Groundswell Gloucester

AGL's Coal Seam Gasfield in Gloucester:

A case study in poor Environmental, Social and Corporate Governance (ESG)

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Poor ESG and AGL in Gloucester

Executive Summary

AGL's Gloucester gas field is not compatible with Environmental, Social and Corporate Governance (ESG) policies at the most basic level. It exposes AGL investors to unacceptable ESG risks for the following reasons:

1. Climate Change – Developing greenfields fossil fuels in an increasingly climate constrained world is not compatible with ESG principles. Page 2

2. No plan has been provided by AGL on how or where they will dispose of large volumes of contaminated salt and other toxic water treatment waste products over the gasfield lifetime. Page 14

3. The Gloucester Basin is part of the water catchment for the drinking supply of 75,000 people downstream. The basin has a unique, highly complex, faulted geology which exponentially increases the risks of water contamination. Page 6

4. AGL plan to frack at the relatively shallow depth of 250m. This is close to areas of high permeability in the soil and fractured rock layers and therefore has a high risk of contamination of ground and surface water. The shallowest that AGL fracked at the Waukivory Pilot Project was 370m. Page 4

5. In an area prone to extensive flooding such risks have been inadequately assessed. Page 6

6. No baseline health monitoring has been done and potential health impacts have not been adequately assessed. Page 9

7. Local climatic conditions which complicate air pollution modelling have been inadequately assessed. The Gloucester valley is densely settled, unlike the Queensland gas fields. Impacts will be more keenly felt. Page 6

8. AGL's gasfield poses direct and indirect threats to existing longterm sustainable industries, agriculture and tourism. Page 7

9. AGL's Waukivory Pilot can in no way be relied upon as adequate information to determine risks, potential impacts or financial viability of the proposed Stage 1 gasfield. Page 12

10. AGL's project faces sustained and substantial local opposition. Downstream communities are also fiercely opposed to the development of CSG at Gloucester. Page 8

11. Government decision making process has been tainted by undisclosed political donations by AGL and inappropriately close links between AGL and the government. Page 9

12. Financial risks already manifest. AGL has written off $382m at Gloucester in just the last 2 years. The current book value of $130m is based on questionable assumptions as to gas prices and exchange rates. Reserves have been downgraded. Page 11

13. Well integrity, for above and below ground components, is questionable, both for CSG production wells and for the numerous existing exploration bores in the basin, leading to long term pollution concerns. Page 15

14. The 4-well pilot program at Waukivory was fraught with pollution incidents and apparent license breaches. AGL has very questionable expertise in the area of upstream gas field development. In recognising this, the company itself has disbanded its upstream gas division. Page 14

It is for these reasons that AGL's Gloucester gas project represents an unacceptable ESG risk and any reputable institution should divest AGL shares.

1.0 Introduction

Groundswell Gloucester is a non-profit community organisation committed to developing Gloucester's sustainable businesses and communities through active participation in social democracy. Groundswell opposes AGL's proposed Gloucester Coal Seam Gas (CSG) Field as it presents ongoing risks to environment, existing sustainable industries and community wellbeing.

This report outlines AGL's failure to adequately meet standards in environmental, social and corporate governance (ESG) and failure to adequately assess and communicate the high risks involved.

Documentation substantiating our concerns and providing context is available on dropbox. Please email info@groundswellgloucester.com with subject line 'ESG case study documents' to request access.

Groundswell's objective has always been to provide accurate and properly referenced information. However, with the number of reports that we need to review, there may be cases where there is relevant further information in reports, particularly more recent ones, which we have not yet identified. As such, any comments on the facts provided or the assessments made, will be gratefully received. If you would like further information, or to visit our region and meet affected families, please get in touch.

2.0 Environmental, Social and Corporate Governance and AGL

AGL's proposed Coal Seam Gas Field and its conduct during the exploratory phase of the project fail to meet best practice in Environmental, Social and Corporate Governance (ESG). AGL's conduct as outlined in section 2 below has consolidated perceptions that AGL pays only lip service to environmental responsibility, community engagement and governance. In so doing, AGL increases both the risk of human and environmental harm and also consolidates opposition to its proposal. The following brief outline considers AGL's Gloucester gasfield conduct against factors from the FTSE4Good ratings model.[1]

2.1. Climate Change

In an era when scientific consensus is that the majority of fossil fuels need to remain undeveloped,[2] developing a greenfield fossil fuel project is not an environmentally responsible decision. CSG Mining is particularly worrying in terms of climate change because of methane's global warming potential.

"Methane is 84 times more effective at trapping heat than CO_2 over the first 20 years after they are both emitted, and 28 times more effective over 100 years."[3]

Fugitive emissions around gas wells are well documented[4], and in AGL's case there has already been 1 gas well of the 4 at Waukivory leaking[5], and in an EPA audit of the Camden gas field it was found that almost 1 in 10 gas wells were leaking.[6] [7]

Aside from the contribution of methane production to global warming, flaring of gas wells is also a contributor to CO2 emissions. AGL's Review of Environmental Factors (REF) for the Waukivory Pilot Project (WPP) estimated 65,000 tonnes of CO2 would be produced, just from the flaring of the four wells.[8]

AGL's recent media announcements of a commitment to reducing emissions amount to little more than a 'greenwash'. AGL currently contributes more greenhouse gases through its power stations that any other energy provider in Australia[9] and its decision to continue operating these power stations until they are due for decommissioning in any case falls far short of actively reducing its carbon output now. Statements at AGL's AGM intimating that the company was waiting for government guidance and a national plan on carbon emissions before committing to specific early emissions reductions or further renewables investment seem to expose AGL's recent rhetoric as PR spin[10]. Meanwhile AGL continues

operating as one of the Southern Hemisphere's largest carbon polluters and investing in greenfield fossil fuel development such as the Gloucester CSG field.

