

Mineral and Energy Resources and Other Legislation Amendment Bill 2024

Submission No: 27
Submitted by: Glendon Farming Co
Publication:
Attachments: No attachment
Submitter Comments:



Liza Balmain



10th May 2024

Committee Secretariat
Clean Energy Jobs, Resources and Transport Committee
Parliament House
George Street
Brisbane Qld 4000
Via email: cejrtc@parliament.qld.gov.au

**Submission to the Mineral and Energy Resources and Other Legislation Amendment (MEROLA) Bill
2024**

Dear Clean Energy Job, Resources and Transport Committee,

I welcome the opportunity to provide a submission to the *Mineral and Energy Resources and Other Legislation Amendment Bill 2024* as introduced to Parliament by Minister for Resources and Critical Minerals, Scott Stewart MP on Thursday 18th April 2024.

1. Background

My husband and I and our two children run a family farming enterprise at Cecil Plains on the Darling Downs. Our property has been in the family for over 100 years and our children represent the 5th generation to farm this land. We grow a mixture of crops ranging from cotton, sorghum, mungbeans, wheat, barley and chickpeas.

Our farm consists of the black cracking clay vertosol soils that the Darling Downs is renowned for. They are rich fertile soils with a tremendous moisture holding capacity. They are known colloquially as 'black gold' for their ability to grow an abundance of high yielding food and fibre crops.

These world-renowned soils, our favourable rainfall, our close proximity to markets and the port of Brisbane, and most importantly, the groundwater that sustains them, makes our region a gem of agricultural production in Queensland¹.

This is demonstrated in the gross value of agricultural production (GVP) figures for Queensland for 2022/23. Toowoomba Region topped the statewide scales with an outstanding \$1.36 billion in GVP,

¹ Australian Society of Soil Science Inc (ASSSI), Submission to the Senate Committee Inquiry into the impacts of mining in the Murray Darling Basin, September 2009

with the Western Downs Region, a close second with \$1.1 billion in GVP. The only two regions within Queensland to exceed \$1 billion in agricultural production.²

Their agricultural value to the State of Queensland is immense and they should rightly be protected for our nation's future food and fibre security needs, which will become increasingly challenged as climate change takes hold.

Our area is a recognised Priority Agricultural Area (PAA) under the *Regional Planning Interests Act 2014*, which is underpinned by the *Darling Downs Regional Plan*, both of which were established to protect Queensland's areas of regional interest, including our best agricultural lands, from resource mining impacts.

Queensland has the smallest amount of arable cropping land out of all the States in Australia.³ Priority Agricultural Areas are extremely scarce in Queensland and make up just 2.86% of the State, as visualised in the below map of areas of regional interest⁴, with PAA denoted in yellow. They should rightly be protected for our future food and fibre security needs, which will become increasingly challenged as climate change takes hold.

Our farm has petroleum leases granted over it, which were approved in 2019 as part as Arrow Energy's Surat Gas Project. At present we are an undeveloped area and are in the dark as to when development may occur. The cards are in the hands of the resource company and we as affected farmers remain in limbo land as to when our future may be turned upside down by the imminent coal seam gas (CSG) invasion with all its inherent impacts, as are occurring to fellow prime agricultural farmers to the north and west of us.

I have spent a large part of the last 4 years doing extensive research and getting myself duly informed about the impacts of CSG mining and how it may impact our farm, our livelihood and the farming future of our children, who will continue the stewardship of the land we currently undertake with pride.

From this research I realise that the impacts of CSG are not negligible. They represent long-term and often irreversible damage to our soils, climate, groundwater, social community structure and mental health. Many of these impacts can never be compensated for.

A region such as ours will never be better off, or mutually benefit from the introduction of CSG. There is no amount of money available that will be able to rectify the future damage our region faces if this industry proceeds across the Condamine Floodplain as intended.

Many of the impacts are already occurring in other areas, and it is only a matter of time before they snowball across this food bowl. One such impact is CSG-induced subsidence. It will have long-term negative effects on our farming operations, our ongoing productive capacity, our financial viability and our mental health.

Being a very flat floodplain, our farms are highly slope-dependent and many fields in the region have been laser levelled to improve drainage and enhance water use efficiencies. Our farms are highly

² <https://statements.qld.gov.au/statements/98051>

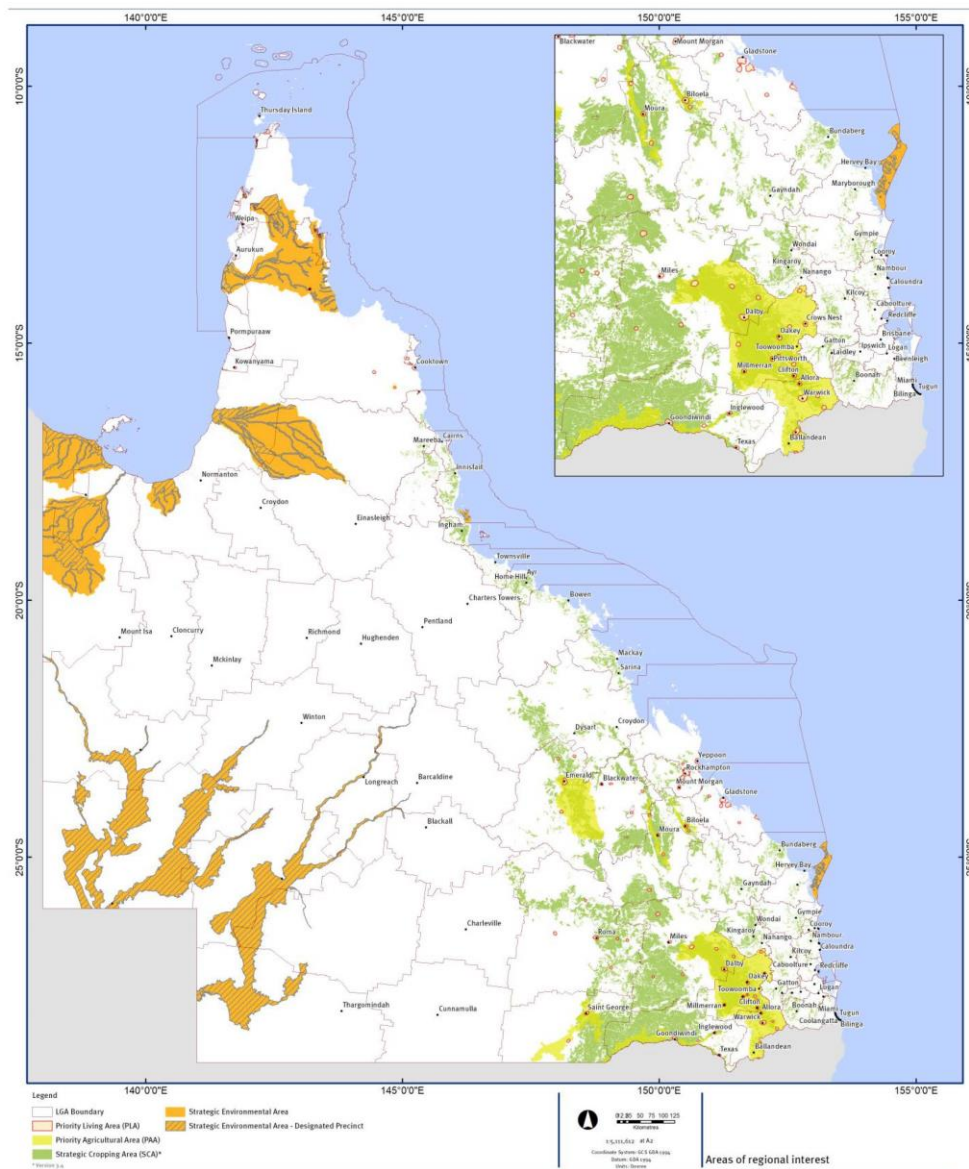
³ <https://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/7121.0Main+Features12016-17?OpenDocument=>

⁴ <https://dtdmipprd.blob.core.windows.net/general/rpi-guideline-11-16-dilgp-companion-guide.pdf> p11

susceptible to any changes in land form which may have a detrimental effect on drainage, the effective application of irrigation water and any ensuing changes to overland flow pathways. All of these impacts have the potential to result in significantly high production and economic losses, as acknowledged by the GasFields Commission in their report: [Potential consequences of CSG-induced subsidence for farming operations on the Condamine alluvial floodplain](#).

RPI Act Statutory Guideline 11/16– Companion Guide

Mapped areas of regional interest¹⁰



¹⁰ Data layers are provided by the Queensland Government. Map is current at 10 June 2016.

CSG-induced subsidence represents significant long-term costs to ourselves and all affected farmers within our region:

- financial costs in the form of extremely high remediation costs (if remediation is at all possible) through earthworks, extensive and continuous laser levelling, and in some cases farm re-design;
- severe financial costs in the form of lost crop production resulting from the numerous consequences of subsidence (refer Appendix);
- costs of our valuable time - time taken away from the running of our busy farms, our businesses and our families to manage the impacts of subsidence on our operations;
- costs of valuable time to navigate a complicated, arduous and fraught-ridden framework in order to recoup the most basic of rightful compensation for the damages and financial losses incurred to our land and businesses over an indefinite number of years; and
- costs to the mental health of farmers and their families as we are unjustly forced to have our lives turned upside by the third-party impacts caused to our businesses and livelihoods, and the long harrowing fight ahead in order to secure justified compensation.

The long-term mental health risk to our region is of particularly heightened concern.

CSG-induced subsidence is already having detrimental impacts on fellow farmers in the Kupunn and Tipton areas. We see with our eyes wide open, the impacts hurtling towards us.

Subsidence will occur over an indeterminate time. No one really knows how long it will play out. The Office of Groundwater Impact Assessment (OGIA) has suggested until 2060, whereas other experts suggest much longer. Therefore, the above-mentioned impacts and their consequences will not affect just our generation, but have the potential to traverse generations, with terrific burdens and risks imposed on our future farming generations.

As the Committee is potentially not overly familiar with CSG-induced subsidence, I have provided some background context, including its cause, its consequences and the scientific uncertainty surrounding CSG-induced subsidence, in the [Appendix](#) attached to this submission.

2. [Summary](#)

The following are some of the main concerns surrounding the proposed Subsidence Management Framework:

- **Insufficient Public Consultation**
The consultation has been very targeted and not comprehensive and widespread. Many of the most impacted farmers are oblivious to the legislative reforms being proposed and how they may impact on their future farming operations and businesses. Due to the poor consultation on this Bill, they will be blind-sided if this gets passed.
- **Inadequate timeframe permitted to consider the Bill**
The time permitted to consult and comment on such a highly complex Bill is wholly inadequate. At our busiest time of year (harvesting, picking and preparing for winter crop

planting) farmers are ill-equipped to digest and analyse the extensive Bill and have not had adequate time to consult with their peak ag body representatives, or seek the necessary expert advice on the Bill concerning its ramifications on their farming operations, farm productivity and ongoing business viability.

- **Regional Planning Interests Act 2014**

The proposed Subsidence Management Framework (SMF) stems from a fundamental failing of the Queensland Government to administer and enforce existing legislation established and intended to protect areas of regional interest, such as those most vulnerable to CSG-induced subsidence, from the widespread and irreversible impacts caused by the extractive resources industry, that being the *Regional Planning Interests Act 2014* (RPI Act). The failure to administer the RPI Act as intended has resulted in CSG-induced damage ensuing in the areas where CSG development has been permitted to occur as a result of the resource company's exploitation of the weaknesses in administration and loopholes inherent in the Act. Where the Act is being applied (in a very small number of development situations) it is proving to be effective in preventing widespread and irreversible harm, such as CSG-induced subsidence, from occurring. This is in reference to the two Regional Interests Development Approval (RIDA) applications:

- *RPI21/028 Arrow - Wells and Gathering Lines*, and
- *RPI22/004 Arrow – Kupunn Springvale CSG Deviated Well Paths*⁵

presently in place and being assessed over Priority Agricultural (PAA) and Strategic Cropping Area (SCA) lands of the Condamine Floodplain. Due to the known and predicted impacts and likely consequences of CSG-induced subsidence, amongst other potential impacts, and the inherent scientific uncertainty and the risks this poses, these applications haven't been able to be approved and have stalled.

- **RPI Act must be strengthened to avoid repetition of past errors**

The Regional Planning Interests Act must be strengthened to ensure these past errors are not repeated whereby widespread and irreversible damage is erroneously permitted to occur on areas of regional interest including some of our most productive food and fibre producing lands. On balance, the current proposed changes to the RPI Act represent a weakening of agricultural area protections and landholder rights, not an overall strengthening. This must be rectified in order to protect the water resources and productive capacity of pivotal agricultural regions such as ours, and subsequently protect the water and food security of our present and future generations.

- **Subsidence Management Framework – insufficient mitigation and preventative provisions**

Irrespective of what happens to the RPI Act, a fundamental flaw of the SMF is in allowing the damage from CSG-induced subsidence to occur in the first place, due to a lack of appropriate regional scale and farm scale risk assessment processes, and with a lack of adequate critical

⁵ <https://planning.statedevelopment.qld.gov.au/planning-issues-and-interests/areas-of-regional-interest/regional-planning-interests-applications>

consequence mitigation and prevention measures to ensure the ongoing prevention of damage to our most vulnerable and highly productive farm land. The onus of proof remains with the farmer to prove cause and effect (after the damage is done), whereas it should be that the resource company has to prove no material harm will occur before development can proceed.

- **Subsidence Management Framework – insufficient compensation provisions**

The SMF is needed to ensure compensation is paid to affected farmers where the Government's failure to administer and enforce the RPI Act has led to damage from CSG-induced subsidence occurring. However, in its current form it does not ensure that the due and appropriate compensation will be forthcoming. Instead it represents an arduous, time-consuming, costly and mentally harrowing framework for the landholder to wretchedly navigate over untold years in order to claim the most basic of rightful compensation for a continuum of damages and financial losses incurred to their land and businesses over an indefinite number of years, with no assurances in place that the appropriate compensation will ever eventuate.

-

3. Proposed Subsidence Management Framework (SMF)

The proposed Subsidence Management Framework is reactive in nature, as with most CSG related regulation. This is a major issue when adaptive management is adopted instead of the necessary and more appropriate precautionary principle in consideration of the risk and scale of potential impacts.

3.1 Why it's needed

We recognise that a Subsidence Management Framework is needed for those farmers already impacted, and those to be impacted, caused by existing and ensuing coal seam gas development over areas most vulnerable to CSG-induced subsidence.

This Framework is needed as resource companies are not upholding their end of the sustainable coexistence equation. A number of the farmers west of Dalby, already impacted by subsidence, do not have a *Conduct and Compensation Agreement* (CCA) with the resource company as they have either been under-drilled or find themselves bordering a landholder hosting gas wells. In this situation the resource company has benefited from loose legislation in order to self-assess this activity as preliminary, as per sections 15A & 15B of the MERCP Act, with no or very little regulatory oversight, despite the extensive impacts their activity is now causing from subsidence which would render it advanced in nature. Despite huge effort, stress, anxiety and much time and money expelled on their part, these impacted farmers have been unable to secure rightful compensation from the responsible and liable tenure holder.

