination of groundwater from BTEX chemicals found in the coal seam<sup>15</sup>;

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<sup>12</sup> For more information on CSG formation and the techniques utilised to exploit CSG see Annexure 4

<sup>13</sup> See Reference list

<sup>14</sup> <http://www.abc.net.au/news/2012-11-23/a-lack-of-trust---sydney-communities-question-csg/4389902?section=nsw>

<sup>15</sup> Lloyd-Smith Dr M., Senjen Dr R., 2011 Briefing paper Hydraulic Fracturing in Coal Seam Gas Mining: Risks to our health, Communities, Environment and Climate April 2011 , National Toxins Network, <http://ntn.org.au/wp-content/uploads/2011/04/NTN-Fracking-Briefing-Paper-April-2011.pdf>

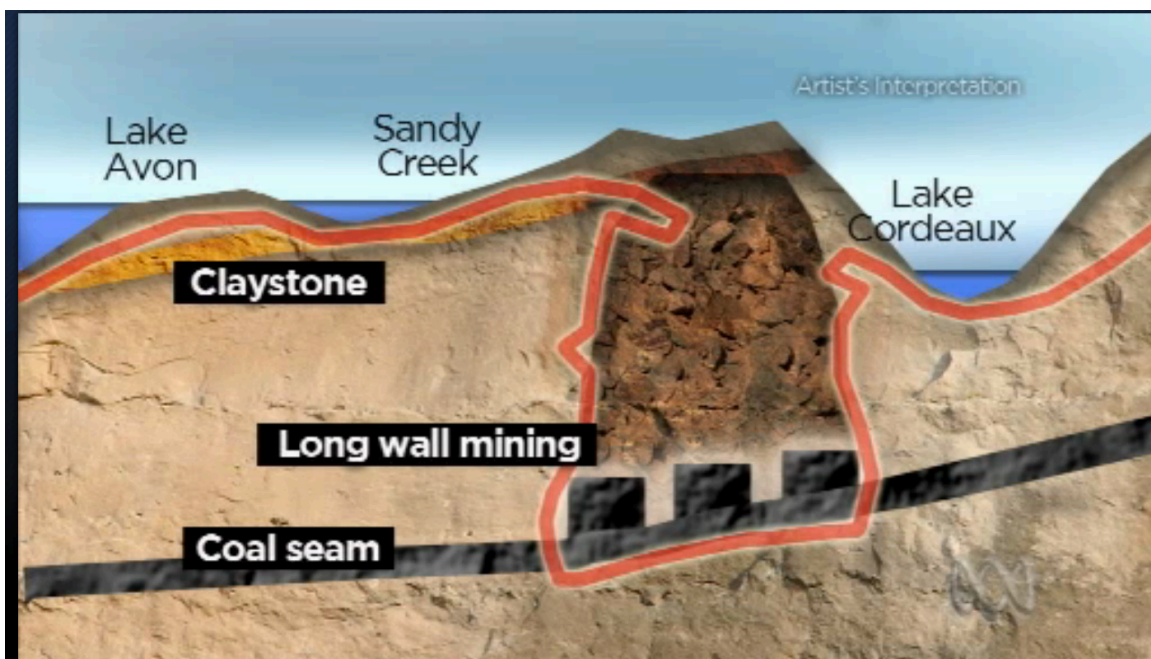
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- (c) pollution and potential contamination of groundwater from hydrofracking and drilling chemicals;
- (d) pollution and potential contamination of groundwater with methane;
- (e) dewatering of the coal seam aquifers resulting in a lowering of the water table and dewatering of overlying aquifers; and
- (f) structural damage to overlying beneficial aquifers, whereby they can no longer act as beneficial aquifers.

The other serious impacts of CSG activities include:

- (g) the “massive demands for water in the drilling process”<sup>16</sup>, and if fraccing is used, in the fraccing process;
- (h) the disposal of “produced water” with its high salt content and contamination with fraccing chemicals and drilling fluids<sup>17</sup>;
- (j) the disturbance and contamination of geosystems, atmospheric pollution primarily due to increased releases of methane into the atmosphere<sup>18</sup>;

(j)



<sup>16</sup> Randall 2012

<sup>17</sup> See <http://www.youtube.com/watch?v=K04taMEqlac&feature=share>. It is quite common for approvals of REFs to allow for the spraying of produced water into the environment. Surely it must be treated before it is released and in accordance with the material data sheet requirements which mostly require the chemicals to be containerised and disposed of by regulated sites

<sup>18</sup> Southern Cross University Study on methane levels in the Tara Gas field in SE Qld [http://www.scu.edu.au/news/media.php?item\\_id=6041&action=show\\_item&type=M](http://www.scu.edu.au/news/media.php?item_id=6041&action=show_item&type=M)

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degradation of landscape aesthetics due to the extensive requirement of infrastructure and connected infrastructure such as roads, pipelines, compressor stations, drilling rigs;

- (k) how CSG miners will be held accountable for the deleterious affects on the environment; and
- (l) serious concerns about whether CSG activities can safely coexist with agricultural and food production.



Above are photos of a mature CSG field in Wyoming USA, and a typical gas drilling site with a produced water pond, a sump, an access road for drilling rigs and trucks which transport water to and from the site, accommodation and office temporary buildings, drill rig, drill pad, chemical storage for drilling fluids and fraccing. Often this is fenced but often it is not. For example, in the Pilliga State Forest the active drill sites of ESG, now controlled by Santos, were not fenced, and those which were inactive were not properly enclosed.<sup>19</sup>

In relation to the environmental impact, one cannot forget the importance of groundwater to Australia which places substantial reliance on groundwater systems<sup>20</sup> for both agricultural irrigation and stock and domestic water requirements. As a consequence, it is of the highest importance that the integrity of these aquifer systems is protected from irreparable harm. The regulatory system will be examined to determine whether or not the integrity of these beneficial aquifers is protected.

### 3 Regulatory process: Overview

#### 3.1 General

The regulatory process governing petroleum operations and their impacts on water resources involves the application of several pieces of legislation, both State and Commonwealth, in addition to a plethora of policies and the underlying application of the common law. In particular, the Petroleum Act, the EP&A Act, the WMA Act (or the Water Act), the PEOA, the CLMA, the EPBC Act, SEPP (Mining, Petroleum Production and Extractive Industries) 2007 (**SEPP Mining**), SEPP (State and Regional Development) 2011 (**SEPP SSD**), the Aquifer Interference Policy, the SRLUP for strategic agricultural land and state significant developments, and

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<sup>19</sup> Author trip to Pilliga State Forest in March 2012

<sup>20</sup> Pigram J 2006 p.v



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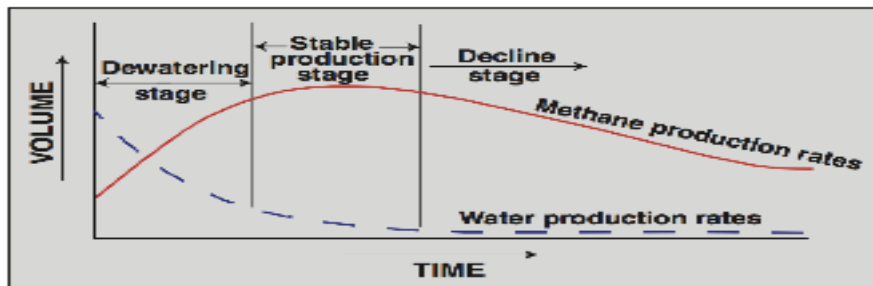
the underlying application of the law of nuisance (both private and public), are all applicable to regulate significant environmental impact from CSG operations on water resources.

### 3.2 Petroleum regulation

Onshore petroleum operations are principally governed by the Petroleum Act and are required to pass through a series of environmental assessments under the EP&A Act, increasing in exactitude as the operations proceed to production. This mirrors the minerals mining regime. At each point, there is some form of examination of environmental impact, which usually includes the examination of the impact on water resources. Unlike minerals mining, the greatest impact on groundwater resources in onshore petroleum operations occurs in the exploration phase, with drilling into the coal seam and dewatering the seam<sup>21</sup>. It is in the exploration phase, when the drilling and fracking chemicals are first introduced into the coal seam and when the seam is first dewatered and depressurised. It is at this time when the potential for faulting and overlying hydraulic connectivity occurs, with resultant potential for pollution and or contamination of the overlying beneficial aquifers.

The below graph shows the dewatering stage with decreasing water production as the aquifer is dewatered, and conversely, increasing gas production. It is curious there is such interest in pilot production in exploration. This could be in order to dewater the seam to prepare it for production, and at the same time, avoid any of the rigorous environmental scrutiny which occurs primarily before the grant of the petroleum production lease (**PPL**).

Figure 8 Typical changes in water and gas production over time



Source: USGS, 2000

It is in exploration when this dewatering is occurring and when the damage is done, although clearly extension and exacerbation of this damage occurs in petroleum production.

## 4 Protection of water in petroleum exploration

Onshore Petroleum operations in a regulatory context are generally broken into 2 phases: exploration; then production. This paragraph considers the protection of water resources in petroleum exploration.

<sup>21</sup> Atkinson 2002, Williamson J 2011

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#### **4.1 Application for a Petroleum Exploration Licence (PEL)**

A miner makes an application for an exploration licence under Part 3 of the Petroleum Act. The application for a PEL does not require the applicant to have any regard to environmental factors. The Minister, however, is required to consider, before granting a PEL, certain specified aspects of the environment. These do not include water<sup>22</sup>.

#### **4.2 Grant of a PEL and terms of the licence**

The Minister may grant an exploration licence under s9 of the Petroleum Act and the miner must comply with the terms of the licence. Those terms generally include provisions protecting water resources from pollution and or contamination and from possible increases in hydraulic connectivity. In PEL2, which surrounds Sydney, now held by AGL Upstream Investments Pty Ltd (**AGLUI**), clause 2 provides

*“Operations must be carried out in a manner that does not cause or aggravate ... water pollution.”*

Clause 8 provides

*“Operations must be carried out in such a way as to avoid pollution of any catchment area.”*

Clause 19 provides

*“Once a drill hole ceases to be used the hole must be completed in such a way as to .... prevent leakage and cross contamination”.*

These are inadequate provisions to ensure no pollution or contamination has taken place, primarily because no baseline is required to be taken and no monitoring in relation to that baseline is required to be undertaken. As a consequence, the PEL terms are currently not adequate in themselves to protect beneficial water resources.<sup>23</sup>

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<sup>22</sup> s74 Petroleum Act

<sup>23</sup> The AGL PPL1, 2 and 4 terms are not much stronger in relation to the protection of water resources and in NSW's largest and longest running petroleum production field, AGLUI has admitted to doing no baseline or monitoring of the groundwater. As a consequence we do not know whether or not pollution or contamination has occurred in relation to the 117 of the 137 wells that have been fraced in Stages 1 and 2 of the Camden Gas Project.