2.2. Water use, pollution and resources

AGL's Gloucester gasfield will impact on water, soil and air and create contaminated waste with no solution yet in place.

a. Complexity of the Gloucester basin and potential fracking impacts to date

Coal seams and surrounding geological formations in Gloucester are intricately connected; this means gas and fluid migration is very likely but also difficult to monitor. Careful siting of gaswells and limiting which coal seams are targeted for fracking and extraction, while limiting recoverable gas volumes, cannot provide adequate protection of water and air and in any case, AGL has demonstrated a lack of precaution in siting wells to date[11]. The number of coal seams AGL will need to access to get viable gas flows adds major complexity to the likelihood of gas migration and significantly increases costs. The source of chemical detections in groundwater and surface water during fracking at the Waukivory pilot has not been established and a report of the fractures conducted shows that some fracks resulted in 'possible vertical growth'[12]. The EPA has accepted the Centre of Coal Seam Gas (University of Queensland) position that the unexplained presence of fracking chemicals in surface water is unlikely to have resulted from fracking. But there is still no evidence provided to indicate that the chemicals came from an alternative source and if the spikes were indeed laboratory errors or limitations as AGL have suggested, the reliability of all WPP results may be questioned. Interburden permeability is variable. Other opportunities for migration are present with over 4000 exploratory bore holes in the basin, many of which may be unidentified and unknown to AGL. Where these bores intersect a coal seam to be fracked, opportunities exist for gas and fluids to migrate, or for a bore hole to blow out under pressure. One such blowout occurred during Lucas Molopo's exploration and it was only after pressure from the community that AGL grouted known pre-existing exploration boreholes within 500m of the wells in the WPP. [13] The cost of doing this across all AGL's proposed gasfields is likely to be significant.

b. Faulting

Also significantly increasing migration risk is the ubiquitous faulting, which can provide direct conduits into the alluvium, creeks and rivers. To our knowledge, complete fault seal analyses have not been done, meaning the extent to which these faults may 'leak' and provide migration paths of fracking fluids and gas, is uncertain. This presents increased risks of fugitive emissions and the likelihood of environmental impacts on surface water and shallow groundwater aquifers - increasing likelihood of breaching of environment regulations and reputational damage.[14] If AGL were to adhere to best practice and expert advice, they would not drill in a heavily faulted basin at all. AGL's frequent statements that avoiding faults means that potential impact is low are questioned by Dr Evans in his peer review, which states:

"Siting CSG wells away from faults is an important, but not necessarily sufficient control, to prevent the impact of faults acting as potential preferred pathways." (p. 42).[15]

AGL has not adopted the important control Evans recommended - to site CSG wells away from faults.[16] Of course, if AGL were to adopt this control across the basin, available locations for gas wells would be severely restricted.

c. High risk in extrapolating from the Waukivory Pilot to the rest of the Gloucester basin

Another outcome of the complexity of the Gloucester geology is that what occurs in one location in the basin as a result of AGL's activities is not necessarily representative of what may occur in another location; or in the same location at a different time. This means that potential future impacts are

extremely difficult to predict; as are potential future gas flows. AGL has explained its adaptive management approach to us as: AGL will progress the gasfield in stages, learning from problems as it goes and applying newly gained information to the next part of the project. This is unacceptable where potential 'problems' include unanticipated drawdowns, well blow-outs and connection of coal seams with creeks and rivers. These 'problems' cannot be retrospectively addressed; yet neither can they be predicted accurately. Because of the depth and overall extent of depressurisation and the nature of the strata, actual maximum drawdowns may take years to develop; meaning future stages may progress before impacts from early stages are identified and addressed. AGL has recently applied to develop stage 1 in one phase, rather than in three; presumably making adaptive management a very high risk approach.

d. Inadequate monitoring program

While AGL proposes that during the Stage 1 gasfield, it will frack coal seams at a depth as shallow as 250m, the shallowest depth fracked during the Waukivory pilot project was 370m. This leaves an information gap on more visible and damaging potential impacts caused by fracking above 370m on water resources; exposing irrigators, water catchment users and the local riverine systems. Groundswell questions whether AGL's failure to test for impacts when fracking between 250m and 370m was to avoid identifying impacts at this level prior to securing final approval and investment in Stage 1. The potential for this to be of major concern for AGL is magnified when it was originally saying in many of its documents that gas extraction would commence at 200m, even 150m in some earlier statements.

Other significant failures in the design of the monitoring program for the Waukivory Pilot are: there was only one monitoring bore screened below 347m during fracking operations; a geophone to monitor fracking migration in only one of the four wells; and no monitoring or analysis in the surrounding creeks and river for many of the fracking chemicals and known coal seam contaminants such as BTEX. Groundswell considers this as evidence that the true potential for impacts has not been adequately investigated. Implications of issues in the design of monitoring for the WPP are further explained in 'Pells on Waukivory Pilot Monitoring' (document 81).

These design issues raise questions about responsible project management in that the Waukivory Pilot represented a significant investment of funds and time while exposing AGL to allegations of breaches and poor performance and yet returning little information in critical areas of the investigation.

e. Water table drawdowns unknown

AGL has not yet completed comprehensive numerical modelling of the whole Gloucester basin so is not in a position to make any kind of assessment of likely drawdowns caused by its project. AGL estimates that any drawdowns will be negligible but this is not supported by evidence or by experience in other unconventional gasfields. An existing coal mine and a proposed coal mine in the basin provided estimates of drawdowns with and without AGL's coal seam gas project and they differ markedly. A peer review, which included considerations of the problems with different models showing different results, stated that these problems must be reconciled. To our knowledge this has not been done.[17] The information gap on likely drawdowns will not be addressed by the WPP as to our knowledge, information used from the WPP will only be based on six months of pumping in a limited number of coal seams. This is completely inadequate.

AGL's latest draft of their Extracted Water Management Strategy (EWMS) assumes that, based on their pump testing at the WPP, the estimated quantity of produced water that will need to be treated will be significantly less than previous estimates. AGL have indicated that this is largely due to the fact that they will now not be targeting very shallow and more permeable coal seams which were tested in their previous exploration work. The EWMS assumes that the shallowest coal seam will be at 250m below

ground level. However, this is still a relatively shallow depth. AGL's assumption seems a high risk approach as AGL did not test any coal seams above 370m at the WPP.