The responsible tenure holder has either denied causing the subsidence, or unashamedly claimed that it is not having an impact on the farming operations. This leaves the landholder exasperated and beyond their wits end, with no option other than to contemplate court action against a well-resourced multinational company, which carries an immense burden on the farmer to collect

sufficient evidence to establish liability without the availability of established effective baselines, a terrible financial risk and precious dedicated time away from their businesses and core family time.

For this reason, a Framework is required in order to hold the responsible resource companies accountable, especially those whose social licence entails sponsoring the local sports club but not paying rightful compensation for damages they have caused and will continue to cause over the long-term to the landholder and their businesses.

Regional Planning Interests Act 2014

It has to be noted however, that this comes as a result of the failure of the Queensland Government to ensure that existing legislation is administered as per its intent. If the *Regional Planning Interests Act 2014* (RPI Act) had been administered and appropriately enforced as resource companies entered onto the Priority Agricultural Areas (PAA) and Strategic Cropping Areas (SCA) of the Condamine Floodplain, without the ability to exploit exemption loopholes in the legislation with no checks and balances from the Department with jurisdictional responsibility for the Act, then we likely would not be in the situation we are today.

According to Arrow Energy's latest [Water Monitoring and Management Annual Report](#), 247 production wells have been installed under the Surat Gas Project with **not one Regional Interests Development Approval (RIDA) being obtained for these wells**, despite the majority of these wells being located on privately owned PAA or SCA land. Arrow has undoubtedly self-assessed their eligibility to the section 22 exemption in the RPI Act:

Division 2 Exempt resource activities

22 Exemption—agreement of land owner

- (1) This section applies if the authority holder for a resource activity is not the owner of the land (the *land owner*).
- (2) The resource activity is an *exempt resource activity* for a priority agricultural area or area that is in the strategic cropping area if—
 - (a) either—
 - (i) if a conduct and compensation agreement requirement applies to the authority holder under a resource Act—
 - (A) the land owner and the authority holder are parties to a conduct and compensation agreement under the resource Act, other than because of the order of a court; and
 - (B) the authority holder has complied with the requirement; or
 - (ii) the land owner has voluntarily entered into a written agreement with the authority holder and the carrying out of the activity is consistent with the agreement; and
 - (b) the activity is not likely to have a significant impact on the priority agricultural area or area that is in the strategic cropping area; and
 - (c) the activity is not likely to have an impact on land owned by a person other than the land owner.
- (3) For subsection (2)(c), a resource activity has an impact on land if the activity has an impact on—
 - (a) for land in a priority agricultural area—the suitability of the land to be used for a priority agricultural land use for the area; or

This is despite the fact that in light of the known predictions of CSG-induced subsidence and the likely effects this will have on PAA, SCA and priority agricultural land uses (PALUs), amongst other potential impacts, they cannot satisfy S22(2)(b) and (c). Due to their inability to prove beyond reasonable doubt that these impacts would not occur, they rightfully should have had to apply for RIDAs for any CSG activity occurring on PAA or SCA land.

And if ever unsure, there are provisions under section 78 in the RPI Act for the proponent to seek a declaration in the Planning and Environment Court.

The necessary enforcement by the Department and the declaratory clarification from the Courts has not been forthcoming. Instead, Arrow Energy has been able to exploit the loopholes in the legislation to the long-term detriment of the Priority Agricultural Areas and Strategic Cropping Areas of this region. This has been a fundamental flaw in the protections put in place to safeguard Queensland's most vulnerable areas of regional interest from the irreversible impacts of CSG extraction.

The government now finds itself having to create legislative amendments to fix the issue where legislation, intended to protect our best agricultural lands from widespread and irreversible damage, has failed in its remit due to a lack of enforcement. Due to the failure to enact the legislated precautionary principle under the RPI Act, fix-up legislation is now required to ensure that the resource companies responsible for the subsidence damage (which should have been avoided through the RPI Act provisions) are held accountable and that farmers are duly compensated for their losses resultant from the failed application of legislated protections.

The concept of a Subsidence Management Framework to ensure compensation for those impacted is a step in the right direction. The proposed Subsidence Management Framework has been developed in response to the [GFCQ Regulatory Review of Coal Seam Gas Induced Subsidence \(GFCQ Regulatory Review\)](#) and is based on a mirroring of the Make Good Framework for water bores in Chapter 3 of the *Water Act 2000*.

However, this must be complimented with a strengthening of the RPI Act to ensure the failings of the past are not repeated. The RPI Act must be strengthened to ensure necessary cumulative regional and farm scale risk assessment of **all** potential impacts, which are not covered by the SMF.

That said, a fundamental flaw of the proposed Subsidence Management Framework is the allowing of the damage to occur in the first place, for those areas not yet developed and for future development expansion scenarios in existing impacted areas where the damage will be intensified. The Framework does not ensure appropriate regional scale and farm scale risk assessment processes with adequate critical consequence mitigation measures to ensure the prevention of damage to our most vulnerable and highly productive farm land.

This contravenes and violates section 804 of the *Petroleum and Gas (Production and Safety) Act 2004* which states:

804 Duty to avoid interference in carrying out authorised activities

A person who carries out an authorised activity for a petroleum authority must carry out the activity in a way that does not unreasonably interfere with anyone else carrying out a lawful activity.

Maximum penalty—500 penalty units.

Note—

If a corporation commits an offence against this provision, an executive officer of the corporation may be taken, under section 814A, to have also committed the offence.

What is more, in its current form, the proposed Framework will unfortunately not ensure the espoused landholder protections and compensation assurance outcomes, due to the many failings and shortfalls in the proposed legislative reform. This is despite key stakeholders making these shortfalls known to the Department of Resources staff during the consultation period and via submissions.

In its present form, the Subsidence Management Framework is a mirage when it comes to ensured protections for landholders. Instead, it contains many pitfalls for the well-resourced responsible tenure holder to utilise to their advantage against the under-resourced and unsupported farmer.

It represents an arduous, time-consuming, costly and mentally harrowing framework for the landholder to wretchedly navigate over untold years in order to claim the most basic of rightful compensation for a continuum of damages and financial losses incurred to their land and businesses over an indefinite number of years, with no assurances in place that the appropriate compensation will ever eventuate.

3.2 The Value of Agriculture

The proposed reforms to the MERC Act 2014 encapsulate the State Government's willingness to allow long-term and irreversible harm to occur to some of our State's best agricultural land, not only resulting in high economic losses to the region's farmers, but also a significant reduction in food and fibre production. That being, a significant dent to the agricultural output from the State's top two agricultural production areas - the rich agricultural lands of the Toowoomba Region and the Western

Downs Region.⁶ This will result in negative flow on effects to the economic and food security purse of Australia.

By introducing a Framework which allows the damage to occur without appropriate risk assessment of the regional and farm scale consequences, including appropriate mitigation measures to prevent the damage from occurring once identified, then the current State Government is clearly demonstrating its undervalued opinion of the long-term value of agriculture on the Darling Downs and in the State of Queensland. It would appear, due to the shortfalls present in the Bill and its pivotal inability to prevent the damage from occurring to our most vulnerable agricultural areas and assets, that they are prioritising the interests of the multinational gas industry whose future is indeed questionable and likely short-term within the global transitional push to rapidly decarbonise. It would appear short-term monetary gain through petroleum royalties is to be extolled at the expense of long-term food and fibre security, and at the expense of multi-generational Queensland family farming businesses and their future prospects and viability.

4. SMF - Interaction with other Legislation

4.1 Regional Planning Interests Act 2014 (RPI Act)

There is significant and well-founded concern amongst landholders that the Subsidence Management Plan (SMP) and the Subsidence Compensation Agreement (SCA) proposed under the SMF will be used as an Agreement under the section 22 exemption (land owner agreement exemption) within the *Regional Planning Interests Act 2014*.

This will have significant ramifications for landholders if the Department of State Planning goes ahead with the proposed injurious changes to the RPI Act⁷, whereby the land owner agreement exemption (s22) is to be replaced with a self-assessable code. The potential changes are injurious as the proposed eligibility criteria and impact definitions to be applicable to the self-assessable code, represent a severe weakening of protections for Queensland's areas of regional interest, especially our top-producing agricultural lands, and a severe weakening of landholder rights.

Under this scenario, landholders coerced into signing a SMP and SCA under the SMF regulatory timeframes, will have these documents used against them in the RPI Act assessment process. Under this scenario, the adopted detrimental eligibility criteria and impact definitions will enable a tick and flick exercise under the self-assessable code, permitting even more CSG development to go ahead without appropriate regional and property scale impact assessment than is currently negligently occurring, despite the significant, widespread, irreversible, irreparable and long-term harm posed by the onshore gas industry.

Recommendation

It must be mandated that a Regional Interests Development Approval (RIDA) must be applied for and obtained prior to a landholder having to negotiate a SMP and SCA with the relevant tenure holder.

⁶ <https://statements.qld.gov.au/statements/98051>

⁷ <https://haveyoursay.dsdilgp.qld.gov.au/proposed-amendments-to-the-regional-planning-interests-act-2014>

The amendments to the MERCP Act under the proposed Subsidence Management Framework should in no way interfere with or hinder the RPI Act assessment processes and obligations on the relevant holder to obtain a RIDA in the applicable areas of regional interest.

4.2 Human Rights Act 2019

CSG-induced subsidence being permitted to occur on vulnerable, flat, slope-dependent farm land has the capacity to limit certain human rights under the *Human Rights Act 2019*.

The MEROLA Bill in its current form is not compatible with the following human rights for the following stated reasons and therefore is a contravention of section 58(1)(a).

A human right may be limited but only to reasonable limits that can be demonstrably justified in a free and democratic society based on human dignity, equality and freedom as per s13(1).

Property Rights (s 24)

Section 24 (2) provides that a person must not be arbitrarily deprived of the person's property.

Property encompasses real and personal property such as land, chattels and other economic interests.

Deprivation can include a formal expropriation involving forced displacement or extinguishment of title, as well as de facto expropriation involving a substantial restriction of a person's use or enjoyment of their property.

For the deprivation to be arbitrary it refers to conduct that is capricious, unpredictable, unjust or unreasonable in the sense of not being proportionate to a legitimate aim sought.

Subsidence on flat floodplain farm land and its subsequent impacts to drainage resulting in inaccessibility during wet periods due to waterlogging in the depressed areas, as well as changes to overland flow pathways which may alter the effective use of farm infrastructure, amount to a significant restriction on the owners use or enjoyment of the property.

The deprivation of property is arbitrary as it is unpredictable. It is unknown exactly where and to what extent the subsidence depressions form, including for how long the subsidence or sinking of the land will occur.

The deprivation of property is arbitrary as it is unjust. It is unjust to inflict third party damages on a property owner that will interfere with the lawful carrying out of their daily farming operations/activities, which is in direct breach of section 804 of the *Petroleum and Gas (Production and Safety) Act 2004*. This also provides for the fact that the limitation cannot be demonstrably justified.

The deprivation of property is arbitrary as it is not proportionate to the legitimate aim sought, the purpose of the Bill. According to the *Statement of Compatibility* the purpose of the Bill is to ensure sustainable coexistence. However, when 'sustainable coexistence' is not provided with a legal definition and without proof of evidence that sustainable coexistence is indeed possible, achievable

or plausible in all situations, this renders the purpose of the Bill and legitimate aim sought to be disputable, dubious, questionable and uncertain; in essence null and void.

As mentioned above, as a clear breach of s804 of the P&G Act, the limitation cannot be demonstrably justified.

Allowing subsidence to occur on flat, vulnerable, slope-dependent Priority Agricultural land, where an even gradient is essential for effective drainage and irrigation use efficiencies, where slight changes to landform could alter and interfere with overland flow pathways, all of which risks resulting in considerable economic losses to the property owner over indefinite years, representing highly significant financial losses to one business for the financial benefit of another business, is not demonstrably justified.

Hence with, this human right is unreasonably limited by the arbitrary deprivation of property which cannot be demonstrably justified.

Right to Life (s 16) and Protection of families and children⁸ (s 26)

Section 16 provides that every person has the right to life and has the right not to be arbitrarily deprived of life. Food and water are existential to life.

Section 26 provides that every child has the right, without discrimination, to the protection that is needed by the child, and is in the child's best interests, because of being a child. A child has no ability to have a say in the decisions that are made today which will affect their future, therefore it is the responsibility of the government to ensure decisions are made in their best interest.

The human rights of young people are particularly impacted because of the disproportionate impact of decisions today on the future environment, which is contrary to the principle of intergenerational equity.

The principle of intergenerational equity states that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The detrimental impacts of subsidence on food production and the risk of impacts on groundwater resources in an increasingly challenged climate change environment is a significant risk of harm, with a more than real likelihood of occurrence, imposed on our future generations which should render the precautionary principle be applied. This is particularly significant in view of the very limited good-quality arable land in Queensland and the extent to which the fertile soils of the Condamine Floodplain contribute to this scarce asset, including consideration of their vulnerability to the impacts of subsidence and subsequent loss of productive capacity. On balance, this poses an unreasonable and unjustifiable risk to the future food and water security of children.

This represents an unreasonable limitation to the right to life and protection of children, contrary to the principle of intergenerational equity, which is not demonstrably justified.

⁸ These rights are based on Articles 23(1) and 24(1)-(2) of the International Covenant on Civil and Political Rights. Australia ratified this treaty in 1980.

The government's role is to properly consider human rights, including in weighing the public interest in allowing the above situation to occur without appropriate preventative measures, and to make a decision that is compatible with human rights.

In doing so the government must assess the impacts of subsidence on surface water, ground water, agricultural land, food production, mental health and intergenerational equity, and how these impacts and their consequential outcomes may impact human rights. Where those rights are threatened, the precautionary principle should be applied.

I attest that the MEROLA Bill in its current form is not compatible with the above-mentioned human rights and therefore would represent a contravention of s58(1)(a) of the Human Rights Act.

4.3 Common Law – The Right to Subjacent Support

The water beneath our land is integral to its stability. When that water (and/or other subterranean substances) is extracted to such an extent that it destabilises our land and causes surface damage and injury to the property owner, then this could constitute trespass, private nuisance and tort of negligence, under a potential breach of duty of care owed to the land owners.

By allowing the subsidence and consequential damage to occur, is the State in breach of its duty of care to land owners?

4.4 Breach of Ecologically Sustainable Development (ESD)

The proposed Subsidence Management Framework, as part of Queensland's suite of Land Access Laws, would allow long-term and irreversible damage to occur to such prized and critical food bowls which would be a clear breach of ecologically sustainable development (ESD) underpinning planning policy and legislation in Queensland and Australia.

ESD is a long-standing and internationally recognised concept.

“Development that meets the needs of present generations while not compromising the ability of future generations to also meet their needs.”