#### **4.3 Code of Practice for Fracture Stimulation<sup>24</sup> and Code of Practice for Well integrity<sup>25</sup>**

Two new Codes of Practice have been released as part of the SRLUP. It is proposed that compliance with these Codes be included as a term of the PEL or PPL. The new PEL and PPL terms are currently being drafted and have not been released. These Codes have mandatory provisions which must be complied with. Noncompliance is considered a breach of the petroleum title which entitles the Minister to cancel the title. The Codes apply to CSG drilling activities both in exploration and production.

##### **(i) Code of Practice for Fracture Stimulation**

This Code applies to all fracture stimulation activities. The purpose of this Code is to ensure all fracture stimulation occurs in a safe manner and that water resources are protected. It only applies to CSG activities not to shale gas activities except in the discretion of the DRE. The Code contains mandatory provisions in relation to water. More detail on this Codes provisions is set out in Schedule 1 to this paper.

##### **(ii) Code of Practice for Well integrity**

Another issue which is frequently cited with CSG operations is the integrity of the wells<sup>26</sup>, not just in the operational phase but following abandonment of the well. During the operational phase, if the well is not properly sealed in the well borehole, the leaking of contaminated CSG fluids can simply come up the well and pollute overlying beneficial aquifers. Maintaining well integrity is difficult as the earth is always shifting, and in certain soils, such as vertosol soils, sometimes metres deep, significant shifting and pipe ruptures can occur<sup>27</sup>. Previous practises utilised when abandoning a well involve filling the borehole with cement. Poor quality cement can and has, after not too long a time, turned to sand. The Code of Practice for Well Integrity has a mandatory requirement of well

*design to ensure all fluids produced from the well travel directly from the production zone to the surface without contaminating groundwater.* <sup>28</sup>

The monitoring and maintenance requirements relate to operation but do not appear to require monitoring after the well has been abandoned. Admittedly we are still awaiting a further code of practice for leaks or emissions<sup>29</sup>. There is appreciable attention to the quality and quantity of cement to be used.

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<sup>24</sup> see [http://www.resources.nsw.gov.au/\\_data/assets/pdf\\_file/0007/441268/COP-for-CSG-fracture-stimulation-activities.pdf](http://www.resources.nsw.gov.au/_data/assets/pdf_file/0007/441268/COP-for-CSG-fracture-stimulation-activities.pdf)

<sup>25</sup> see [http://www.nsw.gov.au/sites/default/files/uploads/common/CSG-wellintegrity\\_SD\\_v01.pdf](http://www.nsw.gov.au/sites/default/files/uploads/common/CSG-wellintegrity_SD_v01.pdf)

<sup>26</sup> An early study of well integrity was done in Queensland which found that 40% of wells leaked, this was fast followed by another study which showed a significantly lesser amount. Queensland Government Department of Employment, Economic Development and Innovation 2010 *Investigation Report Leakage testing of Coal Seam gas wells in the Tara "rural residential estates" vicinity* 1 June 2010

<sup>27</sup> SoilFutures reports on the Vertosol soils in the Bellata Gurley district of NSW and the Coonamble district of NSW

<sup>28</sup> Para 4.1.2 of the Code of Practice for Well Integrity

<sup>29</sup> See Para 4.4.2 Code of Practice for Well Integrity [http://www.nsw.gov.au/sites/default/files/uploads/common/CSG-wellintegrity\\_SD\\_v01.pdf](http://www.nsw.gov.au/sites/default/files/uploads/common/CSG-wellintegrity_SD_v01.pdf)

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These Codes are an important addition to the operating regime.

#### 4.4 Access arrangement - Part 4A of the Petroleum Act

Before the miner can commence any exploration activities it must enter into an access arrangement agreed or determined with the landholder of the land. Part 4A of the Petroleum Act sets out the process for that to occur. Section 69D(1)(e) of the Petroleum Act provides the access arrangement can contain things which the title holder must do in order to protect the environment. Landholders, however, are in a David Goliath battle in trying to ensure their land, and the water they have access to under their land, is protected by miners in access arrangements.<sup>30</sup>

#### 4.5 Conditions to protect water imposed via the approval process in Part 5 of the EP&A Act

The PEL terms require further Part 5 of the EP&A Act approvals to be obtained before certain activities can be conducted. The PEL divides prospecting operations into 3 categories of activity of increasing intensity. The first category causes minimal impact and requires no further approval or consent. The second category causes more impact and the third category causes the most damage. For all category 2 activities<sup>31</sup> in sensitive areas and category 3 activities<sup>32</sup>, a Review of Environmental Factors (**REF**) must be prepared by the proponent in accordance with Regulation 228 of the *Environmental Planning and Assessment Regulation 2000* (**EP&A Regs**) and submitted to the Department for a determination under Part 5 of the EP&A Act.

If the surface disturbance notice, which is required to be submitted with the REF, under the conditions of the PEL, indicates to the Department of Resources and Energy (**DRE**) that the disturbance is likely to be “significant”<sup>33</sup>, the DRE may also require the submission of an environmental impact statement (**EIS**)<sup>34</sup>. As a consequence, it is discretionary as to whether the DRE will allow for the deeper scrutiny, transparency and public participation which is part of the EIS process, in the exploration phase.<sup>35</sup> In the author’s view, this

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<sup>30</sup> Even the current template for minerals agreed by the NSW Farmers and the NSW Minerals Council is a poor attempt to assist the farmers to protect their land or the water resources under their land. The SRLUP proposes a **Land and Water Commissioner** to assist landholders on strategic agricultural land to provide guidance in relation to the regulatory framework and rights under it, to oversee land access agreements by supervising the finalisation of the template, collating remuneration information in relation to compensable loss and providing advice to government on applications for exploration or production activities. An application for the position has been posted, we are as yet unaware of whether an appointment has been made, certainly it has not been publicised.

<sup>31</sup> Category 2 activities are described as “access tracks or line clearing involving formed construction or significant native vegetation disturbance. Category 3 activities are described as Petroleum exploration boreholes, seismic surveys in PEL 469.

<sup>32</sup> Seismic surveying and borehole drilling

<sup>33</sup> see Preston CJ Environmental Impact Statement threshold test (1990) 7 EPLJ 147

<sup>34</sup> Note EP&A Act s112(1)(a) and EP&A Regulation Part 14 EIS under Part 5 requirements

<sup>35</sup> Apart from when the development can be classified as an SSD.

discretion should be exercised, as the impact will be likely to be significant in exploration<sup>36</sup> if an aquifer is to be interfered with. Currently in practice, the author has no knowledge of an EIS being required by the DRE in the exploration phase. The Fullerton Cove case<sup>37</sup> will provide the first indication of whether an EIS is required for pilot production activities in exploration. We are currently awaiting this decision. The LEC has at least ordered an injunction restraining Dart Energy from “*carrying out any development for its pilot appraisal exploration program beyond completion of the above ground component*” until it is determined whether the proposed development is a designated development under s77A of the EP&A Act and clause 27 of Schedule 3 of the EP&A Regulation as petroleum works.

#### 4.6 Review of environmental factors (REF)

The REF, which is the most common environmental assessment in the exploration phase, has developed in response to the duty of a “determining authority”<sup>38</sup> to consider the environmental impact of “matters affecting or likely to affect the environment” under section 111 of the EP&A Act. Section 111 of the EP&A Act requires

##### **111 Duty to consider environmental impact**

- (1) *For the purpose of attaining the objects of this Act relating to the protection and enhancement of the environment, a **determining authority** in its consideration of an activity **shall**, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, **examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.***

Section 111 goes on to set out what must be considered by the determining authority and these matters are reiterated in the DRE’s guidelines for preparation of a REF<sup>39</sup> and include the requirement to have a water sources protection strategy which describes the management controls which will be implemented to:

- *prevent pollution of water sources*
- *prevent depletion of water sources*
- *account for any water extraction*
- *monitor impacts*
- *account for, mitigate or avoid impacts*
- *comply with any statutory requirements, regulatory controls or standards applicable to the conduct of the activity and its impacts on water*

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<sup>36</sup> See Atkinson 2002

<sup>37</sup> Fullerton Cove Residents Action Group Incorporated v Dart Energy Ltd [2012] NSWLEC 207

<sup>38</sup> Defined in s110 EP&A Act which would include the Minister of Resources and Energy or his Department “whose approval is required in order to enable the activity to be carried out” ie under the MEL and PEL such approval is required for certain activities.

<sup>39</sup> ESG2: Environmental Impact Assessment Guidelines for exploration, mining and petroleum production activities subject to Part 5 of the Environmental Planning and assessment Act 1979 including requirements for a review of environmental factors

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The proponent must consult with the appropriate water authorities,<sup>40</sup> it must provide a full description of the proposed activity and, in relation to water, a description of the water sources, the impacts on those water sources physical and chemical, including the volume of water used and how waste water will be disposed of and whether the activity is likely to involve the destruction or depletion of natural resources, including water.