The previous pump testing at the Stratford Pilot Project, which was undertaken by Lucas Molopo up until 2008, did not target specific coal seams. The fracking and pump testing was done over variable depths, testing a number of coal seams on each well at one time. These tests did indicate that the stages which included shallow seams had higher flows of produced water, but did not provide any specific information on the quantities of produced water in individual shallow coal seams.

f. Dearth of information from previous exploration

As far as we can tell, there was also little proper oversight and monitoring of fracking for the 12 wells fracked before the WPP. This has left a dearth of reliable data from which to estimate potential future impacts. Our understanding is that, at that time, the companies were not required to provide any information to the public on the chemicals used for fracking and Groundswell doubts whether it is possible to ascertain what chemicals have been retained in the fracked coal seams and therefore may be mobilised during future operations. For the Stratford Pilot Study by Lucas Molopo, fracking was done in 'stages' rather than coal seams (see above) and there was minimal water quality monitoring of either surface or groundwater.[18]

g. Monitoring equipment faulty

Inaccuracy in data collected to date may have been exacerbated by faulty stream gauges, which have been over and under estimating the volume of surface flow. At the most important gauging station on the Avon River with respect to base flows, the gauge was registering flow when there was in fact no flow. In reference to this gauging station, one of the peer reviews stated, "Exactly how accurate the gauge is at these very low flows (0.01 and 0.1 ML/day), may account for differences between the gauge data and observations by some community members that the Avon River ceases to flow in most years." [19]

A recent study submitted to the Gloucester Shire Council identified that although the datum of this gauge was given as 91.70m AHD, the model results suggested it might be out by 1m (ref 19b). This must put into question all the previous modelling results and implies that estimates of base flows are likely to be much higher than the actual flows. This raises the question of why AGL's consultants did not check the gauge calibrations before relying on the data in applications and also of what other instrumentation failures have already occurred and may also occur in the future.

Information from these gauges raised an assumption that the Avon River was perennial. NSW Office of Water (NOW) has already determined that irrigators will need to cease irrigation more often if proposed fossil fuel extraction goes ahead.[20] But the faulty stream gauge data could mean that this impact is being significantly underestimated.

In addition to irrigation reduction, underestimation of water table drawdowns, together with increasing drought events could cause impacts, including unavailability of groundwater to threatened riverine vegetation that currently stabilises river banks and provides habitat, resulting in major impacts on the Avon river system, which is part of the water catchment for 75,000 users downstream.

h. Floodprone site

AGL's gasfield project is sited largely on floodprone land. Minor flooding cuts access to the Waukivory Pilot site every one to two years, while a number of major floods have occurred in the valley in the last one hundred years. The statutory conditions in the Planning Assessment Commission's 2011 approval of this project specifically state that "consideration to flood prone land" needs to be made in the siting of production wells. New flood mapping released in July 2015 has increased the land area under threat of a

1 in 100 year flood. But 'Flood prone land' is actually defined as land within the extent of the Probable Maximum Flood which covers a much larger area than the 1 in 100 year flood. To our knowledge, exact locations of gas wells have not yet been determined, yet with around 50% of the exploration area on the flood plain, it seems likely that the majority of gas wells will be under threat, or at least difficult to access, during flood events. The new flood study also shows that floods rise swiftly with little or no warning meaning that physical flood mitigation measures would be difficult to implement.[21]

i. Liquid waste disposal impacts on water resources

AGL's latest draft Extracted Water Management Strategy (EWMS) still assumes that during wet periods, the final effluent from their reverse osmosis treatment plant will flow into the Avon River. This is still a very short-sighted approach as, according to AGL's own estimates in the report, it would only take the construction of one additional similar sized dam for the system to only overflow in fairly extreme events. However, the whole premise of any treated water flowing into the Avon River is fraught with problems. As already stated, the catchment is part of the Manning River catchment which provides drinking water to 75,000 people. Procedures in cases of issues at the extracted water treatment plant are not known but the usual approach is that some of the treatment system is bypassed, which may well cause partially treated water to discharge into the Avon River. This is not acceptable. Also see 3.7a.

j. Air pollution risk

Air pollution risk in unconventional gas projects from flaring and fugitive emissions of methane, Volatile Organic Compounds (VOCs) and other gases, is well reported [22](see 2.3d). The Gloucester basin represents an intensified risk due to the complex linkage in the Gloucester basin geological system (see above) and the common inversion layers, which envelop the basin.[23] To date AGL's risk management on air pollution has been inadequate. For example, baseline data for the WPP REF was taken from remote locations, including heavily-mined areas, quite different from Gloucester.[24] We can find no estimate or risk assessment anywhere in AGL's documentation which considers the common inversion layers experienced here. The adequacy of AGL's baseline or 'insurance' air monitoring in terms of 'due diligence' for protection against real or perceived health problems, may be questioned.

2.3. Human rights and community

a. Social Justice

Consideration of 'coexistence' with the CSG industry exposes an imbalance in the sharing of risk and potential reward. While there may be financial rewards for landholders with gas wells on their property, the risks of water, air and soil pollution and diminution of property values are carried by neighbouring landholders, downstream users, and the wider community in both the short and long term. It has been reported that that during the construction phase in the Western Darling Downs, some businesses benefited from a short-term increase in trade, some contractors benefitted from extra work and landlords benefitted from an increase in rental income. Meanwhile, some existing renters in the community had to leave and the whole community bore impacts on lifestyle from heavy vehicle traffic and noise, increases in drug and alcohol related crime, and reported health impacts (see 2.3d). Post-construction, many in the community are suffering impacts, with downturns in local business, drops in property and rental values and the burden of remediation or upkeep of infrastructure or environmental degradation.[25] Some residents in proximity to the proposed AGL gasfield in Gloucester already report large drops in property value and difficulty in selling. The imbalance of sharing in risk and reward may particularly impact beef and dairy farmers (Gloucester's largest employers) where liability for contaminated produce may rest with the producer, even where the contamination originates from CSG wells not on their own property, but on their neighbours'.[26]