Report of the World Commission on Environment and Development, Our Common Future (the Brundtland Report) in 1987.

“The natural resources of the earth, including the air, water, land and flora and fauna, must be safeguarded for the benefit of present and future generations through careful planning and management.”

Principle 2 of Stockholm Declaration at the UN Conference on the Human Environment 1972

In Australia, ESD has been included in over 60 pieces of Australian legislation. [The National Strategy for Ecologically Sustainable Development \(1992\)](#) defines Australia's goal, core objectives and guiding principles for ESD as follows:

Australia's goal, core objectives and guiding principles for the Strategy

The Goal is:

Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

The Core Objectives are:

- to enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations
- to provide for equity within and between generations
- to protect biological diversity and maintain essential ecological processes and life-support systems

The Guiding Principles are:

- decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations
- where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- the global dimension of environmental impacts of actions and policies should be recognised and considered

The principles of ESD are incorporated into State legislation, including the *Environmental Protection Act 1994 (Qld)* and the *Planning Act 2016 (Qld)*.

By allowing long-term irreversible harm to occur to our state's prized, yet sparse and highly limited food bowls, and damage that will traverse and impede future generations, risking a reduction in life-supporting food production, the Queensland Government is entering very shaky waters in a potential breach of ESD goals, core objectives and guiding principles, generated by the inherent conflict of interest in their position as recipient of short-term royalties from the very industry that imposes the threat of serious and irreversible damage.

One has to question whether the short-term financial incentives are clouding objective long-term decision making in the interests of our future generations.

4.5 Breach of General Environmental Duty (GED)

Every person in Queensland, including the State, has a duty of care to not allow the carrying out of an activity that causes or is likely to cause environmental harm, unless measures to prevent or minimise the harm have been taken.

Environmental harm is a serious impact, or potentially serious impact on an environmental value defined under the *Environmental Protection Act 1994 (EP Act)*.

Environmental harm becomes unlawful when it exceeds the thresholds of nuisance, serious, or material environmental harm.

Section 17 of the EP Act provides that “serious environmental harm” is harm:

- that causes actual or potential harm to an environmental value that is irreversible, of a high impact or widespread, or causes actual or potential harm to an area of high conservation value or of special significance; or
- causes actual or potential loss or damage to property of more than \$100,000 (post 1 July + CPI); or results in costs of more than \$100,000 (post 1 July + CPI) to prevent or minimise the harm and to rehabilitate the environment.⁹

By allowing CSG-induced subsidence to occur and risk causing serious environmental harm of a widespread and irreversible nature to environmental values without adequate mitigation and preventative measures in place, the State risks breaching its GED under the EP Act.

5. MEROLA Bill - Coexistence

5.1 Failure to recognise that coexistence is not possible in all situations

An abject failure of the Framework is its incapacity to recognise that coexistence is not possible in all situations.

Sustainable coexistence denotes where **both parties** are on a level playing field and **both parties** mutually benefit from the situation at hand, with the resultant goal of ‘thriving communities’.

In the case of CSG-induced subsidence occurring on a flat, slope-sensitive, intensively farmed floodplain, this is most certainly not the case as farmers incur substantial long-term damage to their land and economic losses to their businesses over an indefinite number of years, traversing generations.

The fact that coexistence is not possible in all situations was recognised by top-level government bureaucrats within the Department of State Planning, Infrastructure and Planning through the consultancy process of the *Regional Planning Interests Bill* in 2013:

“The department acknowledged that there could be instances in which coexistence is not possible. In those cases, the priority agricultural land use would be preserved.”¹⁰

As the decade has since evolved and with the change in governments, this acknowledgment, along with the desire to protect our State’s most productive farmland, has eroded to the situation we find ourselves in today, where the current government is willing to allow long-term and irreversible harm to our State’s top performing food and fibre production regions.

5.2 Coexistence Principles

An overarching fundamental omission in Queensland’s coexistence principles, that underpin the Land Access Code regulating coal seam gas development, is the **equity of giving both parties the ability to:**

⁹ <https://environment.desi.qld.gov.au/management/compliance-enforcement/obligations-duties>

¹⁰ Parliamentary Committee Report to the Regional Planning Interests Bill 2013 – Report No. 35 March 2014, page 25

- be duly, transparently and comprehensively informed,
- weigh up the pros and cons of the proposed development, its risks versus the compensation/benefits offered,
- independently assess if the coexistence relationship will be mutually beneficial or not, and
- have the ability to decide whether or not, on that basis, to go ahead with the proposed development.

This is how all commercial arrangements evolve and exist. Coexistence between the resource sector and the agricultural sector should be no different.

- Without such ability, we do not have sustainable coexistence but forced subjugation.
- Without such ability, we do not have mutually beneficial relationships, but a parasitic arranged marriage.
- Without such ability, we do not have thriving communities, but a fractured, divided and broken region.

If the Queensland Government is genuine about achieving sustainable coexistence and thriving communities then they need to address this fundamental oversight.

Without it, the espoused sustainable coexistence will be but a smokescreen for the underlying reality of:

- one party being roughshod over by another,
- one party being sacrificed for the financial benefit of the other, and
- the blinkered short-term monetary gains of the government coming at the expense of the long-term food security interests of Queensland and the nation.

6. Subsidence Management Framework - Overarching Concerns

6.1 Lack of broad public consultation and short timeframe on the MEROLA Bill

It must be brought to the Committee's attention that the departmental consultation on the legislative reforms which constitutes the makings of the MEROLA Bill has been extremely limited to a small handful of agricultural stakeholders and broadly missing amongst the wider farming community.

Many farmers have been blind-sided by the introduction of the MEROLA Bill. In all essence, it could be passed through parliament with some of the most affected farming community being totally unaware of its existence.

If the GasFields Commission wants to expand its remit then it needs to do a far better job of providing information to regional stakeholders and making them aware of impending government policy and decisions that will directly impact their futures.

It has been a shameful public consultation process.

The extremely short timeframe provided for consideration of the MEROLA Bill and provision of submissions to the Clean Economy Jobs, Resources and Transport Parliamentary Committee also cannot go un-noted. Especially in light of such a broad and highly complex piece of legislation, which busy and under-resourced farmers are not equipped to process at the best of times, let alone during the busiest period of the year when harvesting, picking and preparation for winter crop planting is taking place. The extremely short timeframes provided have not allowed adequate time for proper consultation on the Bill with our peak ag body representatives, nor to seek any independent expert advice that may be required.

Many aspects of the MEROLA Bill will materially impact our farming futures and those of our children in this region. They will dictate whether it is even viable to continue farming in light of that being proposed and the potential damages and risks being permitted. It is wholly unjustified that this fundamental piece of legislation affecting our livelihoods and those of our children is being processed through parliament at brake neck speed. The absence of an exposure draft ahead of the Bill's introduction is an assault on due process in relation to the consideration of draft legislation.

The lack of broad public consultation and extremely short timeframe for consideration of the Bill prohibits the most affected and under-resourced stakeholder group from being able to fully digest and comprehensively analyse the proposed legislative amendments that will have far-reaching ramifications on their lives and businesses. It lacks respect for farmers in this region and what they are being expected to navigate while wholly unsupported.

6.2 Rushed Legislation – incomplete research and science

This legislation is being rushed through Parliament before much of the essential scientific and research analysis contributing to the subsidence modelling and farm scale impacts has been completed:

- OGIA's pilot farm scale assessment work has not been completed. This will play a major role in the development of tools, methods and guidelines which will form a pivotal functioning role in the proposed Subsidence Management Framework;
- There has been a complete absence of economic analysis of the costs subsidence impacts will impose on high value agricultural production across subsidence-vulnerable areas such as the Condamine Floodplain;
- There is a complete lack of regional overland flow assessment, not only to determine how potential changes to regional overland flow pathways would affect and interfere with river and tributary catchments, but also how they would affect and interfere with farm scale catchments and inter-farm drainage;
- Critical scientific data and analysis pivotal to effective CSG-induced subsidence modelling and predictions is not yet available/complete, and therefore the effective assessment of the real risk posed by CSG-induced subsidence is not possible. For example:
 - analysis of the Airborne Electromagnetic (AEM) Survey over the Horrane Fault and Condamine Alluvium extent and how any identified geological connectivity may affect subsidence modelling and predictions,

- the extent to which gas desorption coal shrinkage contributes to compaction and subsequent surface subsidence,
- comprehensive coal stratigraphic data (geological properties) from across CSG development areas, both existing and proposed, in order to establish a better understanding of the extent and characterisation of subsidence, both temporal and spatially.

Without such data and information, the true risk assessment of allowing CSG development to proceed across our most vulnerable agricultural areas cannot occur. Without this true risk assessment being carried out, especially since knowing some of the glaring risk of impacts, the Queensland Government could be considered guilty of negligence in their duty of care to landholders, their children and the environment.

Recommendation

The research and scientific analysis must be completed before any further CSG development can proceed in intensively farmed prime agricultural areas which are inherently vulnerable to the impacts of CSG mining, including subsidence.

6.3 Lack of adequate information provided in order to make an informed submission

There is a severe lack of crucial information missing from the Framework.

Most of the crucial detail is being left to the yet to be developed regulation(s) and guidelines. For example, we are blind as to how land will be categorised, we are blind as to what a Farm Field Assessment will entail, we are even blind as to the types of survey methods to be used for baseline data collection and land monitoring and whether these will be fit-for-purpose and appropriate to ensure compensation from the liable parties in the future.

The devil is in the detail and without it, we as the most affected and at-risk stakeholder, are being severely penalised. This is unacceptable.

Recommendation

More detail, for example, an outline of what the various guidelines will include, must be provided before stakeholders can provide an informed decision on the Bill.

6.4 Forces Landholders to Knowingly Permit and Accept Harm

By forcing landholders down the pathway of having to sign a Subsidence Agreement without the ability to veto the risk of impacts they deem too high, and deemed too high under current Regional Planning Interest regulation, is in essence forcing landholders to knowingly permit and accept harm. Harm not only to their own properties, but also to their neighbours and to the region as a whole; incorporating all facets of harm, that being environmental, social and economic harm.

It is an ill-conceived melting pot of potential future liability action and claims against the landholder from neighbours and beyond, especially as subsidence will continue for years beyond the term of the mining project and tenure surrender, when the resource company will be long gone.

The Queensland Government needs to deeply consider the moral and legal ramifications of forcing landholders accept damage to themselves and to those around them.

6.5 Farmers Burdened with all the Risk – No Upfront Surety

The farmer is being expected to shoulder the immense burden of risk of CSG-induced subsidence and its consequences with no upfront security bond. The proposed framework encompasses a trademark lack of regulatory oversight which permits continued self-assessment by a company that has already been found guilty of breaching Land Access legislation resulting in a \$1 million fine.^{11 12} Arrow Energy demonstrate their strategy for advancement across the Condamine Floodplain with this statement in Energy Bulletin News¹³:

Arrow said it took its obligations seriously and would compensate landholders **if** they could prove the company had impacted farmland.

The telling word is “if”

The onus of proof continues to rest with the farmer who will likely endure a fraught and arduous, costly and mentally harrowing experience in establishing liability and navigating compensation claims with well-resourced multinational companies focused on shareholder returns.

The Queensland Government has taken care of its own financial risk where resource authority holders may fail to comply with their environmental management or rehabilitation obligations, by establishing its own upfront security in the form of the *Financial Provisioning Scheme*¹⁴. This includes upfront surety to the value of the estimated rehabilitation costs (for those under \$100,000) and an annual risk category allocation assessment process (for those over \$100,000). An annual risk assessment ensures estimated costs remain reflective of reality including any evolving risk categorisation of the companies involved and inflationary increases.

And yet the State Government is not providing such similar assurance provisions for farmers most at risk and most vulnerable to the impacts of CSG-induced subsidence. Instead, we are being expected accept the burden of risk and to navigate a treacherous, costly, time consuming and battlefront compensation framework, with no assurances that the rightful compensation will ever be forthcoming.

The Queensland Government are essentially looking after their own backs while they throw farmers to the multinational, well-resourced wolves. Farmers who grow the food and clothe the backs of the citizens of Queensland and the nation, are to become the downtrodden door mat of big business who trample all over us to seek their global warming, carbon intensive, little to no tax, offshore destined profits. It is shameful conduct for a nation that prides itself on being the ‘land of the fair go’. There is nothing fair about this situation.

¹¹ <https://statements.qld.gov.au/statements/94855>

¹² <https://www.theguardian.com/australia-news/2022/mar/31/coal-seam-gas-company-arrow-energy-fined-1m-for-breaching-queenslands-land-access-rules>

¹³ <https://www.energynewsbulletin.net/environment/news/1462292/gas-and-queensland-farmers-clash-continues-with-no-end-in-sight>, 22nd November 2023

¹⁴ <https://www.treasury.qld.gov.au/resource/financial-provisioning-scheme/>

Farmers cannot and should not be expected to accept such risk to their businesses and future viability. Farmers should not be forced to accept the risk with no upfront financial surety provided. No other business would be expected to accept such risk in their commercial operations. If they were exposed to such risk with no upfront surety, they have the option to decline accepting that risk. Because of our draconian laws, farmers and regional landholders do not have that luxury and are treated like second class citizens. It is an assault on equality and property rights.

Recommendation

The SMF will only work, and sustainable coexistence hence be achievable, if an upfront surety in the form of the value of our properties, is provided by the relevant holder. It needs to be of such value in light of the extreme risk of high compensation costs foreseen - in the form of both continual high value crop losses and high remediation costs. This **upfront surety fund** would need to be reviewed on an annual basis - taking into consideration updated development plans, evolving subsidence modelling and inflationary increases - to ensure realistic costs are assured for the long-term. It would need to be administered by a fully independent statutory party, who would not only be responsible for the annual risk assessment to ensure adequate levels are maintained, but also the processing of claims and the settlement of compensation to be paid from the Fund.

This not only ensures security and a far more equitable arrangement for landholders, but also ensures the State will not be wearing the costs of compensation liability post-surrender of the tenure, or if the resource company were to go insolvent. It allows the resource company to factor in the realistic costs of compensation liability into their ongoing business decisions. It will also avoid the situation foreseen within the current proposed framework where landholders will be forced to undertake legal action - via arbitration or in the Land Court - on a regular basis due to the structure and inherent shortfalls in the existing framework proposal.

Failure to enact the above upfront surety fund for landholders would demonstrate the government's unwillingness to achieve genuine sustainable coexistence where risk is appropriately apportioned and both parties find themselves on a more level playing field.

6.6 Lack of appropriate agronomic expertise and oversight

The proposed framework is distinctly lacking in independent agronomic expertise. Despite previous feedback supplied through the in-person consultations and via our written submissions, there appears to be a continued absence of appropriate agronomic expertise in the SMF, especially in the risk assessment and management processes.

It is appropriate that OGIA carry out and are responsible for the subsidence modelling and monitoring, as they have already been tasked concerning subsidence impacts to environmental values under S376 of the Water Act, which are complimented by sections 126A and 227AA of the Environmental Protection Act.