Previous REFs submitted provided woeful detail on geology and hydrogeology.<sup>41</sup> The DRE released in July 2011 “*Additional Part 5 REF requirements for petroleum prospecting: A supplement to ESG2: Environmental Impact Assessment Guidelines.*” These are stated to be in draft form. These additional Part 5 REF requirements require far more detail than has previously been required including, for example, the proponent being required to show:

- what management controls it has in place to ensure the fracking fractures are contained within the target formation,
- how it will monitor and account for or mitigate risks,
- how it will monitor impacts on groundwater, how it will monitor and mitigate chemical and contaminant use.
- The proponent is required to provide a geological model with detail of the seam including the depth, geometry, lithology, permeability, porosity, hydraulic conductivity and faulting.
- The current state of understanding of the regional groundwater resources are to be described, which of these resources is likely to be affected, including the vertical and horizontal proximity to the proposed activity, transmissivity, flow rate, hydraulic conductivity and directions of flow are to be described,
- both barriers and connections between groundwater and seam are to be identified.
- Potentially affected users are to be identified, including the location of any groundwater bores and dependent ecosystems.
- In relation to impact, a description is to be given of the likelihood of vertical fracture propagation for each well location, with reference to depth of fracture, regional stress regime, geometry, lithology;
- an evaluation of the the potential consequences of vertical fracture propagation for each well location

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<sup>40</sup> para 1.3 ESG2 Environmental Impact Assessment Guidelines For exploration, mining and petroleum production activities subject to Part 5 of the Environmental Planning and assessment Act 1979 including requirements for a review of environmental factors

<sup>41</sup> The current guidelines for REFs were issued in March 2012. REFs prior to this date which have been viewed by the author were seriously lacking in content in relation to water and the likely or actual impacts on water. In this respect the author refers to the REF prepared by Eastern Star Gas Limited for the pilot production in exploration in the Pilliga, the Southern recharge zone of the GAB, where no reference was made to the GAB or the southern recharge zone or the affect of fracking on the southern recharge zone to be used for the pilot production of Dewhurst 9 Production well<sup>41</sup>. It is the author’s view that pilot production should not take place in the exploration phase as the regulatory regime is not geared for the necessary environmental protection required in addition to the issue of whether there is actual statutory authority to undertake pilot production in exploration<sup>42</sup>. Hopefully these new guidelines will require far greater attention to the impacts on water and result in some cases in the Department requiring an EIS to be prepared under s112 of the EP&A Act.

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with reference to groundwater resources, gas and fluid migration and any other relevant factors.

This should provide a wealth of material in which to properly assess the activity sought to be approved.

Despite the fact that these guidelines have been in draft since apparently July 2011, the author has not seen anywhere near this amount of detail in any REF examined. such detail would be welcomed.<sup>42</sup>

Approval of the REF and the conditions of the approval are generally issued by the Director General of Planning. The examination must be “to the fullest extent possible” and of “all matters affecting or likely to affect” the environment. The purpose of this examination is to attain the objects of the Act and to encourage “ecologically sustainable development” (**ESD**). An examination of ESD is unfortunately beyond the scope of the word limit for this paper<sup>43</sup>.

#### **4.7 Agricultural impact statement<sup>44</sup> as part of the REF**

The recently released SRLUP has introduced the requirement to preparing an agricultural impact statement (**AIS**).<sup>45</sup> The NSW Government Fact Sheet<sup>46</sup> for AIS states that an agricultural impact statement (**AIS**) is required as part of a REF for CSG exploration activities and for all state significant developments. The Fact Sheet on AIS provides the AIS must, in relation to water, contain

- *detailed information on the ... water resources in the project area...*
- *a risk based assessment of any potential impacts of the project on ... water...*
- *details of any water licences which may be transferred ...*
- *measures to minimises any negative impacts on ... water.*

The AIS is assessed by the DRE in consultation with the NSW Department of Planning and Infrastructure and the Office of Agricultural Sustainability and Food Security.

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<sup>42</sup> A request has been made as to whether these are required to be complied with or whether they have simply been drafted and are awaiting implementation.

<sup>43</sup> See [www.MLPPL.com.au](http://www.MLPPL.com.au) for a paper *Is there effective prevention of significant environmental impacts in CSG projects under NSW law?*

<sup>44</sup> <http://haveyoursay.nsw.gov.au/document/show/195>

<sup>45</sup> Certainly, an AIS is required for state significant developments, whether it is also required in the production of all REF's is what remains unclear to the author, primarily because, although clearly stated as so in the Fact Sheet, the Fact Sheet refers to the Guideline for greater detail, and the Guideline only discusses AIS' for SSDs.

<sup>46</sup> [http://www.nsw.gov.au/sites/default/files/uploads/common/Agricultural-Impact-Statement-FactSheet\\_SD\\_v01.pdf](http://www.nsw.gov.au/sites/default/files/uploads/common/Agricultural-Impact-Statement-FactSheet_SD_v01.pdf)

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## **5 Water law regime**

### **5.1 Overview**

Overlying this petroleum and environmental planning regime is the water law regime. Water law in NSW is complex. It involves

*“common law liabilities of riparian landowners, statutory modification of these common law liabilities, statutory protection afforded to rights created by or under legislation; and common law and statutory liabilities arising from the exercise of statutory powers”<sup>47</sup>.*

The statutory regime begins with the *Water Act 1912 (NSW)*, which is being progressively supplanted by the *Water Management Act 2000 (NSW)*, as water management plans are implemented over water management areas across NSW. More detail on the WMA and its licensing and approval requirements is set out below.

Overlying this state based regime, by virtue of a conferral of state powers to the Commonwealth for the management of the Murray Darling Basin (**MDB**) water resources in the national interest<sup>48</sup>, is the Commonwealth *Water Act 2007 (Cth)*. This Act requires the Basin States to align their water resource plans with the Basin Plan. The Basin Plan will provide for limits on the quantity of water that may be taken from the basin water resources as a whole and from the water resources from each water resources area<sup>49</sup>.

The Final Basin Plan was presented to Commonwealth Minister Burke on 21 November 2012 for consideration of adoption<sup>50</sup>. That process is not yet finalised and has a number of steps to go.

In addition to the water legislation, is the newly finalised AIP. This policy applies to all petroleum exploration and production activities across the state which until recently were largely exempt from the application of the water law regime. The purpose of this policy is to ensure that all water taken from the system is accounted for, and if necessary protected, in the process. More detail on the AIP is given below.

### **5.2 Regulation of aquifer interference<sup>51</sup> and take in petroleum exploration under the WMA**

As outlined above, the primary concern with CSG activities relates to the impact on groundwater resources. Both the Commonwealth and NSW have held inquiries into the impact of CSG activities on water resources and there has been some regulatory movement towards protecting these resources in relation to CSG activities. This began in 2010 with the *Water Management Amendment Act 2010 (NSW)* and the proposal to

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<sup>47</sup> Lucy J 2008 Para 14.9.1530

<sup>48</sup> s7 Water Act 2007 (Cth)

<sup>49</sup> s19 Water Act 2007 (Cth)

<sup>50</sup> [http://www.mdba.gov.au/media\\_centre/media\\_releases/final-basin-plan-presented-to-minister-burke](http://www.mdba.gov.au/media_centre/media_releases/final-basin-plan-presented-to-minister-burke)

<sup>51</sup> <http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/Aquifer-interference/Aquifer-interference>



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insert a new section 60I<sup>52</sup> into the *Water Management Act 2000 (NSW) (WMA)*, yet this section has not commenced operation.

### 5.3 Aquifer access licences (AAL) required after 3 megalitres/annum/authority

A further amendment, which took effect on 30 June 2011, was made in the *Water Management General Amendment (Aquifer Interference) Regulation 2011*. This is now incorporated into the *Water Management (General) Regulation 2011 (NSW) (WMR)* Schedule 5 Exemptions Part 1 Access licence exemptions, which exempts fossickers and prospectors from having an AAL up to the taking of 3MLs /annum/authority. It provides in clause 7

*Any person lawfully engaged in prospecting or fossicking for minerals or petroleum under the [Mining Act 1992](#) or the [Petroleum \(Onshore\) Act 1991](#)—in relation to:*

- (a) the taking of water required for such prospecting or fossicking pursuant to a lease, licence, mineral claim or environmental assessment permit under the [Mining Act 1992](#) or a petroleum title under the [Petroleum \(Onshore\) Act 1991](#) (an authority), up to a maximum of 3 megalitres for all such prospecting or fossicking pursuant to each such authority in any water year, and*
- (b) the taking of up to 3 megalitres of water required for all other such prospecting or fossicking in any water year.*

Previously, no access licence was required for the taking of any water in mining or petroleum prospecting or fossicking operations. This outraged the rural community. From July 2011, prospectors and fossickers, who take more than 3 mega litres per year per authority, must apply for an aquifer access licence under s61 of the WMA otherwise they are in breach of the WMA.<sup>53</sup>

Aquifer access licence applications may be made, if the regulations provide, or a management plan provides, that an application for an access licence may be made under s61(1) of the WMA. If there is an embargo on the issue of AALs, a miner must purchase the entitlement rights from another holder in the relevant water sharing plan area.<sup>54</sup> Objections may be made to the application under s62 of the WMA and the AAL is not to be granted if more than **minimal harm** will be done to the aquifer.

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<sup>52</sup> 60I Access licence required for water used in mining activities

- (1) A person who takes water in the course of carrying out a mining activity is, for the purposes of this Act, taking water from a water source.*
- (2) Without limiting the generality of subsection (1), a person takes water in the course of carrying out a mining activity if, as a result of or in connection with, the activity or a past mining activity carried out by the person, water is removed or diverted from a water source (whether or not water is returned to that water source) or water is re-located from one part of an aquifer to another part of an aquifer.*
- (3) To avoid doubt, a person who takes water in the course of carrying out a mining activity as referred to in subsection (2) is required to hold an access licence authorising the taking of that water.*

<sup>53</sup> How this regime works in practice is a curiosity to the author. The AIP broadly states that all exploration and production activities are now covered by the AIP. The practical effect is that if more than 3 MLs are to be taken in the drilling of a coal seam, an AAL must be had, and presumably must be had before a REF is granted or as a condition of the REF before drilling beings. Otherwise how will one know whether the 3ML's have been reached?

<sup>54</sup> It is envisaged that we will have miners competing with farmers for water entitlements in Water Sharing Plan areas. This does not bode well for the farmers. However it does not necessarily impinge upon the domestic and stock water rights of a landholder.