Many members of the Gloucester community are reporting impacts on mental health as a result of AGL's proposal; prompting a researcher from the UNSW to launch a study into the impacts of AGL on resident mental health and social wellbeing.[27]

Calls in QLD for a moratorium on CSG expansion pending an inquiry into the human impacts of the industry have gained renewed media attention in the wake of the tragic suicide of cotton and grain farmer George Bender. The fifth generation of his family to farm on site, he had been living for 10 years amongst developing gasfields. One point of difficulty reported by Mr Bender was the forced entry by Origin onto his land. While AGL has signed a memorandum that it will respect the decision of landholders to say 'no' to gaswells, it is clear that this document is not in any way legally binding in any dispute between AGL and the landholder. In any case, where neighbouring farms host gaswells, the decision to live in a gasfield is made for all those in the vicinity and risks of contamination to ground and surface water and air quality are forced on neighbours, whether they host gaswells or not.[28]

b. Impact on existing sustainable industries

Two of Gloucester's main employers are agriculture and tourism, with a strong Small to Medium Enterprise (SME) base[29]. From 2000—2010 a tree changer and retirement economy began to develop, fuelling housing development and further new SMEs. Local perception is that the pause in this economy is due to the presence of AGL and proposed coal mining expansion—either the reality of the fossil fuel incursion causing major impacts or the negative publicity surrounding it.

Groundswell believes that the future of all Gloucester's major sustainable industries is threatened by AGL's coal seam gas field, both indirectly through perceptions of gas field contamination and directly through altering the heritage landscape, lifestyle impacts of industrialisation, potential contamination of air, water and soil and drawdowns affecting availability of water for irrigation (see 2.2g). AGL's lack of due care for impacts on these industries is illustrated through its irrigation of produced water onto crops on the banks of the Avon River. While AGL sold its first crop to beef and dairy farmers prior to comprehensive contamination testing, source reports show that AGL's later crops were taking up coal seam contaminants. Fodder from the site had close to Maximum Threshold Levels for some animals, of elements such as cadmium and boron, which can present a health and safety risk to meat and milk consumers.[30]

AGL had originally planned to minimise Stage 1 construction impacts on the community by developing in smaller phases. We understand that the latest proposal is to construct stage 1 in one go. Potential additional impacts include increased soil disturbance, truck movements, noise and stress on already overloaded community services. Increased opposition is expected to the temporary 300 + workers' camp which AGL has applied for, in order to house workers brought in from other locations who will most likely spend a relatively small percentage of their income in the Gloucester area. While such a large-scale workers' camp could be reasonably expected to pose significant social, environmental and economic impacts on the Gloucester community, to our knowledge there has been no comprehensive assessment of such impacts. Compounding the lack of a formal submission process for the community is that the application is not subject to local council approval; disempowering the people and body most likely to be affected.

c. A lack of social license to operate.

In the five years since AGL began exploration in the Gloucester basin, community opposition has grown into a broad-scale, consolidated movement, and continues to increase.

An independent Reachtel poll conducted in the Gloucester and Greater Taree shires in March 2015 found that 75.6% of respondents oppose AGL's project and only 14.8% support the project. This was despite an

aggressive PR campaign by AGL,[31] in which community liaison over Upstream Gas amounted to $10m in 2014; up from $6m the previous year.[32] While AGL refuses to release full details, they conducted a survey in December 2013 and presented a summary of the survey results to Gloucester Council. In this, AGL suggested there was community support for the project. The summary of survey questions did not include a question specifically about the Gloucester gas field, but about CSG in NSW. Even so, this question found that only 13% of respondents supported CSG in NSW. [33]

The 2015 Reachtel poll confirmed Groundswell's perception that the majority of the local community are opposed to the project. Given the deep-rooted conservatism in Gloucester, together with on-going personal retaliation from a small number of vocal pro-gas supporters, many community members are not confident to be active participants in activist organisations or in direct action. Nonetheless, these people resist AGL in ways such as rejecting potential AGL sponsorship of their community or sporting activities; thereby limiting AGL's influence.

Regardless of conservatism or intimidation, Groundswell has the second-largest membership of any group in town; second only to the Tucker Patch (a grassroots horticulture and sustainability project). Weekly, there are highly visible 'knit-ins' at the local meeting place, pop-up anti-AGL 'vigils' in different locations around Gloucester and a protest at AGL's North Sydney office (recently marking its 100th week). Monthly protest walks through Gloucester are well attended with some 'repeat walkers' and also many different locals and visitors 'stepping out' for the first time.

Multiple regional groups oppose the project, including a number of new groups which formed after AGL began fracking at Waukivory Pilot Project. Groups include: Groundswell Gloucester, Knitting Nanas Against Gas (a new local 'loop' formed in late 2014), Manning Clean Water Action Group (MCWAG), CSG Free MidNorth Coast, JTAG (Take Action Gloucester) and Bikers Against Gas. Regional and national groups include GetUp, the Lock The Gate Alliance, Hunter and Central Rivers Alliance, Our Land Our Water Our Future, StopCSGMacarthur and CSGFree local chapters.

Public opposition is also growing in political and religious organisations, both to CSG generally and to AGL's proposed Gloucester gas field specifically.[34] [35] Greater Taree City Council first wrote to AGL in 2013 expressing their opposition to AGL's operations in the Gloucester Valley and it reaffirmed this position in 2015. (ref 35b)

One reason for AGL's failure to secure a social license is incidences of AGL providing misleading or incomplete information to the community in its community updates.[36] [37] Also, in an attempt to secure community approval, AGL has supported a vocal and apparently aggressive minority group on Facebook[38] and a pro-mining local lobby group, Advance Gloucester (AG), whose meetings are routinely attended by AGL staff. In a recent meeting with Groundswell representatives, AGL's new head of stakeholder relations mentioned some of the reported intimidating behaviour by CSG supporters and offered to ask Advance Gloucester to tone it down.