However, it is inappropriate that the responsibility for the risk assessment and management of subsidence impacts on agricultural interests and values, rests with a department whose interests lie with the resource sector, risking bias and partiality against the interests of agriculture and its stakeholders.

The Department of Agriculture and Fisheries (DAF) must play a more pivotal and leading role within the SMF. In the name of fairness and equity, it is imperative that DAF is the department responsible for administering the SMF, as it concerns resource impacts inflicted upon the agricultural industry; just as the Department of Environment, Science and Innovation (DESI) is responsible for and manages impacts that occur to environmental values.

To elaborate further, Chapter 3 of the *Water Act 2000*, which the SMF in principle mirrors, is the responsibility of DESI, whose interests lie with the environment (underground water, springs and groundwater dependent ecosystems (GDEs) to name but a few) – the matter to be protected. The same needs to be done for prime agricultural land and its productive capacity; the framework governing its ongoing integrity should be administered by the body who is responsible for its interests and the matter to be protected – the Department of Agriculture and Fisheries.

The Minister's title says it all, he is the Minister **FOR** Resources. Not for agriculture. The proposed framework in its current form, to be administered by the Department of Resources, whose interests lie with the resource industry, poses further imbalance and inequity in CSG regulation in Queensland.

Agricultural stakeholders, the injured party forced to coexist, will not be able to have confidence in a framework which risks partiality and bias towards one industry over another. And one which is severely lacking in the appropriate agronomic expertise and oversight.

Without such confidence, faith and assurance in the integrity of the Framework, effective coexistence, based on the foundations of equity, will not be achievable.

Technical Guidelines

The technical guidelines concerning consequences to property and agricultural business should be prepared by DAF, and not, as proposed, by the Department of Resources (DOR). DOR and OGIA do not have the appropriate agronomic expertise to be able to draw up technical guidelines which tend to impacts to farm fields, farm infrastructure, farming operations and farm productivity.

Likewise, any technical guidelines concerning impacts to landform and inter-farm drainage should be prepared by DAF, and in conjunction with the Department of Regional Development, Manufacturing and Water (DRDMW), who would have the appropriate expertise and impartiality when dealing with impacts to overland flow.

There must also be public consultation and landholder input during the preparation of the technical guidelines.

Recommendation

The Department of Agriculture and Fisheries (DAF) must be the department responsible for the administration of Chapter 5A and Schedule 1A of the MEROLA Bill 2024, including the responsible party for all facets of risk assessment and subsidence management, including the development of technical guidelines and the regulatory oversight required. DAF's funding and resources must be augmented to accommodate these extra responsibilities and regulatory duties.

Recommendation

DAF are to be responsible for the formation of technical guidelines which assess impacts to agricultural land and land uses. Technical guidelines which involve the assessment of overland flow pathways should be formed by DAF in conjunction with DRDMW.

Recommendation

There must be public consultation and landholder input during the preparation of the technical guidelines.

6.7 Regional Risk Assessment of Critical Consequences

The Regional Risk Assessment should be carried out by DAF, and where affecting impacts to overland flow, carried out in conjunction with DRDMW,.

The Regional Risk Assessment should also incorporate an **assessment of critical consequences on a regional scale**, which would not likely be captured in the proposed landholder instigated and focused critical consequences.

This should include:

- **Surface water** - an assessment of impacts that could cause a change to natural overland flow pathways on a regional and sub-regional scale, including the assessment of impacts to watercourse catchments and erosional risks.¹⁵
- **Groundwater** - an assessment of the impacts of subsurface compaction to aquifer/alluvium integrity caused by water and gas extraction, including the risk of direct settlement in the unconsolidated sediments of overlying alluvium (e.g. Condamine Alluvium)¹⁶ and the risk of the opening of new and existing fractures which could change the hydraulic relationships and groundwater flows between aquifers.¹⁷

Any scientific uncertainty as to irreversible impacts and future integrity should trigger the precautionary principle being applied with appropriate mitigation measures enacted.

Presently, assessment to surface water and groundwater impacts from CSG-induced subsidence is done through the Underground Water Impact Report (UWIR) process. However, it:

- a) does not have a clear and definitive risk assessment pathway to enact appropriate mitigation and preventative measures when critical consequences are identified,
- b) lacks effective independent oversight,

¹⁵ Assessment of impacts of the proposed coal seam gas operations on surface and groundwater systems in the Murray-Darling Basin, Moran & Vinks, UQ (2010)

¹⁶ Background Review: Subsidence from coal seam gas extraction in Australia, IESC, 2014.

¹⁷ Assessment of impacts of the proposed coal seam gas operations on surface and groundwater systems in the Murray-Darling Basin, Moran & Vinks, UQ (2010)

- c) only considers the impact on environmental values, as per the requirements under section 376 of the *Water Act 2000*,
- d) does not overtly consider nor overtly protect impacts to water-based agricultural assets.

Therefore, the above-mentioned regional assessment of critical consequences to surface water (including overland flow) and ground water, specific to agricultural assets, is an utmost necessity.

Recommendation

The SMF must include a regional risk assessment of critical consequences to surface water (including overland flow) and ground water, specific to agricultural assets.

6.8 No Economic Analysis of CSG-Induced Subsidence

There has been no economic analysis of the cost of subsidence induced impacts, including the potential value of lost production and the costs to remediate (if at all possible). This is despite the GFCQ Regulatory Review focusing on the issue of potential economic impact that may occur as a result of CSG-induced subsidence.¹⁸ And a key finding of the review being that *“there is a current knowledge gap in relation to the potential on-farm consequence and economic impacts of current and predicted CSG-induced subsidence”*¹⁹

Without economic analysis, resource tenure holders and government are blind as to the potential long-term compensation costs they face. I include the government in this sentence as subsidence will occur for decades, beyond the life of the producing gasfield as subterranean geomechanical stress processes play out, and the State, and effectively the Queensland taxpayer, could well find themselves liable for compensatable effects resulting from today’s decision-making processes, once the relevant holders have surrendered their tenure and shipped off overseas or even dissolved their business structures.

Without such analysis, true assessment of the viability of the development occurring in an area of regional interest cannot be appropriately effected. Without it, there cannot be comprehensive and effective analysis of whether the risks of impairment to both land and water resources warrant the continuation of CSG development over such areas as the Condamine Alluvial Floodplain.

This remains a critical omission in the assessment capabilities underpinning the Framework.

Recommendation

There needs to be a comprehensive economic analysis carried out to assess the long-term costs to production and of remediation, by a suitably qualified panel of independent experts, before further development is permitted in sensitive and vulnerable intensively farmed regions such as the Condamine Floodplain.

¹⁸ Gasfields Commission Regulatory Review of CSG-induced Subsidence – Discussion Paper, May 2022 – p5

¹⁹ Gasfields Commission Regulatory Review of CSG-induced Subsidence – Discussion Paper, May 2022 – p5

6.9 No Overland Flow Assessment

Overland flow is a critical component of farming on a floodplain as has been recognised by GFCQ. Overland flow represents an important source of water for irrigating crops and replenishing dryland crops.

Similar to the glaring absence of comprehensive and essential economic analysis, no regional overland flow (OLF) assessment has been carried out nor is proposed, despite this being a pivotal recommendation of the GFCQ in both their Regulatory Review²⁰ and Subsidence Consequences Report²¹:

GFCQ Regulatory Review

6. Undertake analysis of potential changes to regional overland flow

A key concern raised during consultation was the potential impacts of changes to regional overland flow as a consequence of CSG-induced subsidence and concerns that it may change a landholder's access to overland flow water.

Regional overland flow impact assessment and analysis is outside the scope of the body of work currently being led by the Commission and therefore has not been considered as part of the regulatory review.

The Commission recommends that the Queensland Government investigate potential implications for regional overland flow that may result from predicted CSG-induced subsidence. If it is determined that regional overland flow would be impacted by CSG-induced subsidence, relevant investigations into the adequacy of the regulatory framework should be undertaken.

Subsidence Consequences Report

5. Assess potential for landscape scale impacts to the overland flow - the focus of the project is on the potential consequences of landform change at the farm field scale on farming operations. The potential impact of landform changes at the broad landscape scale to significantly alter overland flow patterns needs to be assessed.

In fact, there is no mention of overland flow throughout the entire Bill, which is of major concern.

Nor is there mention in the Bill of the Drainage Assessment or Inter-Farm Drainage Assessments as indicated in the Consultation Paper and by the Department of Resources presentations throughout the consultation period (September 2023 to February 2024).

This is despite it clearly stating in the Consultation Paper that the MERCP Act (not Regulation) will include offence provisions for failure of the tenure holder to undertake the inter-farm drainage assessment or undertake it in accordance with the legislative requirements.

The inter-farm and intra-farm drainage assessments were a big part of the proposals put forward under the consultation process and yet it is now completely and mysteriously missing from the

²⁰ Gasfields Commission Regulatory Review of CSG-induced subsidence – Report, November 2022 – p4, 19-20

²¹ Gasfields Commission Potential consequences of CSG-induced subsidence for farming operations on the Condamine alluvial floodplain – July 2023 – p4

proposed SMF within the Bill.

Inter-farm drainage assessment

- inter-farm drainage assessments are applicable to certain areas identified through the regional risk assessment
- the purpose of the assessment is to characterise pre-existing and anticipated CSG-induced subsidence and consequences of subsidence from inter-farm drainage
- specific requirements for undertaking an inter-farm drainage assessment will be set out in the MERCP Regulation
- the Chief Executive of the MERCP Act may ask OGIA to prepare guidelines for undertaking inter-farm drainage assessments

Consultation paper – Coexistence institutions and CSG-induced subsidence management framework

- the tenure holder must notify the landholder prior to accessing the property to undertake the inter-farm drainage assessment, noting it is important that the landholder facilitates access and provides any available information about the farm
- the tenure holder will be required to provide a copy of the outcome of the intra-farm drainage assessment to the landholder, Administering Authority and OGIA
- the MERCP Act will include offence provisions for failure of the tenure holder to:
 - undertake an inter-farm drainage assessment
 - undertake the inter-farm drainage assessment in accordance with the legislative requirements
- the MERCP Act will include provisions for landholders to request the Chief Executive to review the risk categories of farms where they believe the risk is not accurate, including a formal notice process and criteria for the review request.
- if the Chief Executive determines the risk category requires amendment, they can issue a notice to OGIA and the tenure holder regarding the required change.

Responsible entity: tenure holder

Timing: whichever is the earlier:

- timing identified in the Subsidence Impact Report, or
- at least 12 months prior to commencing CSG production within 3 km of a farm field boundary

Drainage is mentioned in the SMF in the Bill but it has no definition provided in the dictionary. One would assume it refers to the time and ease with which water (which has been applied as irrigation water or which falls as rain) drains from the paddock. A reasonable interpretation of drainage is the

removal of a surface's water from an area with excess water, which is necessary to prevent waterlogging.

This does not infer overland flow which is water that runs across the land after rainfall, either before it enters a watercourse or after it leaves a watercourse as floodwater. It is defined in the Water Act as:

overland flow water—

- 1 ***Overland flow water*** means water, including floodwater, that is urban stormwater or is other water flowing over land, otherwise than in a watercourse or lake—
 - (a) after having fallen as rain or in any other way; or
 - (b) after rising to the surface naturally from underground.

Overland Flow is therefore an entirely different concept to drainage:

- Drainage is the **removal** of excess water.
- Overland Flow is the water that **flows** across the land.

It appears there has been a deliberate attempt to avoid the term 'overland flow' and concept entirely within the Bill, despite it being a major aspect of farming on the Condamine Floodplain and pivotal to our productivity.

Our farms have been designed around existing natural flow pathways. This is a highly regulated space, especially in the Murray-Darling Basin which includes our catchment the Upper Condamine, to ensure no increased take of water from the catchment and the sustainability of water availability for other users of ground and surface water, as well as for the environment, as per the current *Water Plan (Condamine and Balonne) 2019*.

The introduction of the Water Act 2000 allowed for Water Resource Plans to regulate the taking of overland flow water. Pursuant to this we had all our farm irrigation infrastructure (overland flow works) e.g. dams, sumps, channels, drains, pumps etc certified by the then Department of Natural Resources, Mines and Water via a Notification of Works process, as per overland flow management rules under the then *Water Resource (Condamine-Balonne) Plan 2004*. All our farm irrigation infrastructure is now accordingly recorded and classified as certified works and our capacity of take of overland flow approved according to these certified works.

This all occurred prior to any CSG development approvals in the Condamine catchment region, therefore resource companies would have been aware of the regulation in place at the time, and which they must adhere to as a result of carrying out their activities.

Any interference with, or changes to, natural overland flow pathways caused by CSG-induced subsidence could severely impact upon our approved certified works and approved take of overland flow water. Not only does it pose a huge threat to the productivity and profitability of our farming

businesses, the interference to natural flow pathways caused by CSG-induced subsidence would also represent a potential breach of the requirements of the *Water Plan (Condamine and Balonne) 2019*.

To add to this, our farms have been designed to capture and retain any contaminated agricultural run-off. We capture, using our existing certified works, the first flushes of any run-off across our farms, into our sumps and dams, to ensure contamination does not enter our rivers and streams, potentially harming the ecology of those aquatic systems.

Contaminated agricultural runoff

Overland flow water that is contaminated with chemicals used in agriculture needs to be captured to prevent harm to streams and rivers.

Contaminated agricultural runoff is overland flow water that contains excess nutrients or farm chemicals that can harm the quality of water in streams and rivers.

The appropriate management of contaminated agricultural runoff is important to prevent harm to streams and rivers, however, capturing more than what is needed can impact on other water users and environmental needs.

22

Any changes to land form and overland flow pathways caused by CSG-induced subsidence risk interfering with the capture of contaminated agricultural run-off on our farms and the risk of contaminated flow entering watercourses which could threaten the environmental health and ecology of those river systems.

Any changes to land form and subsequent natural flow pathways could have devastating effects on our farming businesses (certified overland flow works, physical operations, productivity and profitability), and on the integrity and health of river catchments.

Recommendation

The impacts of CSG-induced subsidence on regional overland flow pathways and farm scale overland flow pathways (both inter-farm and intra-farm) must be included in the risk assessment provisions within the SMF, with appropriate mitigation measures applied where the risks of impacts are identified.

6.10 Unacceptable levels of self-assessment

There is a plethora of self-assessment being proposed in the Framework.

We have the relevant holder in charge of:

- Baseline data collection
- Land Monitoring,
- Farm Field Assessments, and
- Choosing and assigning a Farm field Auditor.

²² <https://www.business.qld.gov.au/industries/mining-energy-water/water/authorisations/overland-flow>

This latitude in self-assessment is totally unacceptable.

There is also a severe lack of direct regulatory oversight and scrutiny.

Baselines and land monitoring are needed to establish liability. It is in the interests of the resource company, who is focused on keeping their compensation liability to a minimum in order to maximise profits, not to carry these out in the interests of the future compensation seeking party – farmers. The fox is being left in charge of the henhouse.