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s63(2) WMA provides “

*An **access licence is not to be granted unless the Minister** is satisfied that:*

- (a) the application has been made as provided by section 61 (1) (a), (b) or (c), and*
- (b) adequate arrangements are in force to ensure that **no more than minimal harm** will be done to any water source as a consequence of water being taken from the water source under the licence.*

#### **5.4 Aquifer interference approval (AIA)**

Section 91F of the WMA makes it an offence for a person to carry out an aquifer interference activity without an aquifer interference approval. Section 91 of the WMA deals with aquifer interference approvals. Part 3 of the WMR concerns approvals, which includes aquifer interference approvals. WMR 33 which concerns aquifer interference provides

##### **33 Aquifer interference in connection with mining**

*A person who is engaged in an **aquifer interference activity** in connection with the mining or extraction of any material is exempt from section 91A (1) of the Act in relation to the using of water from an aquifer if the water is used **in accordance with an aquifer interference approval with respect to that activity.***

It is the author's view that an aquifer interference approval is required by a CSG explorer before any aquifer interference activity is commenced. Aquifer interference is defined in the Dictionary to the WMA as

***aquifer interference activity** means an activity involving any of the following:*

- (a) the penetration of an aquifer,*
- (b) the interference with water in an aquifer,*
- (c) the obstruction of the flow of water in an aquifer,*
- (d) the taking of water from an aquifer in the course of carrying out mining, or any other activity prescribed by the regulations,*
- (e) the disposal of water taken from an aquifer as referred to in paragraph (d).*

For any of these activities, the miner requires an aquifer interference approval referred to in s91(3) of the WMA. The application must be to the Minister in accordance with the WMRs [s92 of the WMA] and the WMRs may require applications of a specified class to be advertised. WMR 24(1)(a) sets out those classes. On its face, it would appear that AIA applications are not required to be advertised. Only those applications advertised can be objected to under s93(1) of the WMA. In the author's view, WMR 24(1)(a) needs to expressly include advertisement of aquifer interference approval applications. Nevertheless, an aquifer interference approval must not be granted unless the Minister is satisfied that no more than **minimal harm** will be done to the aquifer or its dependent ecosystems.

*s97 (6) WMA An aquifer interference approval **is not to be granted** unless the Minister is satisfied that adequate arrangements are in force to ensure that **no more than minimal harm** will be done to the aquifer, or its*

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*dependent ecosystems, as a consequence of its being interfered with in the course of the activities to which the approval relates.*

As such, an aquifer interference approval and an aquifer access licence are both necessary to be in place before a miner commences drilling activities which will interfere with an aquifer.

## 5.5 Aquifer Interference Policy (AIP)

On the same day as the release of the SRLUP, the NSW Government released its much awaited Aquifer Interference Policy (AIP).<sup>55</sup> This policy applies to all aquifer interference activities and is particularly targeted at CSG activity. The purpose of the policy is to ensure that all water is accounted for, that predictions as to volumes of water which will be taken are made, in order to determine, control and manage total take volumes for water management areas.

The policy requires proponents to self regulate providing it is the

*proponent's responsibility to ensure that the necessary licences are held with sufficient share component and water allocation to account for **all water taken from a groundwater** or surface water source as a result of an aquifer interference activity, both for the life of the activity and after the activity has ceased.*<sup>56</sup>

The Policy sets out the assessment process, how it integrates with Parts 4.1 and Part 5 of the EP&A Act, and the gateway process in the SRLUP. The Gateway process requires consideration be given to Part 3.2 of the AIP relating to the framework for assessing impacts of aquifer interference activities on water resources.

*The NSW Office of Water's assessment of impacts on water sources and water dependent ecosystems and subsequent advice and proposed conditions of approval as input to the planning process for a project is based on an "**account for, mitigate, avoid/ prevent, and remediate**" approach.*

This is stated to involve an:

- account of the take of water
- mitigation or avoidance strategies
- minimal impact considerations
- remedial actions

to ensure no more than minimal harm is done to any water source. The AIP sets out in Table 1 minimal impact considerations. The Policy provides<sup>57</sup>:

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<sup>55</sup> 12 September 2012 <http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/Aquifer-interference/Aquifer-interference>

<sup>56</sup> Para 2.1 AIP <http://www.water.nsw.gov.au/Water-management/Law-and-policy/Key-policies/Aquifer-interference/Aquifer-interference>

<sup>57</sup> Para 3.2.1 [http://www.nsw.gov.au/sites/default/files/uploads/common/NSW-Aquifer-Interference-Policy\\_SD\\_v01.pdf](http://www.nsw.gov.au/sites/default/files/uploads/common/NSW-Aquifer-Interference-Policy_SD_v01.pdf)

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*There are two levels of minimal impact considerations specified in Table 1. If the predicted impacts are **less than the Level 1** minimal impact considerations, then these impacts will be considered as **acceptable**.*

*Where an activity's predicted impacts are **greater than the Level 1** minimal impact considerations specified in Table 1, **but these predicted impacts exceed the Level 1 thresholds by no more than the accuracy of an otherwise robust model**, then the project will be considered as having impacts that are within the range of **acceptability**, with **extra monitoring and potential mitigation** or remediation required during operation, should the project be approved. In such instances, the Minister's advice will include a request that appropriate conditions be imposed to ensure the impacts of the activity are acceptable. This may include for example, **adaptive management conditions** requiring the proponent to **monitor the actual impacts of the proposal** and take action to mitigate or remediate the impacts that exceed the Level 1 thresholds.*

*Where the predicted impacts are **greater than the Level 1** minimal impact considerations by more than the accuracy of an otherwise robust model, then the assessment will involve **additional studies** to fully assess these predicted impacts. **If this assessment shows that the predicted impacts do not prevent the long-term viability of the relevant water-dependent asset**, as defined in Table 1, then the impacts will be considered to be **acceptable**.*

Presumably, and conversely, if the impacts will prevent the long term viability of the water dependent asset<sup>58</sup>, the project will be unacceptable and no AIA will be granted and the project will not be able to proceed.

## 5.6 Adaptive management

The policy adopts an adaptive management approach to minimal impact considerations. Much criticism has been levelled at this adaptive management approach, criticising it as a "suck it and see" approach. In particular the Federal Senate Committee in its Final Report<sup>59</sup>, stated adaptive management is not an effective mechanism for the protection of the environment in CSG proposals. The Committee pointed out that consideration be given to whether "adaptive management ... is consistent with the precautionary principle".<sup>60</sup>

Preston CJ in the *Newcastle & Hunter Valley Speleological Society Inc v Upper Hunter Shire Council* [2010] NSWLEC 48 case at [184] has a very different approach to adaptive management:

***[184]** Adaptive management is a concept which is frequently invoked but less often implemented in practice. Adaptive management is not a "suck it and see", trial and error approach to management, but it is an iterative approach involving explicit testing of the achievement of defined goals. Through feedback to the management process, the management procedures are changed in steps until monitoring shows that the desired outcome is obtained. The monitoring program has to be designed so that there is statistical confidence in the outcome. In **adaptive management the goal to be achieved is set, so there is no uncertainty as to the outcome and conditions requiring adaptive management do not lack certainty**, but rather they establish a regime which would permit changes, within defined parameters, to the way the outcome is achieved.*

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<sup>58</sup> Presumably this is the aquifer itself?

<sup>59</sup> [http://www.aph.gov.au/Parliamentary\\_Business/Committees/Senate\\_Committees?url=rrat\\_ctte/mdb/interim\\_report/index.htm](http://www.aph.gov.au/Parliamentary_Business/Committees/Senate_Committees?url=rrat_ctte/mdb/interim_report/index.htm) Para 1.73

<sup>60</sup> [http://www.aph.gov.au/Parliamentary\\_Business/Committees/Senate\\_Committees?url=rrat\\_ctte/mdb/interim\\_report/index.htm](http://www.aph.gov.au/Parliamentary_Business/Committees/Senate_Committees?url=rrat_ctte/mdb/interim_report/index.htm) Para 1.73

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The fear is that if the monitoring is not properly undertaken irreparable damage will be done and nothing then can be done to remediate that damage. In the *Barrington Gloucester Stroud Preservation Alliance v Minister for Planning and Infrastructure* [2012] NSWLEC 197 at para [103] PepperJ stated in relation to conditions to be met, that the language “**avoid and minimise**” meant “**reducing to zero** gas migration risks and adverse impacts on waters affected by the project”.

## 5.7 Conditions of approval

One especially welcomed change in the AIP is the requirement that the proponent take a baseline of groundwater conditions<sup>61</sup>

*establishment of baseline groundwater conditions including groundwater depth, quality and flow based on sampling of all existing bores in the area potentially affected by the activity, any existing monitoring bores and any new monitoring bores that may be required under an authorisation issued under the Mining Act 1992 or the Petroleum (Onshore) Act 1991.*

The AIP also provides, if a project is approved, the conditions of approval should include<sup>62</sup>

- *details of an effective and independently assessed (by the Minister) groundwater/surface water level/pressure, flow and quality monitoring program through all phases of the activity;*
- *details of appropriate water measurement devices, regimes or methods such as water meters or other water measurement methods to measure actual take resulting from the activity;*
- *details of appropriate reporting procedures including timely notification systems for reporting the results of monitoring and metering programs against the licensing and approval requirements specified by this Policy; and*
- *details of contingency plans or remedial measures to be employed where it is found that take by or impacts from the activity are outside of the licensing and approval requirements specified by this Policy.*

## 6 Protection of water in Petroleum Production

### 6.1 State significant development

Under the current regulatory regime and in practice, the extensive environmental scrutiny which is available under the EP&A Act with the requirement of an EIS, primarily occurs after the damage is done in exploration, when the project qualifies as a state significant development (**SSD**)<sup>63</sup>, that is:

- is a development [in exploration] of a set of 6 or more petroleum wells more than 3kms from any other well in a petroleum title<sup>64</sup>; or

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<sup>61</sup> Para 3.2.3 [http://www.nsw.gov.au/sites/default/files/uploads/common/NSW-Aquifer-Interference-Policy\\_SD\\_v01.pdf](http://www.nsw.gov.au/sites/default/files/uploads/common/NSW-Aquifer-Interference-Policy_SD_v01.pdf)

<sup>62</sup> AIP para 3.2.3 [http://www.nsw.gov.au/sites/default/files/uploads/common/NSW-Aquifer-Interference-Policy\\_SD\\_v01.pdf](http://www.nsw.gov.au/sites/default/files/uploads/common/NSW-Aquifer-Interference-Policy_SD_v01.pdf)

<sup>63</sup> See Part 4.1 EP&A Act and SEPP (State and Regional Development) 2011 Schedule 2 clause 6 Petroleum (oil and gas)

<sup>64</sup> How in practise this exploration SSD is to be caught is curious, will it be at the 6th well? What is a set of wells? What would be the point of assessment at the 6th well when 5 were already operating? Is it 3kms from the middle well or the outermost well? Pilot production, which is contemplated in exploration<sup>77</sup> should also be considered SSD, but unless it satisfies this intensive exploration criteria it will not be an SSD.

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- is development for the purpose of petroleum production.

Under s27 of the Petroleum Act, if petroleum is discovered it must be notified to the Minister immediately.

Under s32, if petroleum is discovered the Minister may direct the holder of the licence to apply for an assessment lease or a production lease. If the holder does not so apply the Minister may cancel the licence.