Regardless of the true nature of the relationship between AGL and Advance Gloucester, there is a perception that AGL either caused or supported the formation of the pro-mining lobby group and now uses the positive feedback from this group as evidence of community support and consultation. One example supporting this perception is that despite Groundswell Gloucester being well-established as the lead stakeholder for representing community concerns about AGL's gas field, only Advance Gloucester was listed in AGL's draft Extracted Water Management Plan (EWMP) as a community group requiring to be consulted.

While our local council and communities have no legal right to reject the proposed gasfield, AGL pushing a development against the wishes of the majority of the community is not in line with ethical conduct.

d. Health

No comprehensive health impact study has been conducted. This is despite a growing international body of evidence of health impacts from unconventional gas extraction and successful lawsuits conducted in the US.[39] There are calls from the Australian Medical Journal of Australia, the Public Health Association and Doctors for the Environment to do further research into health impacts before development occurs.[40] The Chief Scientist report concurs with this, saying more research is required.

Reported health impacts on residents in developed gas fields in Tara, QLD have not been properly investigated by the QLD department of health.[41] Resident stories of health impacts are widely available online.[42]

AGL have not acted on international evidence of health impacts and have not conducted or planned for local health monitoring, giving rise to investor risks of a future of legal action, or at the least, a perceptive linking of ill-health in Gloucester to AGL's activities. Also see 2.3a on mental health.

2.4. Anti-corruption

a. AGL and NSW Government links

Close links between AGL and the government, such as the sharing of technological advisors, have deepened community mistrust and represent a risk that material errors in design and engineering may not be identified and corrected.

After AGL applied to carry out fracking at Waukivory, Groundswell, through the EDO, drew the government's attention to the fact that the relevant SEPP made the application a State Significant Development requiring a full Environmental Impact Statement, proper public consultation and donation disclosure. This issue is mentioned in more detail below.

Documents recently produced by the Department of Planning in response to a Groundswell GIPA application have revealed that during the period of about 9 months after the issue was raised by Groundswell, AGL were lobbying and meeting with the government, including the then Premier, seeking to change the wording of the SEPP. AGL made some suggestions as to how the wording of the SEPP should be changed. That lobbying was successful and in July 2014 the SEPP was changed to suit AGL's commercial interests. Throughout the whole of the period Groundswell and the Gloucester community were completely excluded from the process. (See ref 77)

Groundswell has compiled a listing of perceptually problematic cross-overs of AGL employees and the NSW government.[43] [44] Some examples include:

It seems that a senior partner at AECOM, AGL's consultant for the Stage 1 Environmental assessment and for the concept plan, was also hired by the Office of Coal Seam Gas (OCSG) to review and sign-off on the hydrogeological issues in the WPP application.

AGL's former head of government affairs moved from her role at AGL straight into a role as an adviser to Tony Abbott. AGL's new head of government affairs came across from Mike Baird's office.

Perceptions of links between the NSW government and AGL are strengthened in that AGL's donations in NSW in recent years have been almost exclusively to the party in power—the Liberal National Coalition.

Some of the donations, related to functions held by decision makers, also seem to occur at times shortly before or after significant decisions were made on AGL's project.[45] Following a complaint and ongoing media coverage of alleged breaches in AGL's political donations reporting to the NSW Department of Planning, AGL recently announced that it will no longer make donations to any political party.[46] However, allegations of non-reporting of political donations during the approval process for the Stage 1 gasfield remain outstanding.[47] The Department of Planning's non-action on the allegations, despite a partial admission from AGL's auditors, is now the subject of a complaint to the NSW ombudsman.

Promotional activities between AGL and the NSW government such as regulators having a booth at an AGL open day and advertising of AGL as a retailer to Senior's Card Holders deepens mistrust in the government's will to regulate AGL's activities.

Following the detection of BTEX in flowback fluid at the WPP, the Minister for Resources appointed Lee Shearer to lead an investigation into the source of the BTEX and also into a number of breach complaints lodged by Groundswell in February 2015 (see 3.5). Subsequent investigations by Groundswell uncovered that Ms Shearer also ran a consultancy for extraction companies on dealing with sensitive issues, volatile community response and protecting extraction companies' brands. A complaint to the ombudsman relating to the appointment of Ms Shearer is outstanding. [48]

2.5. Controversy monitoring

Controversy surrounding AGL's CSG project in Gloucester extends from the initial application for the Stage 1 gasfield, to AGL's relationships with political parties and regulators, to numerous failures in its exploration program to its determination to proceed with a project where an overwhelming majority of both the local and state community is profoundly against the project. A listing of media coverage exposing controversial aspects of the proposed project is provided.[49] Groundswell will continue to network, conduct research and release information to ensure that future issues with AGL's gasfield and its impacts are covered widely.

An additional cost risk for AGL is that the controversy surrounding its project envelops other businesses AGL contracts for the proposal. One example is the backlash against waste facilities originally receiving AGL's WPP flowback fluid (see 3.8 below), partly responsible for AGL's eventual failure to secure a NSW-based waste facility and the added expense of exporting the flowback fluid interstate, to QLD. QLD media has now picked up the story – renewing negative media attention on AGL's activities.[50] It is anticipated that similar negative attention may be visited upon potential future contractors, meaning increased costs for AGL in securing contractors.
Also see 2.4 and 3.6.

3.0 Investment risk

AGL's core business is not resource exploration and its experience in developing a greenfield extraction project is limited. Extensive delays due to failed community relations, changing government regulations and 'planning on the run' together with a limited exploration program mean inherent risk and profitability of the proposed gasfield cannot be ascertained accurately prior to commencement.

3.1 Limitations on returns

After an estimated spend of over $400m, AGL has now written down the value of the project to about $130m. Extensive delays to the project mean the gas market is now very different than it was in 2008 when AGL embarked on the project. The Australian Energy Market Operator has stated there is no pending shortage of gas in NSW. The gas produced at Gloucester is very expensive gas in a global

environment of low cost gas, meaning it is likely to be uneconomic in the current climate. AGL's own 'Solving for X' paper stated production costs for Gloucester of $8/GJ at the well head, compared to most east coast gas fields with production costs of $3 - $5.[51] Divestment and consumer rejection of AGL and other energy retailers who are involved in CSG extraction is a considerable cost that is also difficult to quantify.[52] [53] Also see 3.9.