Recommendation

The Baseline Data Collection and Land Monitoring should be carried out and managed by an independent body like OGIA, with funding provided by the gas industry via a proportional increase to their levy. The data should be made publicly available.

It is also totally unacceptable that the resource company is in charge of carrying out the Farm Field Assessments (FFAs). Again, the fox is being left in charge of the hen house. It will be in their interests to find impacts to be less than minor, and the FFAs will undoubtedly be engineered accordingly.

Recommendation

The Farm Field Assessments must be carried out by an independent panel of agronomic experts, or a suitably qualified division within DAF, to ensure just fairness, due process and impartiality.

6.11 Insufficient Baselines

Baseline obligations are a significant concern due to the lack of sufficient topographic survey data available to determine, beyond reasonable doubt in a court of law situation, that CSG-induced subsidence has occurred.

For example, LiDAR is only suitable for determining a change in slope due to its repeatability limitations, but even then, it carries significant horizontal and vertical inaccuracies. What is more, the 2012 & 2014 LiDAR surveys, affecting landholders in the earlier development areas in particular, wasn't even done with a control benchmark.

InSAR, which can be used to determine a relative change in elevation, has significant limitations over cropping lands where the variation in vegetation results in lost cohesion of data points.

This leaves landholders having to rely more heavily on sourcing their own alternative surveys, at their own expense; however, these likewise, may not be suitable for determining undeniable cause and effect in a court of law setting.

There is still a significant absence of publicly available survey data to prove undeniable liability and ensure that compensation for CSG-induced subsidence impacts will be forthcoming. And yet, despite the absence of baseline survey protections and future liability assurances, CSG development is allowed to continue in the areas most susceptible to landform change.

The baseline data collection obligations must be accompanied by more direct regulatory oversight and scrutiny to avoid the flawed absence of future liability assurance, as is occurring with the water

bore baselines. The water bore baselines being carried out by Arrow Energy in our area, are being done to an unsatisfactory standard, with no direct regulatory oversight or scrutiny being applied. This will mean that rural residents who rely on such baselines to prove liability for any future CSG-induced impacts to their groundwater, will be sorely let down by the lack of adequate government protection mechanisms in place.

This risks being repeated with the topographic baselines needed in the SMF.

Without appropriate baselines (groundwater and topographic), including regulation and direct oversight to ensure their efficacy, regulators of the extractive resource industry risk being complicit in potential negligence caused as a result of breaching a duty of care to impacted farmers and regional communities.

Recommendation

There needs to be an urgent independent Inquiry into the adequacy of the groundwater baseline assessments being undertaken across the Condamine Alluvium, including whether they are complying with the requirements of the Baseline Assessment Guideline (ESR/2016/1999), and assessing who within government is responsible for the oversight and scrutiny of the baseline reports and if this is effectively being undertaken. If the baselines are found to be inadequate and not fit for purpose, then there should be an independent review into the efficacy of the baseline provisions for water bores as well as that mirrored in the proposed topographic baselines under the SMF.

6.12 Preservation of productive capacity and land use type

There needs to be an underlying policy objective of the SMF that agricultural land must be restored to pre-development conditions. It is important that any assessments, whether farm scale or regional scale, including the consideration of critical consequences, ensure that agricultural land is able to retain its productive capacity. It is also important that landholders are able to retain the existing agricultural land use type, and not be forced to undergo structural change to their farming operations. Intergenerational equity must be maintained. This holistic objective is presently lacking in the proposed framework.

MEROLA BILL 2024 – Amendments

7. Part 4 - GasFields Commissions Queensland (GFCQ)

The GasFields Commission is to have its remit expanded to encompass other resources and renewable energy as part of its role. Sufficient funding and resources must be provided to GFCQ to ensure that they can accommodate the expanded role encompassing other resources and renewables, and not have their ability to cover onshore gas industry related matters and issues diminished. Coal seam gas mining comes with many impacts and widespread coexistence issues; therefore, it is imperative that landholders dealing with onshore CSG matters do not have their access to the little assistance and support available to them now, weakened any further.

Despite an expanded remit it would appear that the GFCQ are to have their functionality severely weakened under the rhetoric of a **refreshed focus on providing education and information to stakeholders**.

According to the Bill, the GFCQ are to have their existing review and oversight functions removed. They will be losing the following existing functions:

7 **Commission's functions**

- (1) **(b)** reviewing the effectiveness of government entities in implementing regulatory frameworks that relate to the onshore gas industry;
- (c)** advising Ministers and government entities about the ability of landholders, regional communities and the onshore gas industry to coexist within an identified area;
- (e)** making recommendations to the relevant Minister that regulatory frameworks and legislation relating to the onshore gas industry be reviewed and amended;
- (h)** obtaining particular information from government entities and prescribed entities;
- (i)** obtaining advice about the onshore gas industry or functions of the commission from government entities;
- (n)** convening advisory bodies to assist the commission to perform a function mentioned in paragraphs (a) to (m).

That is 6 significant functions to be rescinded. All in all, the removal of these functions results in GFCQ's inability to carry out the following much needed tasks:

- reviewing the effectiveness of government entities in implementing regulatory frameworks,
- the provision of advice to government when GFCQ deems it necessary,
- making recommendations to government when GFCQ deems it necessary,
- ability to obtain information from government entities and prescribed entities,
- ability to form advisory groups, and
- general regulatory oversight function.

This so-called ‘refreshment’ of the Commission **would leave a decided vacuum in CSG regulatory oversight.**

It is pertinent to be reminded that the Queensland Audit Office (QAO) Report [Managing Coal Seam Gas Activities 2019-20](#), which was scathing of CSG regulation in Queensland, outlined that:

- Some stakeholders are confused and frustrated by the number of entities (including the regulators, the commission, the Land Access Ombudsman, and other government departments) that perform roles and provide information about coal seam gas activities and processes.
- Some stakeholders are also confused about the rights, entitlements, and obligations of industry and stakeholders.
- It is difficult for some landholders to know who to ask for, and how to access, information relevant to their queries or concerns.
- It also leads to the risk of incomplete or conflicting information being provided on occasion.²³

This all indicates the need for:

- A first point of call for community stakeholders where their enquiries can be ‘triaged’ to the appropriate body or department.
- Direct, boots-on-the-ground information and education provision to be enhanced and improved, especially concerning stakeholders’ rights & entitlements; the obligations of industry to adhere to legal requirements; and the duties and obligations of the regulators responsible for administering the regulatory legislation.
- An overarching overseer of the CSG regulatory framework and of the regulators to ensure they are appropriately upholding the law as per its intent, without undue political interference.
- Regular and shared update, information and review sessions between government entities to ensure that their individual objectives align to achieve a combined front of compliance and enforcement measures.

Therefore, now is not the time to weaken the GFCQ, but rather empower it to oversee and review; to act as a first point of call to help alleviate stakeholder confusion; as well as improve upon its education and information provision responsibilities, especially to the rural sector concerning landholder rights and resource company obligations.

This is especially not the time to weaken its functionality as CSG expands onto some of our most productive and vulnerable farm land on the Darling Downs where many significant impacts and consequential issues will evolve. And although renewables do not have the nefarious impacts as does CSG, it is a rapidly expanding industry without a well-established regulatory framework and so

²³ Queensland Audit Office, Managing coal seam gas activities, Report 12, 2019-2020 (QAO Report) – page 5 <https://www.qao.qld.gov.au/reports-resources/reports-parliament/managing-coal-seam-gas-activities>

much needed energy and resources will be needed for this policy development space. Coexistence issues will most certainly inflate and GFCQ's functionality must match these challenging times so that regional communities can have faith and confidence in the strength and integrity of the frameworks governing the various industries and their players, and the ability and efficacy of the government agencies to effectively manage and carry their regulatory duties.

Now is not the time to leave an oversight vacuum to be exploited by industry and to allow the influence of political will and imbalanced policy decisions to creep in under the radar.

The importance and the uniqueness of the oversight function was outlined in the QAO Report:

*“Unlike its other functions, this role of the commission [oversight function as per section 7(1)(b) of the GasFields Commission Act 2013] could not be readily or appropriately passed on to a government department. By not fulfilling this function the commission is missing the unique opportunity it has been given to **provide transparency and independent assurance** that the industry is appropriately regulated and held to account when needed. **Delivering this function is an important element in ensuring community and landholder confidence in the regulators and industry and for fostering coexistence.**”²⁴*

However, to be an effective, trusted and respected, independent overseer, GFCQ must work quickly and constructively to improve upon its reputation, seen by many, as a biased facilitator to the gas industry. This reputation will only fester and remain apparent in its new expanded role dealing with renewables and associated land access coexistence, despite any name changes applied.

To help improve upon this reputation, it must reduce its workforce input from the resource sector and increase its workforce input from more impartial backgrounds, including the private sector. A revolving doors scenario between Government employees and industry, leads to continued mistrust amongst stakeholders. GFCQ needs equal representation from the agriculture industry and regional communities to balance that in place from the resource and energy industry, which at present is the dominant factor. This applies to both staffing quotas and Board positions. Unless there is equal representation, effective coexistence will be but an elusive concept.

- **Clause 22 - Section 25 (Compulsory consultation)** should remain in the Act and be expanded to include ‘the resources industry and the renewable energy industry’.
- **Clause 31 - Amendment of Schedule 1**
It is farcical to have the GFCQ's name changed to ‘Coexistence Queensland’, around which their purpose to manage and improve **sustainable coexistence** is focused, and yet have no definition for ‘coexistence’ nor ‘sustainable coexistence’ in the Act.

Both or either of these terms needs to be added to the Dictionary with appropriate definition(s).

²⁴ QAO Report page 36

8. Part 8 - Amendment of Mineral and Energy Resources (Common Provisions) Act 2014

- **Clause 69 & 70 – Amendment of long title and main purpose**

The purpose of the Act is not just to manage CSG-induced subsidence but also to mitigate it in areas where priority agricultural land uses occur. This is clearly stated on page 3 of the Explanatory Notes:

“The subsidence management framework will ensure that CSG-induced subsidence is managed and mitigated in areas where priority agricultural land uses occur and will support coexistence between the resources and agricultural sectors. This will facilitate sustainable prosperity for regional communities, ensuring food security and affordability and export earning potential, and allow the sustainable development of the State’s CSG resources. In doing so, it will build upon the resource sector’s environmental, social and governance (ESG) credentials by enhancing the sector’s social licence.”

Therefore, the long title and main purpose, and any other related section within the Act, should be amended to read **“to manage and mitigate the impacts of CSG-induced subsidence”**.

Farm Field Assessments (FFA)

We are totally opposed to Farm Field Assessments being carried out by the responsible tenure holder (RTH), who has a material financial conflict of interest in carrying out this role. Farm field assessments must be carried out by a suitably qualified, independent entity.

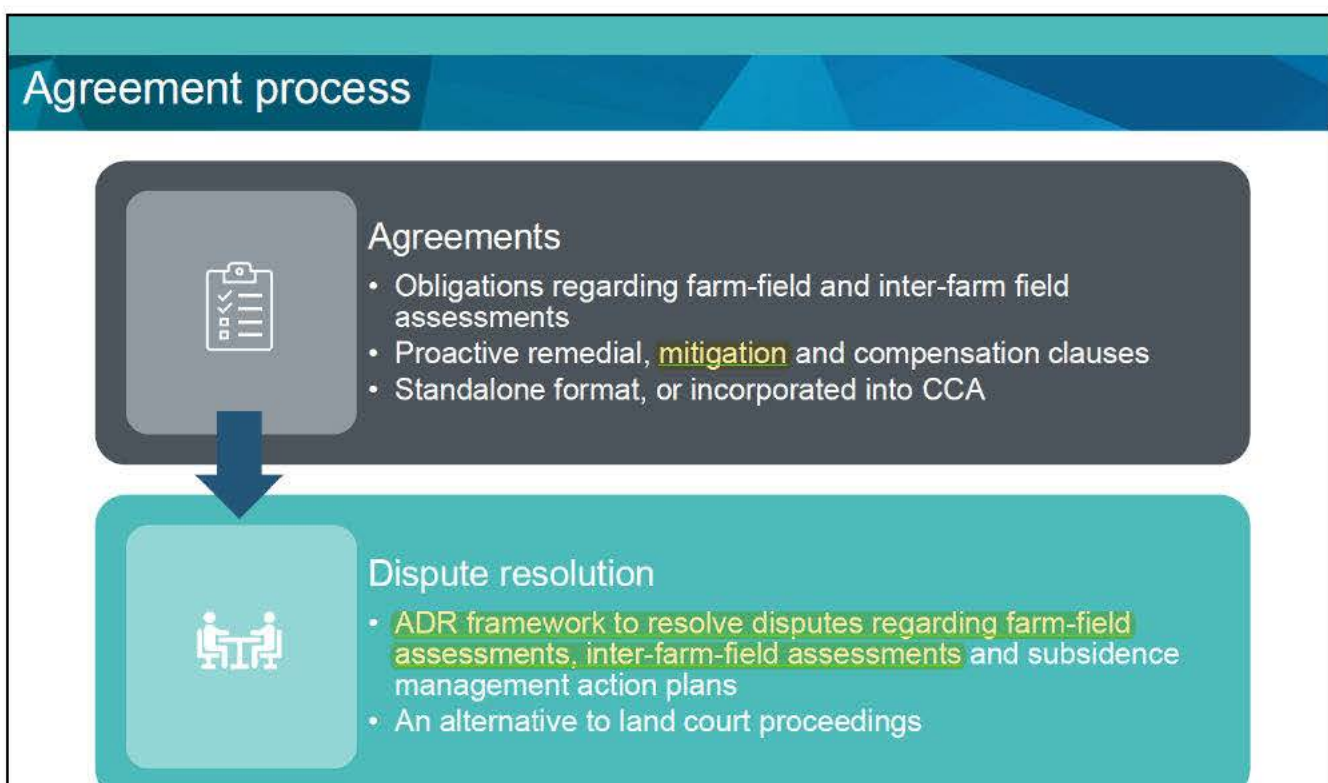
The proposed *independent third-party auditor* must be able to consult with the landholder to verify the veracity of the information supplied by the relevant holder.

The landholder must be compensated for reasonable third-party expert and legal advice they wish to seek in reviewing the FFA and auditor report.

If the outcome of the FFA and auditor report is low or nil current or predicted consequence, but the landholder (and their consulted experts) believes this not to be the case, then there needs to be a review capacity with ADR provisions.

If the outcome of the FFA and auditor report is more than low current or predicted consequence, then **mitigation measures**, as well as remedial actions, are to be developed in the subsidence management plan.

The aspect of *mitigation measures* and *ADR provisions* to resolve disputes regarding farm-field assessments and inter-farm drainage assessment outcomes was included in the consultation papers/presentations but appears to be missing from the Bill.



An extract from the initial presentation slides presented to stakeholders on 5th October 2023

Recommendation

It is essential that a review mechanism and ADR provisions are available for any disputes regarding the outcome of a FFA report.