The Minister cannot grant the PPL until the appropriate development consent is in force in respect of that land.<sup>65</sup> Development consent is required under Part 4.1 of the EP&A Act as SSD under clause 6 of Schedule 1 of *SEPP (State and Regional Development) 2011* provides that all development for the purpose of petroleum production is SSD.

## **6.2 Environmental planning and assessment as state significant development**

Development for the purpose of petroleum production qualifies as an SSD. As SSD the miner must submit a development application under Part 4.1 of the EP&A Act for development consent. That application must be accompanied by an environmental impact statement (**EIS**), which is made publicly available for submissions by the public of objections, which must be responded to. Effective 1 October 2011, the Minister made a standing delegation to the Planning Assessment Commission (**PAC**) of all SSD applications.<sup>66</sup> If the PAC holds a public hearing, then there are no rights of merit appeal<sup>67</sup>. As such, the objectors have lost their rights to a truly independent assessment of the merits of CSG petroleum production. This is often lamented by the LEC<sup>68</sup>.

## **6.3 Strategic Regional Land Use Package (SRLUP)<sup>69</sup>**

On 11 September 2012, the NSW Government released its much awaited SRLUP. The SRLUP is only applicable to SSD, and arguably only SSD in relation to petroleum production<sup>70</sup>. The rural community was outraged, as despite clear promises by the O'Farrell Government<sup>71</sup>, key prime agricultural land and critical industry clusters were not quarantined from large coal or CSG projects<sup>72</sup>. What is required is an additional layer of investigation.

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<sup>65</sup> s67 Petroleum Act

<sup>66</sup> [http://www.pac.nsw.gov.au/Portals/0/Documents/instrument\\_of\\_delegation\\_pac.pdf](http://www.pac.nsw.gov.au/Portals/0/Documents/instrument_of_delegation_pac.pdf)

<sup>67</sup> s23F EP&A Act

<sup>68</sup> See the Barrington Stroud case [2012] NSWLEC 197 and the Fullerton Cove case [2012] NSWLEC 203 comments.

<sup>69</sup> See <http://www.planning.nsw.gov.au/slurp> for all the state documents

<sup>70</sup> See Public consultation drafts of the cl 17H SEPP 2007 amendment and the EP&A Reg amendment 2012

<sup>71</sup> <http://www.youtube.com/watch?v=1cZ5Y-P1Z3A>

<sup>72</sup> Unlike what the West Australian Government has done in WA by quarantining the Margaret River from CSG activities

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The SRLUP includes:

- (i) cadastral level maps of the first two areas of Strategic Agricultural Land (**SAL**) in the Upper Hunter and New England North West of NSW. Other maps<sup>73</sup> are currently being drafted. Within SAL is identified Biophysical Strategic Agricultural Land (**BSAL**) and Critical Industry Clusters (**CIC**). **Verification certificates** are used to determine whether land falls within or without BSAL or is CIC land,
- (ii) a new Land and Water Commissioner,
- (iii) the guidelines for the submission of Agricultural Impact Statements,
- (iv) the Aquifer Interference Policy,
- (v) guidelines for Verification Certificates,
- (vi) guidelines for the Gateway process and Gateway Certificates,
- (vii) a new Gateway Panel of 3 experts with expertise in agricultural science, hydrogeology, mining and petroleum development,
- (viii) linkage of the Gateway process with the recently passed Commonwealth *Environmental Protection Biodiversity Conservation (Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development) Bill 2012* to amend the *Environmental Protection Biodiversity Conservation Act 1999 (Cth)* allowing for referral of large coal projects and coal seam gas projects that affect water resources to be referred to this newly created Independent Expert Scientific Committee (**IESC**)<sup>74</sup>.
- (ix) also released were several Codes of Practice for Well Integrity, Fracture Stimulation Activities and Coal Seam Gas Exploration.

On 6 November 2012, the *Environmental Planning and Assessment (Gateway Process for Strategic Agricultural Land) Regulation 2012 (NSW)* was publicised for public consultation until 10 December 2012. Also released for public consultation was the *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment 2012 (NSW)*. These two instruments (**Consultation Drafts**)<sup>75</sup> seek to embed the application of the SRLUP into NSW legislation.

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<sup>73</sup> Southern Highlands, Central West, North Coast also to be mapped

<sup>74</sup> Commonwealth Minister Tony Burke released the names of the committee members on 27 November 2012 <http://www.environment.gov.au/minister/burke/2012/mr20121127.html>

<sup>75</sup> The current uncertainties with the Consultation Drafts relate to whether or not SSD in the exploration phase is included in the gateway process: see 17A(2) of the SEPP 2007 amendment, which appears to contradict 17A(i)(a)(ii) and 17A(1)(c); how the certificate amendment process works; why the landholder is notified of the verification application if he is given no objector rights; why the relevant criteria in relation to impacts does not include subsurface impacts on the integrity of groundwater aquifers, although maybe this will be included in consideration of the impact on highly productive groundwater.

#### 6.4 The Gateway

If SSD is proposed on BSAL or on CIC land, under the newly introduced SRLUP, the miner must:

- before submitting its development application under Part 4.1 of the EP&A Act (**DA**), go through the newly introduced Gateway process for scientific assessment of the potential impact of mining on CSG projects on water resources by the Gateway Panel and,
- the Gateway Panel must refer the application to:
  - the Commonwealth Independent Expert Scientific Committee (IESC) who can comment if it will affect a matter of national environmental significance and water resources, and
  - the Minister for Primary Industries,
- The Gateway Panel must determine the application either meets the relevant criteria (an **unconditional certificate**) or does not meet the relevant criteria (a **conditional certificate**). The conditional certificate must include recommendations as to how the miner can meet the criteria, and may also include recommendations that specified studies be undertaken.
- the **Relevant criteria**<sup>76</sup> include:
  - in relation to **BSAL**, that the proposed development **will not significantly reduce** agricultural productivity based on:
    - any impacts on the land through surface area disturbance or subsidence
    - impacts on soil fertility, rooting depths, soil profile materials and thickness
    - increases in land surface micro relief or soil salinity or changes in pH
    - impacts on highly productive groundwater
    - fragmentation of agricultural land uses
  - in relation to **CIC**, that the proposed development **will not significantly impact** on the critical industry based on:
    - surface area disturbance or subsidence
    - reduced access to, or impacts on, water resources and agricultural resources
    - reduced access to support services and infrastructure
    - reduced access to transport routes
    - loss of scenic or landscape values
- the Gateway Panel is to give the applicant a gateway certificate with or without conditions,
- the gateway certificate must be submitted with the DA to the PAC,
- the Director General (**DG**) must consider the certificate and provide DG Requirements to be satisfied in the production of the EIS by the applicant, and
- the PAC must consider those conditions in its assessment of the DA.

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<sup>76</sup> clause 17H SEPP 2007 amendment consultation draft



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As already provided, if the project is proposed for BSAL or CIC land, the proponent will have to go through the Gateway process set out above. Gateway certificates are not required for a DA where the relevant environmental assessment requirements under Part 2 of Schedule 2 of the EP&A regulations were notified to the DG on or before 10 September 2012.<sup>77</sup>

## **6.5 The public interest, ESD and the precautionary principle**

As an SSD, all the scrutiny and transparency and public participation is mandatory<sup>78</sup>. Further, section 79C of the EP&A Act requires the consent authority to take into consideration the “public interest”. In *Telstra Corporation Limited v Hornsby Shire Council* [2006] NSWLEC 133 at [123] the meaning of “public interest in s79C was considered.

*The consideration of the public interest is ample enough, having regard to the subject matter, scope and purpose of the EP&A Act, to embrace ecologically sustainable development. [124] Accordingly, by requiring a consent authority to have regard to the public interest, s79C(1)(e) of the EP&A Act obliges the consent authority to have regard to the principles of ecologically sustainable development in cases where issues relevant to these principles arise.*

As a consequence, the principles of ESD and the precautionary principle must be applied in the decision making process for SSD consent. The elements of the precautionary principle are set out in Annexure 2 to this paper. In the Barrington - Stroud case<sup>79</sup>, it was claimed that the PAC failed to consider ESD and the precautionary principle, yet the court held the PAC had considered ESD as it had undertaken an

*extensive analysis of issues concerning groundwater and re-use and disposal of extracted water which resulted in the imposition of conditions aimed at ensuring appropriate measures were adopted and implemented to ensure avoidance or minimisation of gas migration or adverse affects on water resources.*<sup>80</sup>

To conclude, it is apparent that significant movement has been made towards the recognition of and protection of groundwater water resources in NSW, particularly given the recently released Aquifer Interference Policy. However, until:

- the application of the AIP is mandatory, rather than advisory;
- the additional Part 5 REF conditions are applicable;
- it is ensured that proper baseline data and monitoring is taking place
- it is possible to ensure that CSG activities do not increase hydraulic connectivity and thereby threaten beneficial water resources,

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<sup>77</sup> Public Consultation Draft *Environmental Planning and Assessment Amendment (Gateway Process for Strategic Agricultural Land) Regulation 2012 Reg 50A (3)*

<sup>78</sup> See Annexure 1 for an overview of the process.

<sup>79</sup> *Barrington Gloucester Stroud Preservation Alliance v Minister for Planning and Infrastructure* [2012] NSWLEC 197

<sup>80</sup> Case note on *Barrington Gloucester Stroud Preservation Alliance v Minister for Planning and Infrastructure* [2012] NSWLEC 197

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we are all still very much dabbling dangerously with our most precious and rare resource, fresh water<sup>81</sup>.

A brief outline of how water is protected on the enforcement side of the equation is set out below.