3.2. Early indications of 'a lemon'

The previous owner of PEL 285, Lucas Molopo (LM), had purchased the Exploration Lease in 2002 with plans to develop CSG resources.

LM did little exploration work before 2007. In the Chairman's address at the 2007 AGM on 23 November, his comments included that:

"……the monies we are spending this year on coal seam gas, most particularly at Gloucester Basin, is indicative of the high priority we now place on this area. Part of the Group's recapitalisation in June 2007 was made to provide additional capital for this project."

There seemed to be an air of confidence at LM that they were heading down the right path. The Stratford Production Pilot (SPP) commenced in 2007 and at this stage included six wells. Three wells were drilled, failed and abandoned before the final wells could be fracked. Of its other 10 exploration wells drilled in 2007/08, it would seem that eight wells were ultimately abandoned; of which at least five failed due to 'stability' problems, according to LM's ASX announcements.[54]

In terms of the usefulness of the data from the Stratford Production Pilot, only 'stages' of the wells were fracked rather than individual coal seams. This would seem a relatively 'coarse' way of gaining estimates of gas and water production when compared to the nine coal seams AGL fracked on WK13.

Lucas then announced to the ASX on 25/02/08 that LM had received 'Initial Reserves Certification' through a named 'independent certification' company, showing 525.4 billion standard cubic feet of potential recoverable gas. However only 3% of that volume was in the 'Proved' category and the other 96% were in either the 'Probable', mostly 'Possible' or 'Contingent' categories. One might question how the company can come up with such precise volumes.

During 2008, LM did very little drilling. They completed one well in June (commenced in 2007), then seemed in a rush to complete two more wells in late December 2008.

At some stage in late 2008, LM put the project on the market. This raises the question of whether Molopo and Lucas, the latter a very experienced drilling company, may have realised that their problems with drilling stable wells could be the result of the very high level of geological complexity and the project was not worth the risk. Their initial reserves certification gave them an opportunity to offload the project.

Then, in its report to the ASX for the six months to 31/12/2008, dated 19/02/2009, Lucas announced that it had "sold its investment in Gloucester Basin during December 2008 for $259 million realising a profit of $218 million before tax." The report goes on to say that "Management considered that, having regard to developments in the market place, it was a prudent time to exit as this asset moved into the production stage, when significant development expenditure would have been required." The 2009 Annual Report states that the Gloucester PEL was sold with the "…gross sale proceeds of $259 million realising a net profit after tax of 154.8 million."

In spite of the limitations and risks, AGL apparently considered that they had enough information to make the purchase, realising a massive profit for LM.

Risk of gas and fluid migration in the surface water mean that AGL now states they will not target coal seams above 250m; thereby limiting recoverable gas volume (see 2.2)[55]. Some coal seams are so narrow that costs of extraction are unlikely to be justified by volumes returned. In addition, if AGL were to follow expert advice and avoid flood prone areas and fault zones, the areas available for drilling wells would be greatly restricted.

Further restrictions are possible in terms of exclusion zones in that there is some uncertainty over potential triggers for 2km exclusion zones in the Stage 1 area and Stages 2 and 3 will be subject to the 2km exclusion zone (see 3.9).

3.3. An exploratory program that cannot and will not provide technical certainty on potential costs and risks

"When adequate geological modelling and baseline groundwater monitoring data is lacking, failures in engineering design can be major, potentially irreversible, and costly to remediate," Anderson, 2014.[56]

The geology in the Gloucester basin is highly heterogeneous and heavily faulted, creating a range of cost and risk issues; many of which cannot be adequately mitigated (see 2.2).

Compounding these difficulties is that failures in the design of the exploration program to date mean that potential future impacts and costs are difficult to predict, and expose AGL to increased risk of reputational damage and compensatory commitments. One example of this is that if drawdown predictions are realised, or exceeded (see 2.2g), AGL may be liable to 'make good' the loss of water to irrigators in the region. NOW told a public meeting in Gloucester that regulations for extraction companies to 'make good' loss of irrigation water due to drawdowns are being developed.

AGL and Lucas Molopo before it, have had major problems with the construction of gas wells and monitoring bores. This will have already cost these companies millions of dollars. A major factor contributing to these problems is likely to be the highly complex geology. Just a few examples of these problems are:

- The major blowout which occurred in 2004 meant that Lucas Molopo had to shut down its Stratford pilot project for 9 weeks;
- As far as we are aware, AGL still has not explained why it only fracked four seams in two WPP wells and only two seams for WK12;
- WK12 well has recently had a 'workover' rig positioned over it for more than 5 weeks. This is inconsistent with normal 'workover' maintenance that should only take a few days;
- One of the key monitoring bores for the WPP had to be abandoned because of drilling problems;
- An exploration/potential production well was abandoned because of its proximity to the WPP not being consistent with the State Environmental Protection Policy (SEPP).

AGL's flawed adaptive management approach and lack of comprehensive and accurate numerical modelling could mean that catalysts for significant impacts are created before these impacts are visible or measurable. This could mean that significant expenditure on infrastructure and development is incurred before a project-stopping impact or limit on production is discovered.

3.4 Poor planning and approval process and anomalies for Stage 1 gasfield

a. Inadequate assessment for Stage 1 approval

The Stage 1 gasfield received conditional approval on the basis of very little or no assessment of geology, fracking, waste disposal, water table drawdown, or other likely impacts or details. The more usual process for a largescale mining development, as applied to coal mines in the Gloucester basin, is that numerical modelling and associated assessment of environmental impacts are completed before approval. Some anomalies in the Stage 1 approval relating to numerical modelling and the phasing of the construction are also open to interpretation, potentially resulting in unanticipated additional costs and delays.