Recommendation

Mitigation measures, as well as remedial measures must form part of the Subsidence Management Plan.

Subsidence Management Plan (SMP) and Subsidence Compensation Agreement (SCA)

In line with the above, the second consultation presentation we received in February 2024, only talked of triggers for remedial actions under the Subsidence Management Plan and omitted mitigation measures to manage consequences.

Mitigation measures are paramount. A SMP and SCA without them is totally unacceptable.

If a SMP is triggered, it is reasonable to deduce that the activity is likely, or has the potential, to cause impact and subsequently render the activity **advanced** in nature. This in turn would trigger the statutory requirement for a Conduct and Compensation Agreement (CCA) to be negotiated with the landholder as per section 43 of the MERCP Act. It would make sense to use the well-established CCA framework for SMP-triggered situations and retain the proposed SCA for off-tenure situations, which fall outside of the CCA framework.

The proposed Subsidence Compensation Agreement states that general liability to compensate for CSG-induced subsidence applies if/when current or predicted consequence triggers the general liability to compensate a subsidence claimant. More detail is required on how this trigger may be established before we can make comment on its suitability.

Also, of concern, is the term “**may** incorporate future liability”. It goes without saying that the obligation to assure future liability is essential.

The SCA only caters for compensation if/when the impacts have occurred. As mentioned above, it unacceptable that the farmer should be burdened with such risk with no upfront security bond. As with the majority of CSG compensation arrangements, the onus of proof will rest with the landholder or injured party, including the triggering of the proposed SCA. Arrow have demonstrated this handsomely in their current dealings with landholders currently being impacted by CSG-induced subsidence, where they continue to deny either responsibility or impact, and it remains the farmer’s unfair imposition to try and prove general liability to compensate.

There must be provision for upfront financial assurance in the form of a security bond, in the form of the property value paid by the RTH, to be held in trust by the State Government, similar to the existing Residual Risk provisions held by the State for potential environmental harm and the risk of default on rehabilitation duties. Failing this, the State Government should guarantee/under-write liability through a formal legislated mechanism for any future damage that occurs to landholders, their properties and their businesses resultant of CSG-induced subsidence.

Critical Consequences

The Critical Consequences proposed provide for individual based considerations. As mentioned above, it should be complimented by Regional Risk Assessments that incorporate critical consequence considerations and appropriate mitigation measures for regional scale impacts.

To that proposed, a landholder's inability, or uncertainty, in being able to enact future property improvement and business management plans, brought about by the advent of CSG-induced subsidence must also be factored in. This may be impediments already incurred or the operational uncertainty brought about by future predicted subsidence. An example would be forward plans to install bankless irrigation that become stalled or unfeasible due to the unquantified extent and timing of current or predicted subsidence.

As a whole, we are concerned that the review of critical consequences is to be left to the discretion of the Minister for Resources. As mentioned above, the interests of the Resources Department and by association, the Minister, rests with the resource sector. What is more, they do not possess the agronomic expertise to be able to evaluate the veracity of impacts on agricultural land, agricultural infrastructure and agricultural productive capacity. Due to where interests lie and the lack of suitable expertise, it is not appropriate that they should be responsible for evaluating critical consequences of damage to agricultural land; of impacts on farming operations and/or agricultural infrastructure; and of the magnitude of economic cost, damage or loss to any person. We feel that as these are industry impacts imposed on the agricultural sector, any critical consequence considerations of the impacts to agriculture, will be best served by the Department of Agriculture and its respective Minister.

Conclusion

The Subsidence Management Framework with the Merola Bill forms part of a suite of legislative reforms designed to facilitate gas development regardless of the risks to the ongoing productive capacity of our best agricultural lands.

Knowing what has been proposed in the legislative reforms to the RPI Act, whereby they proposed to remove the assessment of subsidence from the Act entirely, on the basis that there would be duplication with the proposed SMF, and a potential severe weakening of assessment criteria and impact definitions, it is clear to see where the Government is headed with these reforms.

It is well understood, from the limited regional interest development applications (RIDAs) that are being assessed, that the RPI Act, when applied, is actually working as intended, that is to protect our best agricultural land from widespread and irreversible impacts. Shell and PetroChina's Arrow Energy, to whom this most relates as they have the most productive and vulnerable agricultural land under their tenure, including the invaluable Condamine Alluvium, detests this barrier. They know, that as they approach development in the east of their tenure, over the heart of the Condamine Alluvial Floodplain, where landholder opposition is strong and unwavering due to the known and likely risks coming their way, that the RPI Act will be a significant barrier to their risk-prone advancement.

It would appear from the suite of reforms that have so far been proposed, consisting of the following discussion papers:

- [The Coexistence Institutions and CSG-Induced Subsidence Management Framework](#), and
- [Proposed amendments to the Regional Planning Interests Act 2014](#)

That the Queensland Government are working to remove this barrier and facilitate gas development across sacrosanct and scarce prime agricultural land regardless of the risks to the ongoing productive capacity of our best cropping lands and to the groundwater that sustains it.

I envisage that landholders will be forced down the Subsidence Management Framework to negotiate and sign Subsidence Management Plans and Subsidence Compensation Agreements within designated timeframes allotted. It is greatly incentivised by the fears and the financial risks of Land Court, that these will be arranged through the Conference or ADR process, rendering them 'voluntary agreements'.

As there are no designated timeframes allotted to the RPI Act processes, these SMPs and SCAs can come first and will then be applied as 'voluntary agreements' under the newly proposed section 22 *Self-assessable Code* under the RPI Act. With the severely weakened eligibility criteria and impact definitions applied, this will become a tick and flick exercise to Arrow's expansion across the most fertile and productive soils of the Downs, including expansion in existing vulnerable areas, without appropriate regional and farm scale risk assessment, regardless of the inherent risks involved. Arrow's advancement across the Darling Downs will be a fait accompli with the RPI Act sitting redundant on a shelf while the SMF becomes the new go to regulatory authority under the watchful gaze of the department who has the gas industry's vested interests in their sights.

I do not joke. There are powers and influences within government that are navigating this as we speak. I just hope that I can be proved wrong.

If not, sustainable agriculture, long-term food security, critical water security, environmental values and climate goals are to be the sacrificial lamb to the profits of the fossil fuel giants.

A policy direction that contravenes many moral and legal principles which are embedded in many aspects of Queensland Law, as described at Chapter 4 above.

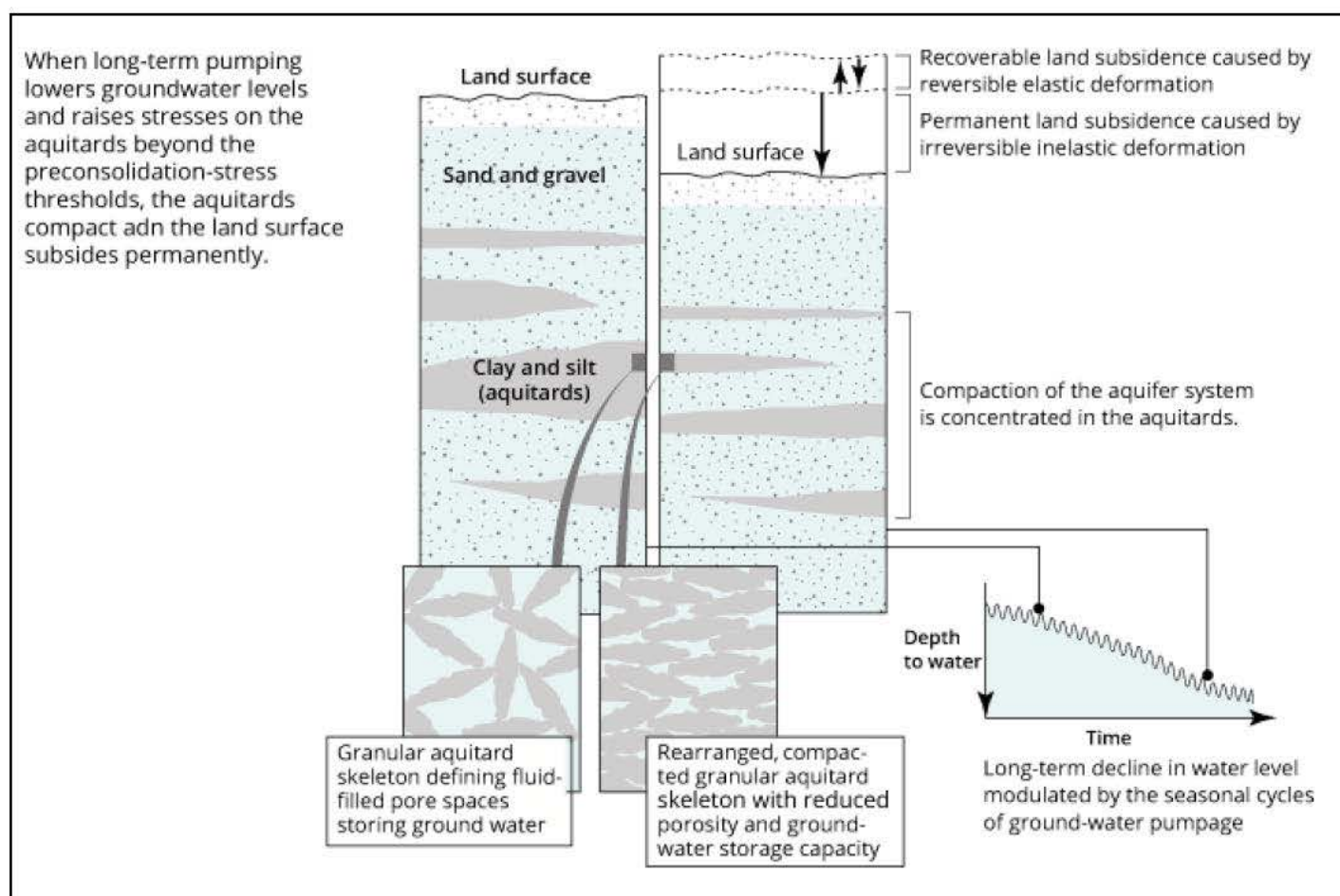
The timer on the future sustainability of agriculture in Queensland is ticking.....

Appendix: CSG-Induced Subsidence

Subsidence - Cause

In basic terms, subsidence is caused by the fluid (water and gas) extraction from the subsurface and the subsequent change in effective stress which causes compaction of the rock formation, translating to subsidence at the ground surface:

“At any point below the ground surface, the weight of overlying strata is supported partly by water pressure and partly by the fabric of the rock mass. Any reduction in water pressure therefore results in an increased proportion of the load being carried by the rock mass, leading to compression of the rock. This is known as an increase in effective stress. The combined compression over the thickness of rock strata affected by reduced water pressure results in subsidence at the ground surface.”²⁵



Extract from Arrow Energy presentation slides to the Arrow Surat Community Reference Group – March 2020²⁶

²⁵ Arrow Energy Pty Ltd, Surat Gas Project - Subsidence monitoring and prediction, 754-MELENP268280-AA 10 December 2021

²⁶ https://www.arrowenergy.com.au/__data/assets/pdf_file/0005/32909/ASCRG-Presentation-March-2020.pdf

Prior to CSG development occurring, water pressure in the coal seams is holding the gas adsorbed to the coal matrix. In order to release the gas, water is extracted so that adequate depressurisation is achieved for the gas to mobilise.

Subsidence is caused consequent upon the right of proponents to take an unlimited amount of water from the Walloon Coal Measures (part of the Great Artesian Basin), under section 185 of the *Petroleum and Gas (Production and Safety) Act 2004* under an authorised activity.

Part 4 Water rights for petroleum tenures

185 Underground water rights—general

(1) The holder of a petroleum tenure may take or interfere with underground water in the area of the tenure if the taking or interference happens during the course of, or results from, the carrying out of another authorised activity for the tenure.

Examples—

- underground water necessarily or unavoidably taken during the drilling of a petroleum well or water observation bore
- underground water necessarily or unavoidably taken during testing for petroleum production or petroleum production authorised under section 32 or 109

(2) The rights under subsection (1)—

(a) are the *underground water rights* for the petroleum tenure; and

(b) are subject to the tenure holder complying with the holder’s underground water obligations.

Page 194Current as at 26 April 2024

Authorised by the Parliamentary Counsel

Petroleum and Gas (Production and Safety) Act 2004
Chapter 2 Petroleum tenures and related matters
[s 186]

(3) There is no limit to the volume of water that may be taken under the underground water rights.

(4) Underground water taken or interfered with, under subsection (1), from a petroleum well is *associated water*.

(5) The tenure holder may use associated water for any purpose and within or outside the area of the tenure.

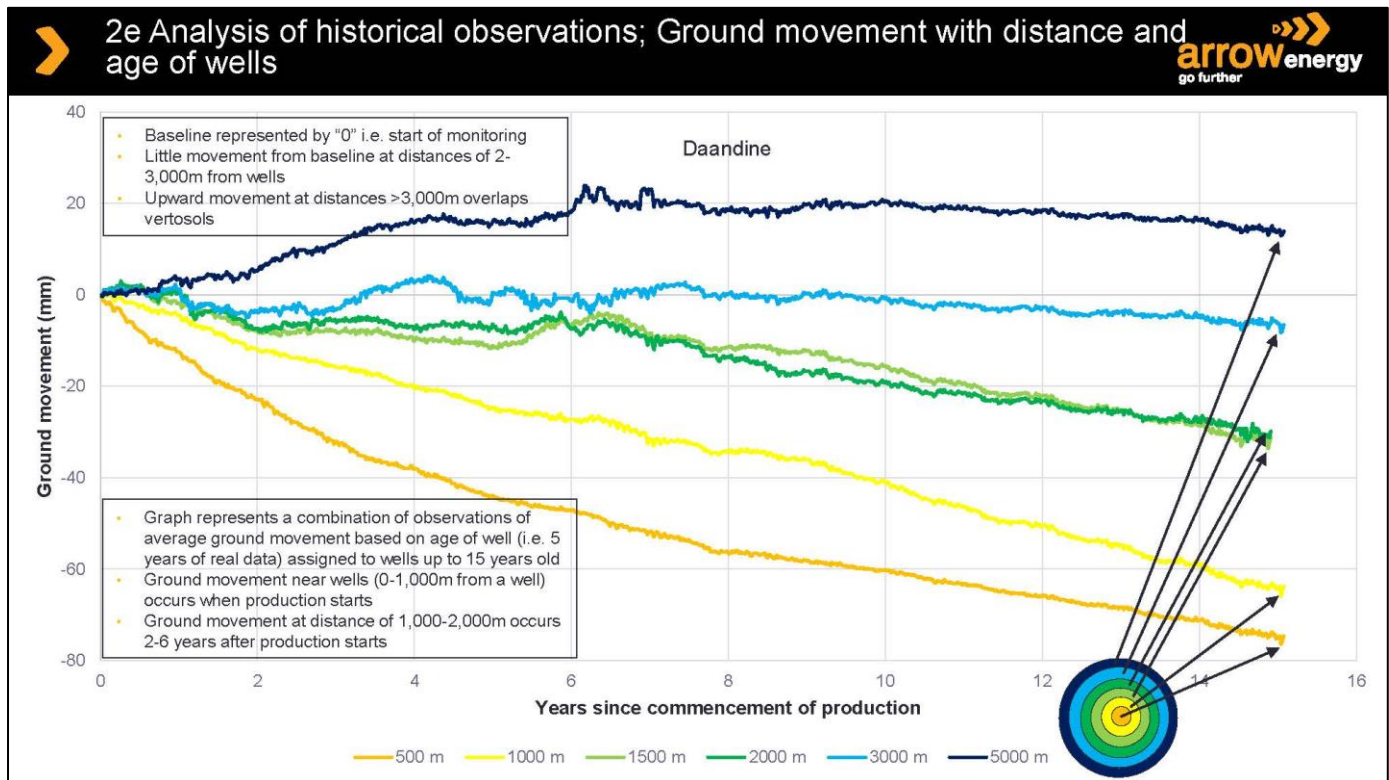
(6) In this section—

another authorised activity, for the petroleum tenure, means an authorised activity for the tenure under part 1, division 1 or part 2, division 1.