## **7 Rights to protect the water**

### **7.1 At common law**

Common law rights exercisable by the landholder in relation to water on his or her land exist to the extent that they have not been overridden by legislation.<sup>82</sup> The common law distinguishes between ownership and control with respect to land and water<sup>83</sup> conferring a right of access to water and the conversion of this right to a right of use and control with the taking of possession of the water<sup>84</sup>. An infringement of the common law riparian rights creates liability on the part of the person responsible for the infringement. The rule adopted in Australia<sup>85</sup> was formulated in *John Young & Co v Bankier Distillery Co*<sup>86</sup> by Macnaghten LJ of the House of Lords as follows:

*“Every riparian proprietor is thus entitled to the water in his stream, in its natural flow, without sensible diminution or increase and without sensible alteration in its character or quality. Any invasion of this right causing actual damage or calculated to found a claim which may ripen into an adverse right entitles the party injured to the intervention of the Court.”*

Dr Juliet Lucy aptly states:

*“Although the use of water is a usufructuary<sup>87</sup> right rather than a right of property, the exercise of the right, whatever its source, is inextricably related to the ownership, occupation or control of land.”<sup>88</sup>*

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<sup>81</sup> Project Blue Sky

<sup>82</sup> Lucy J 2008 Para 14.9.1530

<sup>83</sup> Lucy J 2008 Para 14.9.1540

<sup>84</sup> Lucy J 2008 Para 14.9.1540. *Water Act 1912 (NSW) s8* the ministerial council shall have sole and exclusive use of the said work and the water contained therein”; *Water Management Act 2000 (NSW) s392* State’s water rights “rights to control use and flow of ... (c) all water naturally occurring on or below the surface of the ground, are the states water rights. (2) the states water rights are vested in the crown..”

<sup>85</sup> *Gartner v Kidman* (1962) 108 CLR 12, Lucy 2008 14.9.3710 50 [1893] AC 691, Lord Macnaghten at 698

<sup>86</sup> [1893] AC 691, Lord MacNaughten at 698

<sup>87</sup> Usufructuary is the right to enjoy all the advantages derived from the use of something which belongs to another, so far as compatible with the substance of the thing not being destroyed or injured.” Macquarie Dictionary p2069

<sup>88</sup> Lucy J., 2008 para 14.9.2480

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Alteration of the quality of water by pollution may amount to infringement<sup>89</sup>. Lucy goes on to provide “the remedy available for an infringement may be an award of damages, an injunction or a lawful abatement by the person whose rights have been infringed.”<sup>90</sup>. The most obvious action is nuisance and the most important aspect of such an action is damage. Evidence of damage can only really be shown if there is a baseline set of data taken before the CSG operations occur and regular monitoring of the actual chemicals used in the CSG process in the beneficial water sources. Given the application of the AIP, with proper enforcement of AIA conditions, nuisance actions may be easier to prove.

## **7.2 Water Act 1912 (NSW)**

The Water Act 1912 (NSW) recognises the concurrent common power of abating nuisance in s21A(3). Arguably<sup>91</sup>, a landholder with its common law rights, has standing to protect quality and character of the water from nuisance in the LEC under s115(1) of the Petroleum Act, and may seek answers to questions put to miners concerning protection of groundwater.

## **7.3 Water Management Act 2000 (NSW) (WMA)**

The WMA provides that it is a Tier 1 offence for a person to take water from a water source other than in accordance with a licence. The WMA provides for various types of licence already discussed.

## **7.4 Contaminated Land Management Act 1997 (NSW) (CLMA)**

The object of the CLMA is to establish a process for investigating, and where appropriate remediating, land the EPA considers contaminated. In this Act, “land” is defined “to include water”<sup>92</sup>. Contamination is defined in s5 to mean:

*the presence ... of a substance at a concentration above which the substance is normally present in, on or under the land in the same locality being a presence that presents a risk of **harm to human health or any aspect of the environment**.*

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<sup>89</sup> Kempsey SC v Lawrence [1996] Aust Torts Reports 81-375 affirming Lawrence v Kempsey SC (1995) 87 LGERA 49

<sup>90</sup> Lucy J., 2008 para 14.9.3710

<sup>91</sup> There are difficulties here. The landholder has no property in the groundwater, simply access rights. The obligations in the PEL and the PPL to protect the groundwater are not obligations owed by the miner to the landholder, but obligations owed to the Minister of Mineral Resources on behalf of the State of NSW. Further, in order to prove there has been damage, a baseline study is essential. Current provisions of PELs and PPLs do not require baseline studies to be undertaken. AGLUI has taken no baseline for the majority of the PPL 1,2, or 4. However it is proposing in its application for the Northern Expansion to take a baseline.

<sup>92</sup> s4 CLMA

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Fracking chemicals which are toxic and known to cause harm to human health and the environment, and BTEX chemicals, contained in the coal seam, if released from it, are also highly toxic<sup>93</sup>. Under the CLMA the person responsible for contamination is the person who caused the contamination<sup>94</sup>. It is the duty of the EPA to examine and respond to information it receives of actual or possible contamination of land, address it and record what it has done<sup>95</sup>.

Breaches or apprehended breaches of the CLMA can be the subject of restraint orders of the LEC under Part 10 of the CLMA on the application of “any person”<sup>96</sup>. Part 10 Division 2 sets out who can institute proceedings: the EPA, and “any person ... if the court grants the person leave to bring the proceedings”<sup>97</sup>. Section 95(2) CLMA provides the court is not to grant leave unless the listed criteria are satisfied. “Any person” under the CLMA could be a landholder, or a representative body<sup>98</sup>, such as those which have sprung up down the east coast of Australia<sup>99</sup>.

### **7.5 Protection of the Environment Operations Act 1997 (PEOA)**

PEOA allows for “any person” to commence action in the LEC for an order to remedy or restrain a breach (or a threatened or apprehended breach) of the PEOA. A landholder could commence proceedings if it has evidence of pollution or contamination of surrounding aquifers.

Parts 5.2 and 5.3 of Chapter 5 of the PEOA set out the tier 1 and tier 2 offences in relation to water pollution.

#### **(a) Tier 1 Offences**

Part 5.2 PEOA Tier 1 Offences provides in s116 that if:

*a person wilfully or negligently causes any substance to leak, spill or otherwise escape (whether or not from a container) in a manner that harms or is likely to harm the environment, the person is guilty of an offence.*

A tier 1 breach has very serious penalties including jail time.

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<sup>93</sup> Lloyd-Smith 2011 p6

<sup>94</sup> s6 CLMA

<sup>95</sup> s8 CLMA

<sup>96</sup> s96 CLMA

<sup>97</sup> s95(1) CLMA

<sup>98</sup> s96 CLMA

<sup>99</sup> Lock The Gate Alliance (LTG), Great Artesian Basin Protection Alliance, Southern Highlands Coal Action Group, Hunter Valley protection Alliance, and the list goes on. There are at least 91 such groups currently represented by a head alliance the LTG Alliance [www.lockthegate.com.au](http://www.lockthegate.com.au) Those groups are listed at <http://lockthegate.org.au/groups/> and this is not a complete list.

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The granting of the PEL or the PPL does not excuse the miner from leaks, spillages or escapes of petroleum (methane gas), BTEX chemicals or fracking chemicals. The defences provided in Part 5.2 would be available to a miner for pollution or contamination of the groundwater if it had exercised due diligence in relation to the protection of the groundwater, or had taken reasonable precautions to ensure that there was no pollution of the groundwater. One presumes this would include the taking of a baseline set of data and regular monitoring. The lawful authority under an environmental protection licence does not allow breaches of s120 of the PEOA.

#### **(b) Tier 2 offence Pollution**

Part 5.3 Water pollution provides in section 120 of the PEOA, a person who pollutes waters is guilty of an offence. "Water pollution" is defined in the Dictionary of the PEOA to mean:

*placing in or otherwise introducing into or onto waters (whether through an act of omission) any matter, whether solid, liquid or gaseous, so that the physical, chemical or biological condition of the waters is changed.*

Proof of pollution requires baseline data as previously described, to be taken before the prospecting activities commence.

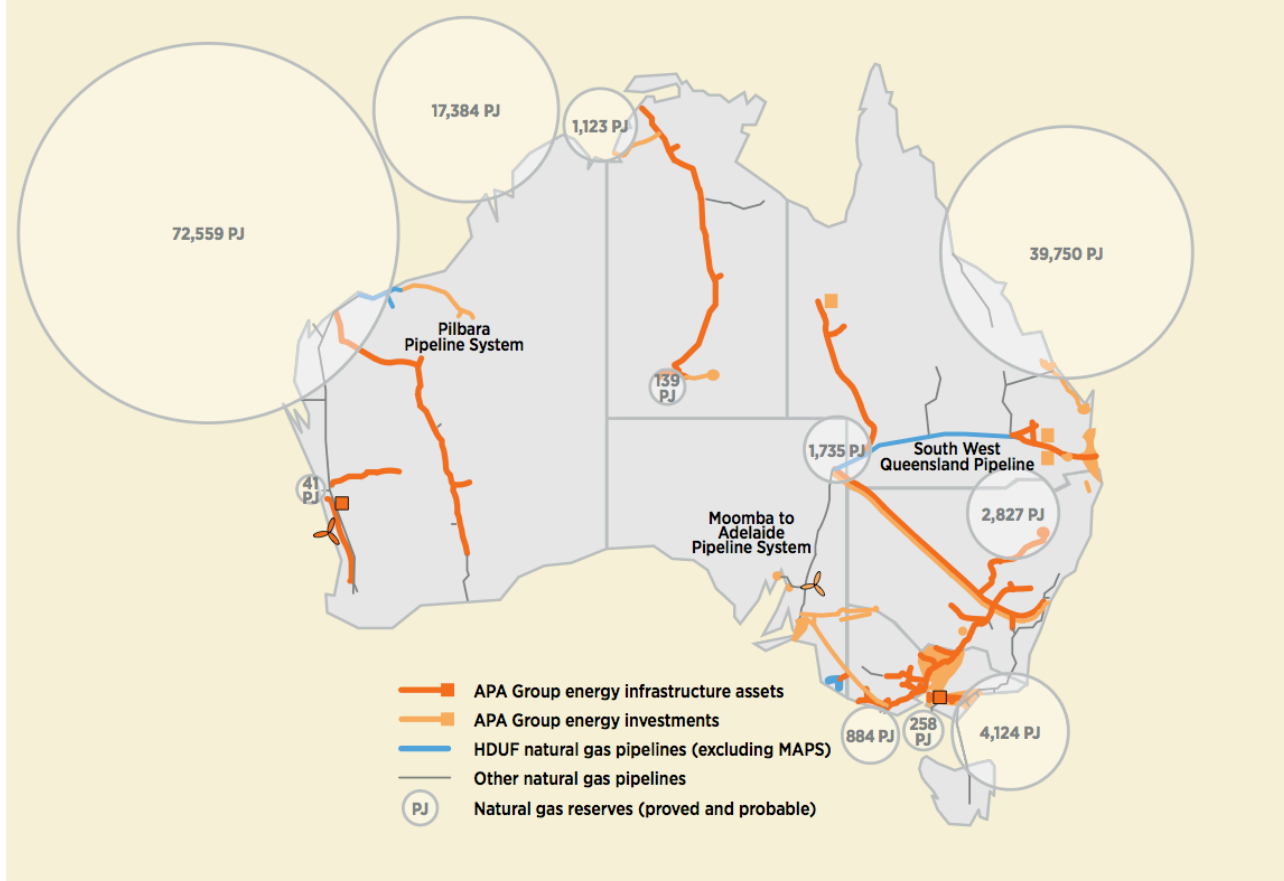
#### **Conclusion**

The regulatory process attempts to capture significant environmental impact at various stages of CSG operations, both in exploration and in production, and significant progress has been made in recent years.