The timing and process by which the Stage 1 gasfield and WPP were approved have led to suspicion of collusion between AGL and the government and some anomalies are still the subject of scrutiny.[57] [58] [59]

b. Insufficient confidence in consultant contributions

The Chief Scientist's report stated that it is important for the hydrogeology of a basin to be adequately modelled and understood before projects commence. In AGL's case, numerical modelling by its consultants has still not been completed and many of their plans are yet to be assessed. Therefore, the full potential impacts have not been identified or assessed.

Much of the consulting for the proposed gasfield has been done by Parson's Brinckerhoff (PBH). PBH's work has been the subject of independent criticism – both on the Gloucester gasfield and the West Connex motorway [60]. In the case of the Gloucester gasfield, a number of PBH assumptions and findings have been questioned by independent experts.[61] [62]

c. Uncertainty to true requirements and costs and opportunities for continuing opposition

Plans for dealing with contaminated produced water, flowback fluid, water treatment plant design, a compressor station, construction management, power supply to wells, were all left to be completed post-approval as part of the conditions of approval. While the conditions need to be met, no criteria are given as to what design standard must be achieved. All of these plans can be developed in-house by AGL without going through the usual approval process incorporating independent scrutiny and community submissions. While on the surface this may seem like a good thing for AGL, it has deepened mistrust in the project and it exposes them to additional risk as inadequate scrutiny can lead to expensive design failures. In addition, it is Groundswell's experience that the lack of a formal submission process does not preclude the community from exposing inadequacies in design and exerting pressure on AGL and regulatory bodies to improve proposals albeit at a much higher cost and after substantial delays.

3.5. Outstanding breach allegations against AGL

A poor planning and approval process, poor implementation of the exploration program and associated community engagement activities have given rise to a number of apparent breaches.

a. AGL failed to declare political donations to the NSW Planning department during the applications process for the gas pipeline and storage facility. This complaint spawned widespread media coverage and is now the subject of an Ombudsman complaint against the NSW Department of Planning.[63]

b. A major complaint was lodged with the Minister for Resources in February 2015 citing multiple breaches including failing to comply with community consultation requirements, misleading the Gloucester community, and gives evidence suggesting AGL is not a fit and proper person to hold an

exploration licence. Following several months of inaction by the OCSG, this complaint is now with the EPA.[64]

c. AGL's approval to store produced water was part of the Tiedman's Irrigation Trial approval which expired in April 2015. Neither AGL nor the NSW government has demonstrated that an alternate approval is in place.[65]

3.6 Broad-scale consolidated and increasing community opposition

Prior to AGL's purchase of the project in 2008, owner Lucas Molopo estimated first gas would be delivered to Hexham in 2010. Determined and sustained community opposition has resulted in extended and expensive delays, through various measures such as physical blockades, legal challenges and approvals process challenges. The Waukivory Pilot Project was applied for in 2011 but a physical blockade presented the first delay and Groundswell's subsequent 2013 challenge to the application process and submissions for the WPP (Section 3.8), resulted in increased government scrutiny and requirements and a delay in the commencement of the WPP till late October 2014. It is still not complete. Challenges to AGL's Stage 1 approvals and modification applications are under preparation and expected to continue.

Increased costs are also incurred by AGL in responding to opposition, including a significant amount of additional security at AGL sites, responding to media and community communication on these issues and difficulty in securing contractors willing to expose themselves to direct action and community pushback. Also see 2.5.

3.7 Specific failures in AGL's exploration program - WPP

Failures in the planning and implementation of the Waukivory Pilot program have strengthened perceptions of AGL as an incompetent operator and exposed high risk elements in the proposed gasfield.

Government failures to adequately follow applications and planning processes and to adequately assess AGL's exploration program have contributed to the commission of alleged breaches by AGL and to highly-publicised failures in AGL's Waukivory Pilot Program. This has consolidated community mistrust.

a. Flowback fluid

1. AGL failed to describe in full the treatment and disposal of flowback fluid during planning as required by industry Codes of Practice; only saying that it would go to an 'EPA licensed facility'. Despite the lack of detail, this was accepted by regulators. AGL have now taken the same approach in their EWMS. No details are provided of which EPA licenced facilities will be used by AGL to dispose of the final potentially toxic salt resulting from the RO treatment, nor for any of the toxic waste products resulting from the pre-treatment.

2. Despite clear directions from the Hunter Water Corporation not to allow flowback fluid to be transported into the Hunter Water Area, AGL sent flowback fluid to Transpacific in Newcastle.

3. In the midst of investigations by the EPA and Hunter Water, Transpacific stopped receiving flowback fluid and it was sent to Worth Recycling in the Hawkesbury. Following detections of BTEX in the flowback fluid and intense media and community scrutiny, Worth Recycling began receiving the fluid.[66]

4. After weeks of delay, AGL applied to store the flowback fluid in an open dam.[67] It was given permission to do so by the OCSG but began transporting the fluid interstate to Toxfree in QLD.[68]

AGL's failure to follow regulations by properly consulting with affected communities or to fully disclose the treatment and disposal process resulted in weeks of delay and added expense as well as extensive

negative media coverage. Questions around the full treatment of BTEX contained in flowback fluid and the final disposal of final contaminants remain unanswered. [69]

b. Sulfate Reducing Bacteria

Hydrogen sulphide found at one of the Waukivory wells indicated the likely presence of Sulfate Reducing Bacteria (SRB), which can affect gas well integrity; increasing cost and risk of impacts.[70] Groundswell had raised this issue in its Exposing the Risks document[71] and a local Councillor had raised it at the Gloucester dialogue but the issue was seemingly ignored by AGL and the NSW government. Media concern, increased monitoring and controls are likely additional costs and if gaswell integrity in the Waukivory pilot wells or pre-existing exploration wells in the basin is compromised, increased cost in repairing or abandoning affected wells will be incurred. [72] [73]

c. Gas well leaks

One of the gaswells at Waukivory pilot has already leaked. The leak was repaired but no information has been forthcoming about how long the well was leaking nor volumes or composition of gas. It is unknown whether the information is unavailable due to limitations in monitoring or due to non-disclosure. The leak at Gloucester follows an EPA report of AGL's Camden operations which found that almost 1 in 10 wells at Camden was leaking.[74]

d. Detections of fracking chemicals in surface and groundwater.