CSG-induced subsidence has far-reaching effects and cannot be isolated to one farm field or property, it adheres to no anthropogenic surface boundaries. The effects of CSG depressurisation may be felt up to 10km from the extraction point:

“Depressurisation of coal seams from a single well creates a cone of groundwater pressure decline – also referred to as ‘cone of depression’ (refer to section 7.2 for definition) that extends radially away from the well over time – typically to about 10 km within 2–3 years of production in the Surat Basin if there is no interference from nearby wells.”²⁷

As can be seen from the below analysis of historical ground movement observations, CSG-induced subsidence is most apparent up to 2km from the well head. But is noticeable at even 3km from the well head.



Extract from Arrow Energy Duleen-Kupunn AWP presentation slides²⁸

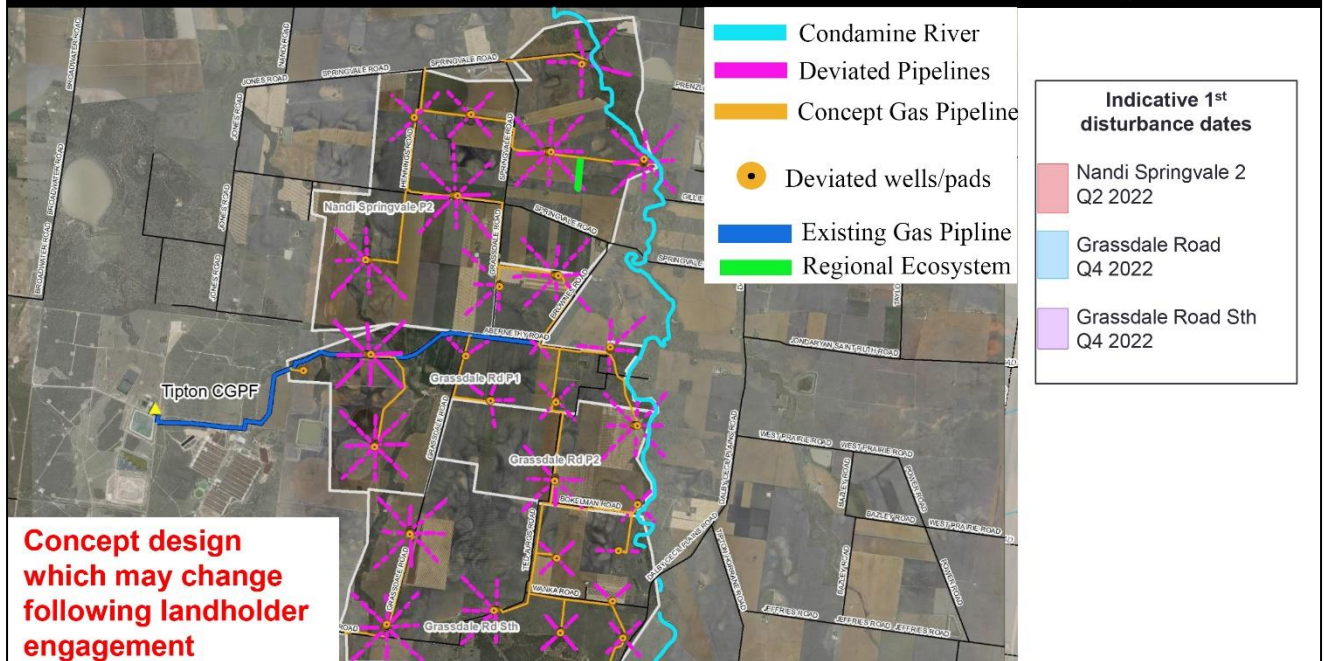
However, it must be noted that the above analysis is based on the Daandine gasfield which is predominantly single vertical wells. Whereas, deviated or directional multi wells are more predominant on the Condamine Floodplain, and are the planned and preferred well type where depths allow. Up to 8 deviated wells, also known as horizontal wells, can be located on a single well pad, where each well is drilled vertically and then deviates out horizontally, up to a distance of 1500m underground from the well pad, in a spider like effect.

The following diagram of planned development in the Springvale and Grassdale areas shows the extent of deviated well pads planned across one area.

²⁷ Underground Water Impact Report for the Surat Cumulative Management Area 2021, OGIA – p100
https://www.rdmw.qld.gov.au/_data/assets/pdf_file/0008/1584728/uwir-2021-report.pdf

²⁸ https://www.arrowenergy.com.au/_data/assets/pdf_file/0004/33079/Surat-Gas-Project-Area-wide-planning-update-14-May-2021.pdf

Springvale and Grassdale development areas



Deviated (horizontal) drilling is likely to cause a higher degree of CSG-induced subsidence as opposed to vertical drilling due to the larger surface area in contact with the coal seam, with varying and enlarged subsidence patterns compared with vertical wells:

“a horizontal well allows higher rates of production due to its large surface area in contact with the coal seam (assuming the same volume of coal in both cases). Therefore, a horizontal well will tend to reach the maximum settlement early. However, different shapes of the subsidence bowl could be expected. An enlarged subsidence bowl, symmetric about the horizontal well axis, similar to the one observed in tunnels, could be expected in horizontal wells (see Figure 6) compared to the axisymmetric type of bowl that is commonly observed in conventional vertical wells.”²⁹

²⁹ Subsidence: An overview of causes, risks and future developments for coal seam gas production, Jubert A. Pineda and Daichao Sheng, July 2013 – p40

Therefore, the onset of subsidence will likely be more rapid and severe in the case of horizontal multi-directional wells:

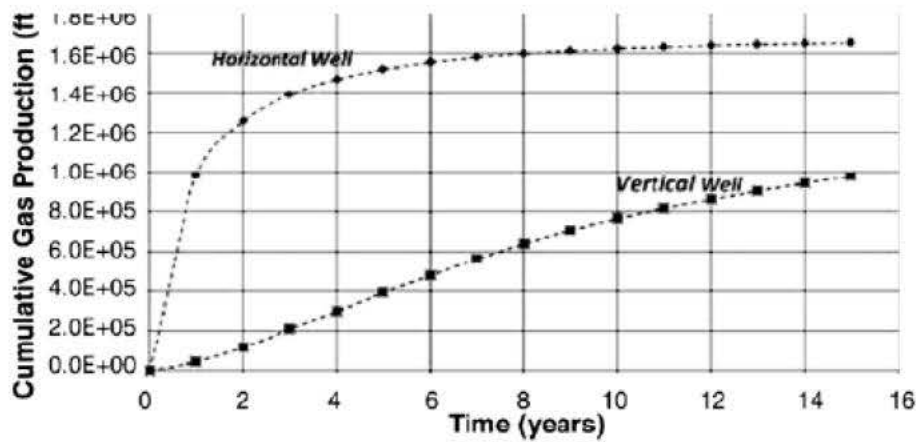


Figure 22. Cumulative gas production in vertical and horizontal wells (from Maricic et al, 2008)

Extract from 'Subsidence: An overview of causes, risks and future developments for coal seam gas production, Jubert A. Pineda and Daichao Sheng, July 2013'

*"The adoption of multiple wells, in both vertical and horizontal configurations, will enlarge the volume of soil prone to settlement. Thus, the impacts on natural resources, such as aquifers and rivers, as well as infrastructure will increase. A complex and possibly non-symmetrical subsidence bowl could be expected if multiple wells are involved."*³⁰

*"It is expected that multiple wells will enhance and complicate the subsidence bowl in both cases."*³¹

All in all, the Condamine Alluvial Floodplain faces some of the most extensive, far-reaching and varied subsidence due to shallow coal depths, geological characteristics and the preference for horizontal multi-directional wells, all while occurring on farmland which is undeniably the most vulnerable to CSG-induced subsidence within the Surat Basin.

Subsidence - Consequences

Subsidence poses a considerable threat to farming operations and crop productivity on the slope-dependent Condamine Floodplain, where effective drainage is critical.

The Gasfields Commission Queensland (GFCQ) in their report '[Potential consequences of CSG-induced subsidence for farming operations on the Condamine alluvial floodplain](#)' acknowledged that, unlike

³⁰ Subsidence: An overview of causes, risks and future developments for coal seam gas production, Jubert A. Pineda and Daichao Sheng, July 2013 – p41

³¹ Subsidence: An overview of causes, risks and future developments for coal seam gas production, Jubert A. Pineda and Daichao Sheng, July 2013 – p50

the swell-shrinkage properties of soil which are temporary and manageable, **CSG-induced subsidence is permanent**.³² They also confirmed that if effective drainage is impaired through landform change resulting from CSG-induced subsidence **there will be some (potentially high) reduction of productivity**.³³

Many of our farms have been intensively developed over time with laser levelling to improve effective drainage, to ensure the optimal application of flood irrigation water and to enhance water use efficiencies, including the return of irrigation tail water to water storages via return drains where a consistent gradient is critical, and designing our farms to ensure the first flush of any contaminated agricultural run-off remains on farm and does not enter water ways.

While laser-levelling is utilised to achieve the above-mentioned goals, it is usually only required once, at the initial development stages. Apart from the occasional touch-up work that may be required in order to fix patches of occasional floodwater erosion. Laser-levelling is kept to a minimum due to the considerable financial cost and the compaction issues it causes to farm fields, as explained below.

Some of the consequences of CSG-induced subsidence on very flat, intensively farmed prime agricultural land include the following:

Drainage:

As depressions form, water is unable to effectively drain from an area and will sit in the depression. If a crop is present in the subsided area, it will suffer from waterlogging as explained in the following section.

While this photo is not from a CSG development area, it demonstrates the severe effects of damaged crops due to waterlogging – a likely consequence of CSG-induced subsidence:



³² GFCQ Potential consequences of CSG-induced subsidence for farming operations on the Condamine alluvial floodplain – Final Report, July 2023 – p7

³³ GFCQ Potential consequences of CSG-induced subsidence for farming operations on the Condamine alluvial floodplain – Final Report, July 2023 – p20

Ineffective application of irrigation water:

Flood furrows are developed to ensure a consistent grade across the paddock so that applied irrigation water will travel consistently down the furrow and uniformly wet the crop line.



If subsidence depressions form within the paddock, the irrigation water will not flow uniformly across the paddock and will sit in the depression resulting in areas which do not get watered. In the dry, unwatered areas, the crop will suffer and result in considerably reduced crop yields. Where the water sits for a prolonged duration in the depressions, this will cause waterlogging effects on the crop health, as detailed below, and again will lead to a reduced crop yield.

Waterlogging results in crop losses or yield decline:

Our soil is a heavy black clay vertosol³⁴ which has an immense water holding capacity. This is great for retaining moisture for the growth of crops. However, when it comes to CSG-induced subsidence and the forming of depressions in paddocks, it means that water will sit for prolonged periods in the depressions compared with sandier loamy soils, where deep drainage occurs much quicker. Water sitting in the depressions on black clay soil will be subject to slow drainage and slow evaporation.

Impacts of waterlogging include:

- Missed planting crop opportunities due to inaccessibility of the waterlogged subsided areas/paddocks
- Inability to harvest crops in waterlogged areas

³⁴ <https://www.qld.gov.au/environment/land/management/soil/soil-testing/types>

- Weed/pest/fungicide disease pressures and not being able to address these issues due to inaccessibility of the subsided waterlogged areas/paddocks by machinery, spray coupe etc
- General inability to fulfil weed/pest/fungicide management program
- Waterlogging lowers oxygen levels in the root zone, which reduces plant growth.
- Waterlogging or inundation of the seedbed affects germinating seeds and young seedlings more than mature plants. Earlier-sown crops that have emerged and are well established can tolerate waterlogging more than plants that are emerging during waterlogged conditions.
- Waterlogging causes root-tip death within days. Loss of root tips limits the uptake of nutrients (particularly nitrogen) and water after waterlogging. As a result, plants that have been waterlogged ripen early and grain is often pinched.
- Nitrogen is lost from waterlogged soils by leaching and denitrification – the process where nitrogen is converted to gaseous oxides of nitrogen.³⁵ This loss of nitrogen is damaging to crop growth, strength, vigour & yield. What’s more, the subsequent emissions of nitrous oxide (N₂O) – a major greenhouse gas - is detrimental to the atmosphere, hence bad for our planet and worsens a farming business’s carbon footprint.
- Denitrification leads to a loss of soil fertility³⁶
- Shallow rooting systems formed in waterlogged areas, which then in drier times are unable to obtain sufficient moisture to maintain full growth.

Pondage causes an increase to soil compaction which harms soil structure. Good soil structure is important for the movement of water, gases and roots, which are critical for healthy soil. Compacted soils lack good soil structure as the air spaces that are essential in the movement of water, gases and plant roots are compressed.

“Waterlogging - When the soil is at or near field capacity, micropores in the soil are full of water and the macropores allow for the movement of oxygen.

When a soil is above field capacity, the macropores fill with water and the soil is depleted of oxygen. When this happens, plant roots cannot get oxygen from the soil and microbial activity slows. Over a prolonged period, plants eventually die.

Also, without oxygen in the soil, nitrogen breaks down and is lost as gas in a process called denitrification. This can cause a decline in soil fertility.”³⁷

This more detailed explanation from [N-Drip](#) explains some of the severe impacts on cotton crop production in waterlogging situations:

“Vertosol is one of the most common soil types in the Queensland region. The soil ranges from brown to black and tends to crack open when dry and swell when wet.

Vertosol has a high water holding capacity, is very fertile, and can supply crops with nutrients over time.

³⁵ <https://www.qld.gov.au/environment/land/management/soil/soil-testing/soil-terms>

³⁶ <https://www.qld.gov.au/environment/land/management/soil/soil-properties/fertility>

³⁷ <https://www.qld.gov.au/environment/land/management/soil/soil-properties/water>

Initial water infiltration into Vertosol is rapid and fast due to shrinkage and cracks of the soil when dry. However, when the cracks disappear due to wetting, water infiltration becomes extremely slow, and waterlogging can occur.