However CSG is a new industry for NSW. There is substantial controversy surrounding it and its economic necessity. When looking at Australia's known gas reserves<sup>100</sup> one questions the need to exploit the insignificant unconventional gas reserves in NSW when such exploitation could potentially irreparably destroy NSW's most important beneficial groundwater resources, such as in the GAB and the MDB. Given the popular distrust, at least in the initial stages of the industry's development in NSW and until it can be shown not to be unsafe, thorough and careful progression would appear to be prudent.

**FIGURE 11 - APA Group exposure to major gas production sources**

Source: APA Group data; EnergyQuest May 2012



<sup>100</sup> See APA Abare diagram

## Annexure 1 - Process

### Exploration

- 1) **application** for a PEL under Part 3 of Petroleum Act
- 2) **grant** of application s9 Petroleum act
- 3) Minister must consider environment under s74 Petroleum Act (does not include water)
- 4) Minister can impose conditions in PEL s23 Petroleum Act
- 5) limitation of **challenges** of grants s25 Petroleum Act [3 months after grant notified in Gazette]
- 6) **access arrangement** (AA) to be agreed or determined Part 4A Petroleum Act
- 7) protection of environment provisions can be part of AA s69D91)(e) Petroleum Act
- 8) **verification certificate** for land within biophysical strategic agricultural land if sought by owner of land under clause 17C *State Environmental Planning Policy (Mining, Petroleum Production and Extractive Industries) Amendment 2012 Public Consultation Draft* [Only after an AA has been entered into.]
- 9) approval under the **EPBC Act**, if the activity affects a “matter of national environmental significance”.
- 10) approval for **seismic study/borehole drilling** requires **REF** under s111 Part 5 EP&A Act unless likelihood of “significant” environmental harm determined by the Department, whereupon an **EIS** is required under s112, Part 5 of the EP&A Act and public consultation but no appeal rights under Part 5
- 11) condition of REF, an **aquifer access licence** under WMA – minimal harm requirements [Query uncertainty of this application - AIP provides AAL required in exploration. ]
- 12) condition of REF, an **aquifer interference approval** under WMA – minimal harm requirements [Query uncertainty of this application - AIP provides AIA required in exploration yet makes a list of minimal harm events leading to uncertainty as to whether the NOW considers these to be matters which are requiring an AIA or are not]
- 13) **agricultural impact statement** required as part of REF [query Fact Sheet which says it does and Guideline which only speaks of SSDs - inconsistency]
- 14) if SSD in exploration [cl 6(2) Schedule 1, SEPP 2011 (State and Regional development)], development consent required under Part 4 of the EP&A Act then:
  - public exhibition of development application and EIS under Part 4 of the EP&A Act
  - any person can object to development application under Part 4 of the EP&A Act
  - development consent under Part 4 of the EP&A Act
  - objectors can apply for merits review in the LEC under EP&A Act Class 1
  - s89J EP& A Act - AIA and AAL required
- 15) pilot production in exploration <sup>101</sup>
- 16) no nuisance allowed

### Production

- 1) application for a production lease under Part 3 of the Petroleum Act by licence holder
- 2) application for a production lease must be published s43 Petroleum Act

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<sup>101</sup> Current draft policies speak of pilot production in exploration however the author questions whether there is the power for the Minister has the power to allow pilot production in exploration. Fullerton Cove Residents v Dart [2012] NSW LEC decision yet to be handed down as to whether EIS required for pilot production.

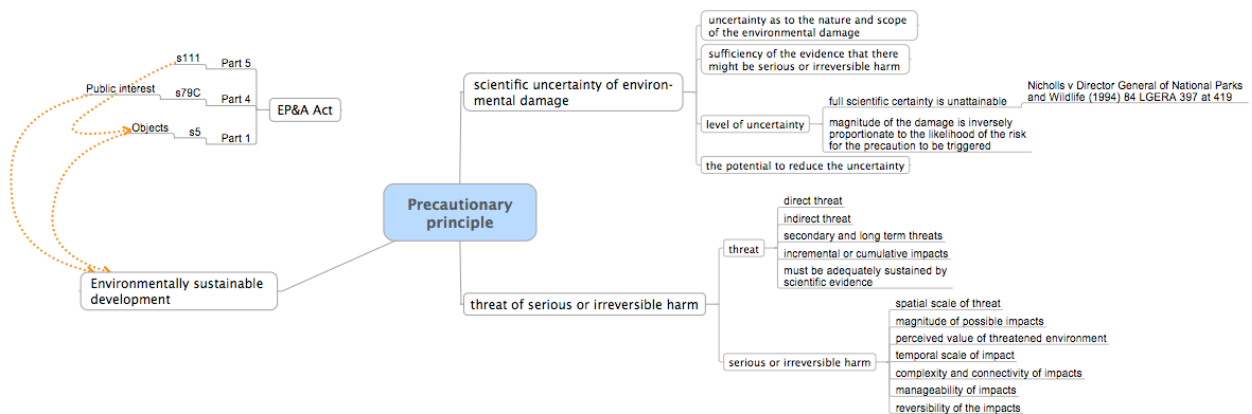
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- 3) no production on cultivated land s71 Petroleum Act
- 4) Minister must not grant production lease until an appropriate development consent is in force in relation to the land s67(2) Petroleum Act
- 5) application for development consent under Part 4 EP&A Act for petroleum production. All petroleum production is state significant development under SEPP (State and Regional Development) 2011 and as SSD then:
  - (i) public exhibition of development application and EIS under Part 4 of the EP&A Act
  - (ii) any person can object to development application under Part 4 of the EP&A Act
  - (iii) development consent under Part 4 of the EP&A Act
  - (iv) objectors can apply for merits review in the LEC under EP&A Act Class 1
- 6) As SSD the DA must contain a Gateway certificate
- 7) Gateway certificate application to be submitted to the Gateway Panel
- 8) Gateway Panel to consider application and make referrals of application to the Minister for Primary Industry and the IESC for their consideration and comment
- 9) Gateway Panel must consider comments of Min Primary Industry and IESC
- 10) Gateway Panel must issue a gateway certificate either conditional or unconditional
- 11) Application for development consent must contain the gateway certificate
- 12) Consent authority must consider the Gateway Certificate
- 13) granting of a production lease under s9 Petroleum Act – environment to be considered under s74
- 14) challenge of grant can be made in the LEC within 3 months of gazettal of grant under s25 Petroleum Act
- 15) environmental protection licence (EPL) required under the PEOA for production beyond a trigger level
- 16) no pollution allowed beyond EPL – s120 PEOA
- 17) aquifer access licence and aquifer interference approval required under the WMA
- 18) no nuisance allowed



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## Annexure 2 Application of the precautionary principle



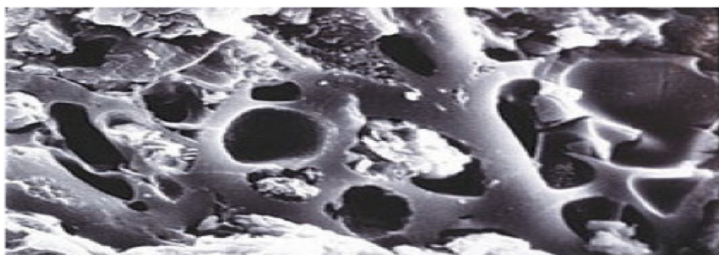
**Annexure 4 Extract with amendment from Environmental Planning and Assessment paper of the author<sup>102</sup>**

## **1 CSG activities**

Coal seam gas activities or onshore petroleum activities, generally referred to in the industry as unconventional<sup>103</sup> gas activities, typically involve the ascertaining of the position of, and then the drilling into, a coal seam, the dewatering of the seam and then the extraction of the gas.

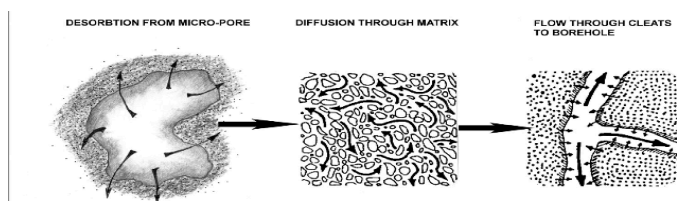
## **2 Coal seam gas**

Coal seam gas or coal seam methane or coal bed methane (**CSG**), is methane which sits within the pores of a coal seam. Coal is made up of organic material, crushed and compressed over thousands of years. The gas found in the coal is formed as the coal is formed, some say in the decomposition process of the organic material. It is estimated that with every 1 tonne of coal, some 1500m<sup>3</sup> of gas is produced<sup>104</sup>. Not all the gas is methane gas. It can also contain CO<sub>2</sub>, CO and nitrogen. Figure 2 is a photo under a scanning microscope of coal. It is full of minute pores. The methane is absorbed onto the sides of the pores and held there by water.



*Figure 2; SEM photograph by Satya Harpani* <sup>105</sup>

It is through the cleat system, which holds the water in the coal, that gas is extracted. In order to extract the gas, the cleats must be dewatered or depressurised.



*Figure 3: The chemo-physics of gas extraction from coal (after King, 1990)*

<sup>102</sup> Published at [mmm.mlppl.com.au](http://mmm.mlppl.com.au)

<sup>103</sup> Conventional gas extraction is from sedimentary rock such as sandstone or limestone as opposed to in a coal seam. The extraction processes are well known and have been practised over the last century.