The Environmental Protection Licence (EPL) which was issued for the Waukivory Pilot listed a number of fracking chemicals for which AGL was to monitor in local creeks, river and groundwater, to identify any migration of fracking chemicals. The EPL required a zero detection of these chemicals. At a community meeting in Gloucester, an EPA representative stated that the choice of chemicals to be monitored was determined by the EPA in consultation with AGL. Spikes in these chemicals during and after some fracture events occurred, suggesting to the community that the detection system for chemical migration had been triggered. Subsequently, AGL suggested that the detections were not valid, either because these chemicals were present in the background environment or because of limits in laboratory detection. Neither these suggestions, nor alternative sources for the spikes in these chemicals have been definitively established. The EPA termed the breaches of the EPL as 'technical breaches' and took no action,[75] but stated at a public meeting that the choice of those chemicals for migration detection with a zero limit was an error, due to the EPA and the OCSG 'still getting their heads around it'. This situation has cemented community concerns that AGL is not providing adequate and effective monitoring and also that the government is not regulating adequately to protect water resources.[76]

3.8. Government and AGL failures to adequately follow applications and planning processes

Aside from the flowback fluid and chemical detections issues outlined above, the most striking government/AGL failure to follow environmental guidelines was the use of a Review of Environmental Factors (REF) rather than a full EIS for the Waukivory Pilot. At the time AGL submitted their REF, existing wells within 3km of the wells to be fracked meant the WPP qualified as a state significant development and therefore required a full EIS, including participation by the community and independent scrutiny. Groundswell alerted the government to this issue in December 2013. Within two weeks, AGL announced that it had plugged and abandoned the nearest well. Months of delay to the project ensued until the issue was resolved favourably for AGL with a change to well distance measurement procedures; neatly shutting out the community and allowing AGL to proceed with an inferior environmental assessment. Recently released GIPA documents covering the issue reveal AGL as the source of the idea to change the

well distance measurement procedures.[77] These changes were incorporated into the mining SEPP in July 2014 and shortly after, the WPP was approved. Despite having raised the issue, Groundswell received no communication on the issue throughout.[78]

This has consolidated community mistrust that the proposed gasfield will be designed, assessed and regulated adequately to prevent material harm to our community, our air, soil and water resources and our principal employers – the agricultural and tourism industries. It should also be of concern to investors as the apparently fluid nature of planning and regulations means expensive errors in design and implementation are less likely to be identified and corrected before impacts occur.

3.9 Regulatory Uncertainty

In addition to uncertainty about the standards to which AGL's Stage 1 conditions must be met, as outlined in 3.3, we understand that AGL is preparing to submit a modification application for several elements of its Stage 1 application. Each modification will be subject to community and regulatory scrutiny. There remains uncertainty about the application of 2km exclusion zones, particularly in terms of the expiry of the current approval in February 2016 and future modifications to the approval. This could further limit AGL's ability to drill sufficient wells, while avoiding fault zones and the probable maximum flood zone, should they choose to apply best practice in these areas.

The 2km exclusion zones will apply to Stages 2 and 3 of AGL's gasfield concept plan, as will new regulations and the recommendations of the Chief Scientist's Report, should the government honour its commitment to impose them. Future stages of the project will also be subject to a new and lengthy approvals process, including community submissions. Approval for stages 2 and 3 within the foreseeable future seems improbable and therefore the financial viability of Stage 1 as a stand-alone project, in light of the cost of necessary infrastructure, including an extensive pipeline, is questionable.

There is potential for state-wide changes to regulations and costs to CSG operators, while uncertainty for how and when these changes might apply remains. Minister for Resources, Anthony Roberts, has committed to implementing all of the Chief Scientist for NSW recommendations.[79] One of these is that all costs, including monitoring and regulation, should be shouldered by CSG companies. With just one set of NSW Office of Water monitoring bores recently costed at over $200,000[80], and AGL as the only active NSW operator at the moment, there is potential for significant additional costs to AGL.

4.0 Conclusion

AGL's Coal Seam Gas field in Gloucester serves well as a case study in poor Environmental, Social and Corporate Governance. In addition to the environmental impacts commonly attributed to Coal Seam Gas exploration, the complex geology of the basin, a paucity of modelling, and inadequate regulatory adherence and control mean that the risk of environmental harm is exacerbated. Water contamination could have particularly high consequences as the gasfield site is a floodplain and part of the water catchment for 75,000 people. There is no comprehensive health impact assessment. As well as posing a threat to health, AGL's presence in Gloucester also threatens sustainable industries in the region, in which 75% of residents oppose the project. Impacts on social capital are already evident, with some residents leaving, and those remaining uncertain about the future, which is impacting on new investment. Mental health is affected and some fracturing is evident in social networks.

While the failure to meet basic ESG standards poses its own risks to AGL investors, it is also a high risk project in other areas. Certainty of costs vs return is limited by the complexity of the geology, the site of the project and changing government regulations against a background of low international gas pricing and potentially huge excesses in supply from other existing projects. Brand damage to AGL is likely to

continue under intense scrutiny by local, regional and interstate CSG opponents. Customer movement away from AGL, as one of Australia's worst carbon polluters, is underway as consumers look towards energy companies offering a true commitment to renewable energy and positive ethical and social practices in the communities in which they operate.

NOTE ON SOURCE DOCUMENTS: Most documents are provided through Dropbox. Filenames correspond with the relevant endnote number. For example, to view Water Conundrum (End note 56) Go to Dropbox and select file: 56. Water Conundrum. For access to Dropbox or to request source documents not provided, email info@groundswellgloucester.com .

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[23] http://www.gloucesteradvocate.com.au/story/3286210/glorious-gloucesters-beauty-inspires-local-photographers/
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