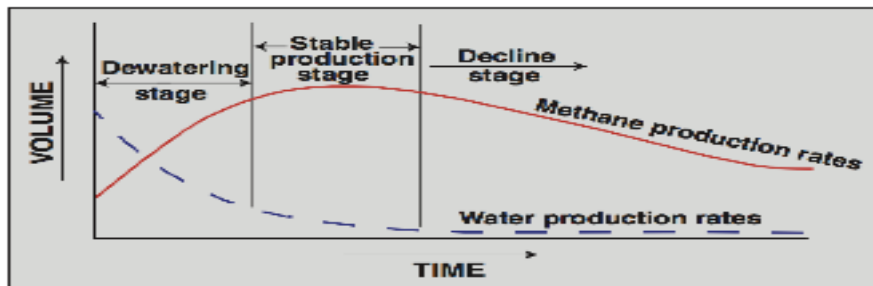
<sup>104</sup> Remmer et al, 1986

<sup>105</sup> Found in Pells Consulting report on the Thirlmeier Lakes Memorandum 2 to Report of October 2011

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The dewatering and gas extraction is described in the following graph. As the seam is dewatered, the gas extraction increases. Note that the seam needs to be largely dewatered before the methane is at a stable production stage.

Figure 8 Typical changes in water and gas production over time

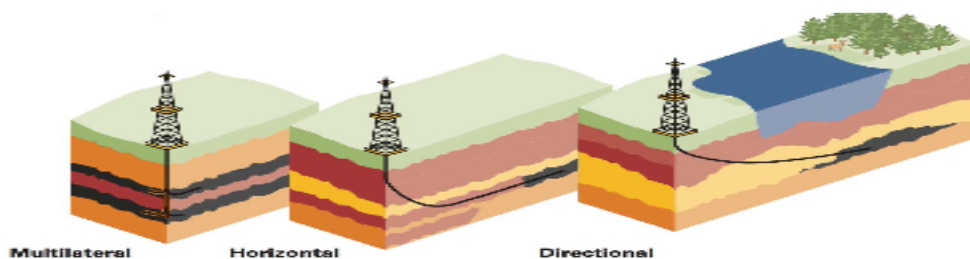


Source: USGS, 2000

### 3 Extraction techniques

The techniques used to extract the CSG use either vertical, horizontal or directional wells. Horizontal or directional well drilling can extract gas from a radius of greater than 2.5km from the well head. This form of drilling is far more expensive than vertical drilling<sup>106</sup>. Horizontal or directional drilling causes substantially less surface disruption but substantially more subsurface disturbance. It allows for several horizontal wells to be sunk from the same well head, each fanning out in a different direction. Figure 5 is an example of the various drilling techniques.

Figure 5 Stylised representation of various CSG drilling techniques



Source: US DOE Office of Fossil Energy, 1999

Figure 2a is a photo of a directional drill bit and motor. These drill heads are steerable, have down hole percussive motors and provide directional drilling.<sup>107</sup>

<sup>106</sup> AGLUI Pty Ltd estimates a vertical well in the Camden Gas Project to cost \$700k and upwards to drill whereas a horizontal drill over \$1.2m.

<sup>107</sup> Pells Consulting report Memorandum Thirlmeier Lakes – Addendum 2 to Report of October 2011



**Figure 2a: Directional drill bit and motor**

To increase the flow of gas, a further technique of hydraulic fracturing is utilised. This technique involves the use of water, sand and hydraulic fracturing chemicals which are pumped at high pressure down the bore hole into the coal seam, essentially to fracture the coal seam. The sand particles sit between the fractured coal to allow the gas to flow more freely. The fractures can extend for distances of up to 400m depending on the hardness of the coal and surrounding geology and the nature of the “fracc”. Considerable public concern exists internationally and in Australia over the nature of the chemicals used, not only in the drilling fluids but also in the hydrofracturing fluids. Hydrofracturing chemicals have included what are referred to as BTEX chemicals. BTEX stands for benzene, toluene, ethylbenzene, xylene. BTEX chemicals also occur naturally in the coal seam.

*The fracking process itself can release BTEX from the natural-gas reservoirs, which may allow them to penetrate into the groundwater aquifers or volatilise into air. As a consequence people may be exposed to BTEX by drinking contaminated water, breathing contaminated air or from spills on their skin. It is important to note that BTEX chemicals are naturally part of the volatile chemicals found in coal seams.<sup>108</sup>*

The affect of BTEX chemicals on human health has been documented to include, in the short term, skin irritation, central nervous system problems (tiredness, dizziness, headache, loss of coordination) and effects on the respiratory system (eye and nose irritation). Prolonged exposure to these compounds can also negatively affect the functioning of the kidneys, liver and blood system. Long-term exposure to high levels of benzene in the air can lead to leukemia and cancers of the blood.<sup>16</sup> In the Queensland Coal Gasification Project in Kingaroy, BTEX chemicals were found in the beef which were agisted on the property. That project was subsequently shut down and the Queensland Ombudsman has recently released a very interesting report on the administrative failings of the Queensland government in relation to this project.<sup>109</sup>

In NSW, the NSW Legislative Council Inquiry Report March 2012 Recommendation 9 provides

*That the NSW Government continue the current ban on fracking until the National Industrial Chemicals Notification and Assessment Scheme assesses fracking chemicals for their intended use and toxicity according to international standards, and the NSW Government consider any findings of this assessment.”*

<sup>108</sup> Lloyd-Smith Dr M., Senjen Dr R., 2011 Briefing paper Hydraulic Fracturing in Coal Seam Gas Mining: Risks to our health, Communities, Environment and Climate April 2011 , National Toxins Network,

<sup>109</sup> Queensland Ombudsman Report on the Coal Gassification Project in Kingaroy <http://www.parliament.qld.gov.au/documents/tableOffice/TabledPapers/2012/5412T1124.pdf>

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Fracking occurs both in CSG exploration and in production. In exploration, to assist in the assessment of the commercial viability of the seam, and, in production to produce the gas.

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## Schedule 1 Codes of Practice for Fracture Stimulation

Some of the more interesting mandatory provisions include:

### *7.2 Mandatory requirements*

*The FSMP must, at a minimum:*

- a) Identify the location, extent, pre-existing water quality and use of water sources which have the potential to be impacted by the fracture stimulation activity.*
- b) Identify sources of fracture stimulation injection water, the estimated quality and volume to be injected and any licensing/approval requirements under the Water Management Act 2000 or Water Act 1912.*
- c) Include a qualitative risk assessment for risks associated with the fracture stimulation activity, including:*
  - i. cross-contamination between coal bed waters and shallower water sources*
  - ii. changes to groundwater pressure and levels*
  - iii. changes to surface water levels*
  - iv. changes to water quality characteristics.*
- d) If the risk of establishing a connection between the target coal bed and other water sources as a result of fracture stimulation activity is assessed to be moderate or higher, then a fate and transport model study must be undertaken to quantify the impacts on water sources and the likelihood of any changes to the beneficial use category applicable to any affected aquifer.*
- e) If there is a moderate or greater risk of significant changes to pressure or levels as referred to in c) (ii) or (iii), the impacts on all affected aquifers must be quantitatively assessed.*
- f) Describe consultation undertaken with the NSW Office of Water in developing the water resources component of the risk assessment.*

Until the release of this code, fracking had been banned in NSW from March 2011. The Code also bans the use of BTEX chemicals<sup>110</sup>. Now all chemicals to be used in fracture stimulation in NSW must be identified, including their volumes and concentrations and potential risks to human health.

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<sup>110</sup> Para 6.1 Code of Practice for Fracture Stimulation

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## Legislation

### NSW

Contaminated Land Management Act 1997 (NSW) (CMLA)

Environmental Planning and Assessment Act 1979 (NSW)

Water Act 1912 (NSW)

Mining Act 1992 (NSW)

Petroleum (Onshore) Act 1991 (NSW)

### Queensland

Petroleum Act 1923 (QLD)

Petroleum and Gas (Production and Safety) Act 2004 (QLD)

### Commonwealth

Environmental Protection Biodiversity Conservation Act 2000 (Cth)

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Protection of the Environment Operations Act 1997  
(NSW)

Protection of the Environment Administration Act 1991  
(NSW)

Water Management Act 2000 (NSW)

### **Policies and NSW government documentation**

NSW Strategic Regional Land Use Package September 2012 including:

- Strategic Regional Land Use Plan - New England North West September 2012
- Strategic Regional Land Use Plan - Upper Hunter September 2012
- NSW Aquifer Interference Policy September 2012
- Coal Seam Gas Code of Practice - Well integrity
- Coal Seam Gas Codes of Practice - Fracture Stimulation Activities
- Guidelines for Agricultural Impact Statements October 2012
- Draft Code of practise for CSG explorers <http://www.resources.nsw.gov.au/community-information/coal-seam-gas/code-of-practice-for-coal-seam-gas-explorers>
- *Explanation of the intended effect of the proposed amendment to the State Environmental Planning Policy (Mining, Petroleum Production and extractive industries) 2007*
- *NSW Planning and Infrastructure Frequently asked questions Amendment to the Mining SEPP & establishing the Gateway Panel*
- *NSW Government An explanation of the Mining SEPP and EP&A Regulation draft amendments*
- *Draft guideline for site verification of critical industry clusters*
- *NSW Government Fact Sheet Strategic Regional Land Use Policy Development of protocol for site verification and mapping of Biophysical Strategic Agricultural Land (BSAL)*
- NSW Legislative Council General Purpose Standing Committee No.5 Inquiry into Coal Seam Gas Report
- NSW Legislative Council General Purpose Standing Committee No.5 Inquiry into Coal Seam Gas NSW Government response Oct 2012

Queensland Ombudsman Report on the Underground Coal Gasification Report An investigation into the Kingaroy underground coal gasification project

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Minister for Aboriginal Affairs v Peko-Wallsend (1986) 162 CLR 24

Minister for Environment and Heritage v Greentree (2004) 138 FCR 198

Murrumbidgee Groundwater Preservation Association v Minister for Natural Resources [2004] NSWLEC 122

Paramatta City Council v Hale (1982) 47 LGRA 319

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Telstra Corporation Limited v Hornsby Shire Council [2006] NSWLEC 133

Turner v Minister for Immigration (1981) 35 ALR 388

Ulan Coal Mines V Minister for Mineral Resources BC200812052 [2008] NSWCA 251, [2007] NSWSC 1299

Brown v CMA Pty Ltd [2010] 76 NSWLR 473

Cadia Holdings Pty Ltd v State of NSW 25 August 2010 HCT S367/2009

#### Websites

<http://www.pellsconsulting.com.au/>

#### Data bases

Lexisnexus Environmental litigation civil enforcement Updated by Gerry Bates