Waterlogging is the saturation of soil with water. *i.e.*, soil pores, which are the spaces between soil particles, are filled with water. Gases diffuse slowly in solution, and so waterlogging reduces oxygen (O₂) concentration while increases Carbon-dioxide (CO₂) concentrations in the soil.

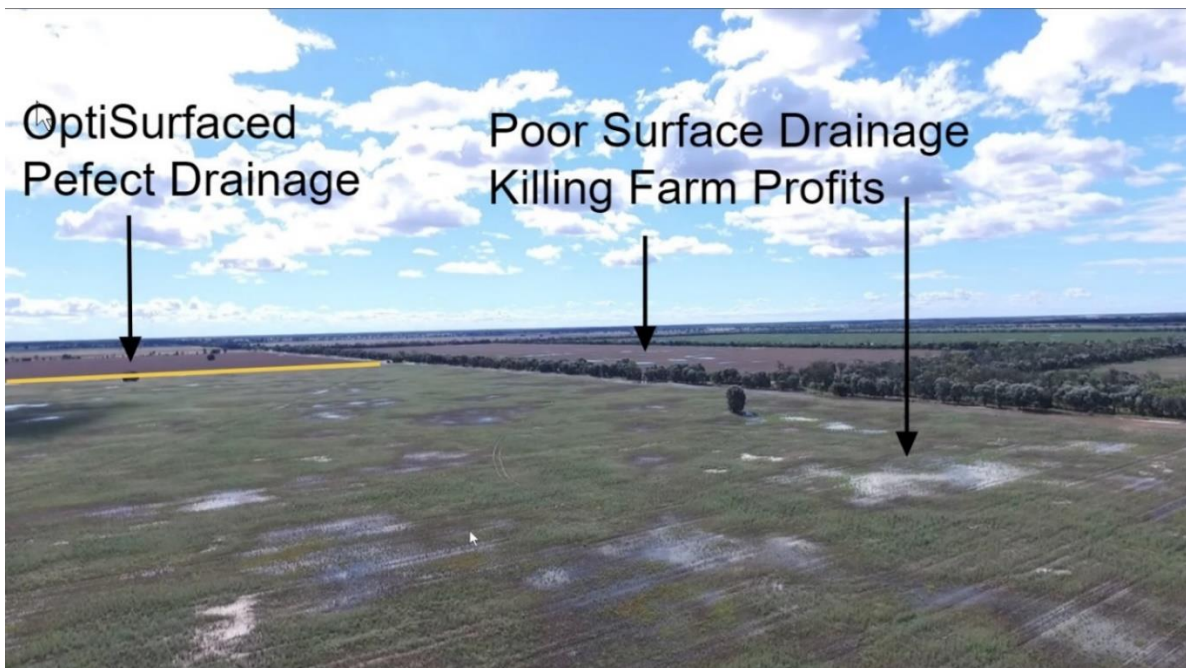
Since plant roots need oxygen for respiration, waterlogging consequences for plants may include reduced or ceased growth, death of root apices, and changes in nutrient accumulation (Dodd et al., 2013). In addition, waterlogging increases soil salinity and can cause transient toxicity of soil nutrients that are typically safe when the soil is drained, such as iron, manganese, and even nitrogen.

In cotton crops, the immediate effects of various waterlogging periods on the plant are extreme. Exposure of cotton plants to 3 hour waterlogging results in complete death of terminal apices of roots (Huck, 1970) and impedes energy generation due to the lack of oxygen.

Since the uptake of mineral nutrients depends on energy production in the roots, waterlogging inhibits the uptake of macro-nutrients (N-P-K), especially during peak flowering (McLeod, 2001; Milroy et al., 2009).

Waterlogging affects the vegetative growth and yield of cotton depending on the cumulative time it is subjected to it. Wu *et al.* (2012) observed a 27–30 % yield reduction after 4–9 days of waterlogging, while ten-day waterlogging caused a 42% yield reduction (Jiang et al., 2013). These yield losses are more significant when waterlogging happens during the early stages (Bange et al., 2004)."

These photo from [OptiSurface](#), a leading farm earthworks solutions specialist, visually demonstrate the benefits of having consistent grades for optimal drainage as opposed to water-logged depressions:





Just a 50mm difference in ground height can mean the difference between a bumper crop and no crop:



Remediation through laser levelling comes with a multitude of issues:

- Laser levelling comes at a huge financial cost
- There are only a limited number of earth-moving contractors on the Downs with the required skill set to work on these issues. They are already in short supply and this will only increase exponentially as subsidence occurs across the Floodplain.
- Where is the dirt to be obtained to fill in the depressions?
 - a. You cannot bring dirt into an area without causing an impact in the retrieved area
 - b. If based on cut and fill process from within one paddock, the whole paddock will reduce in elevation compared with the surrounding land, potentially creating a low area on one's farm where water will naturally flow towards
 - c. You cannot effectively introduce soil from an outside area due to the incompatibility of soils and potential lower grade of external soils
- Extreme management difficulties as the subsidence doesn't happen all at once in the first couple of years, it is ongoing and the length of time is unquantified. Therefore, do you attempt to rectify it on a regular basis as the subsidence progresses (every 1-2 years), or wait for years until it's plateaued and suffer the consequences in the meantime?
- It could lead to having to redesign whole farm/paddock layouts if a change in slope occurs or the overall elevation within rectified subsided paddocks change (see (b) above).
- The practice of laser levelling and its aftermath comes with many issues/impacts:
 - a. Crop losses/yield decline due to compacted soils. Compaction results in reduced porosity, preventing water from accessing the root zone. The effects of compacted soils can be witnessed in reduced crop yields for a number of seasons following the laser levelling event
 - b. The uneven distribution of Nitrogen and other nutrients following laser levelling
 - c. The potential for sodic or saline subsoils to be exposed in the laser levelling process which could lead to long lasting low production effects
 - d. Loss of moisture retaining stubble cover
 - e. Loss of biomass (carbon sequestration) from lost stubble cover
 - f. Missed crop opportunities while laser levelling remediation work is carried out

"Good soil structure is important for the movement of water, gases and roots, which are all critical for a healthy soil. Compacted soils lack good soil structure as the air spaces that are essential in the movement of water, gases and plant roots are compressed."³⁸

Subsidence risks impacts on surface water flows including:

- Changing the natural flow of the water across the floodplain, around which our farms have been designed
- Changing the natural flow of the water and potentially reducing flows to ecological systems (GDEs) which rely upon existing flows and quantities of water available

³⁸ <https://www.qld.gov.au/environment/land/management/soil/soil-health/compaction>

- Resulting in potential overland flow (OLF) losses (for irrigators) from the change in natural water flow direction and subsequent missed crop opportunities from the loss in OLF water available
- A change in slope may change the velocity of surface water flows leading to erosion
- A change in slope may change the velocity of surface water flows leading to sediment deposition

Subsidence could have far-reaching impacts to farm infrastructure including:

- Costs to repair potentially impacted farm infrastructure e.g. leaking/seeping storage dams or worst-case scenario dam failure
- Loss of water from seeping/failed dams
- Subsequent lost crop opportunities due to lack of water from subsidence induced seeping/failed dams
- Making the slope in channels and return drains ineffective
- Causing stress/strain on underground polypipe water supply networks which could lead to pipe joint failure

Consumption of valuable time:

- Landholders' time working on issues and compensation claims, time taken away from their families and running their businesses

Mental Health Impacts:

- Significant Mental Health concerns in dealing with the consequences and having to negotiate with resource companies in what will likely be an extremely stressful period

Not only does subsidence risk permanent and irreversible impacts to prime agricultural farms and their infrastructure, resulting in potentially high yield and economic losses as outlined above, it can also have less apparent but devastating effects on our shared environmental assets.

Subsidence has the potential to change overland flow pathways, around which our farms have been designed and developed. A loss or increase in overland flow could be extremely impactful to the profitability and productivity of farming businesses. Any changes to overland flow pathways will affect river catchments alike with a risk of increased erosion and gully formations.

“However, consequences of subsidence and small changes to land surface topography in the study region could be important in terms of changing overland flow patterns, which may increase erosion and gully formation.”³⁹

³⁹ Assessment of impacts of the proposed coal seam gas operations on surface and groundwater systems in the Murray-Darling Basin, Moran & Vinks, UQ (2010) – p46

Subsurface compaction may result in the deformation of overlying or underlying aquifers. This deformation could result in the opening of new or existing fractures which would change the hydraulic relationships and risks changing groundwater flows between aquifers.

“In addition, proponents did not consider whether compaction of coal seams in the Walloon Coal Measures after dewatering might result in deformation of overlying or underlying aquifers or confining units. This deformation may result in opening of new or existing fractures in these units which would change the hydraulic relationships and may change groundwater flows between aquifers.”⁴⁰

There is a very concerning risk, particular to our region, that the propagation of dewatering effects in the immediately underlying target coal seams may lead to direct settlement in the unconsolidated sediments of overlying alluvial systems like the Condamine Alluvium.

“Primary subsidence issues remain associated with shallow groundwater extraction in largely unconsolidated and clay-rich sediments. There may be a concern in Australia in areas where shallow coal seam targets immediately underlie alluvial systems, such as the Condamine Alluvium in Queensland. In this situation, propagation of dewatering effects may lead to direct settlement in the unconsolidated sediments.”⁴¹

The Independent Expert Scientific Committee (IESC) has highlighted that there is a greater risk of settlement or compaction of overlying aquifers or alluviums which directly overlie the target coal seams, such as in the case of the Condamine Alluvium, and especially where the intervening material is thin or absent.

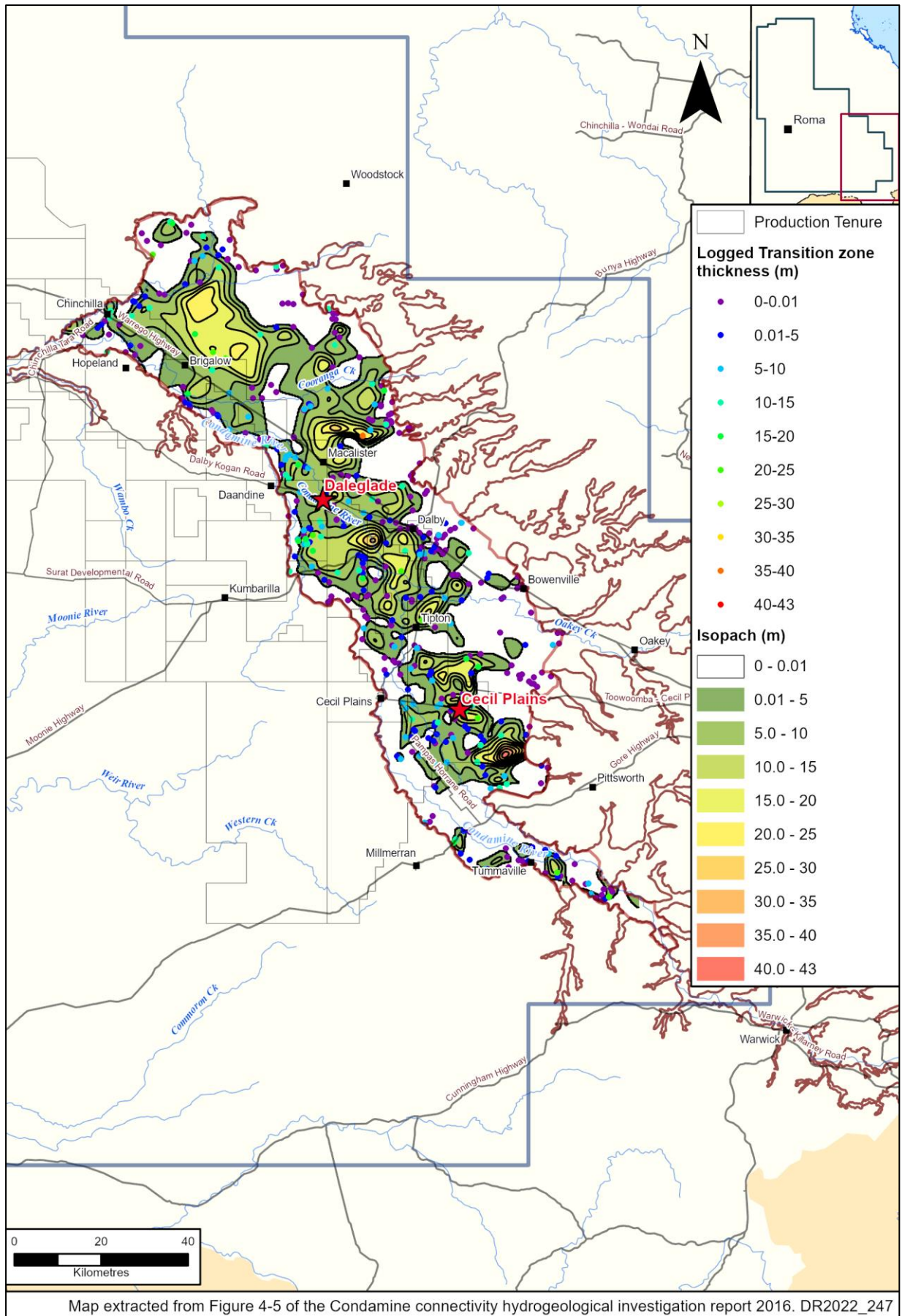
“A greater hydraulic risk exists where intervening material is absent due to a geological unconformity or where aquifers directly overlie or underlie the coal seam, such as in the Condamine alluvium in central Queensland (Hillier 2010; Moran & Vink 2010). A higher risk of connectivity results in a greater potential for settlement as a greater thickness of materials will be impacted and potentially compressed. Less connected systems are likely to be more competent and hence exhibit less total settlement.”⁴²

From the following Isopach map, which shows the thickness of the intervening layer (known as the *transition zone*) between the Condamine Alluvium and the Walloon Coal Measures, it is clear to see that the transition zone separating the two formations is thin or absent across large swaths of the Condamine Alluvium extent and therefore subject to a greater risk of hydraulic connectivity and a subsequent greater potential for settlement within the overlying Alluvium.

⁴⁰ Assessment of impacts of the proposed coal seam gas operations on surface and groundwater systems in the Murray-Darling Basin, Moran & Vinks, UQ (2010) – p46

⁴¹ Background Review: Subsidence from coal seam gas extraction in Australia, IESC, 2014 – p49

⁴² Background Review: Subsidence from coal seam gas extraction in Australia, IESC, 2014 – p30



In fact, 40% of the Alluvium has a transition zone thickness of less than 5 metres:

Table 4-1 Modelled transition zone thickness

Thickness of transition zone (metres)	Modelled coverage of area (%)
<5	40
5–10	31
10–15	15
15–20	9
>20	4

Extract from 'Groundwater Connectivity between the Condamine Alluvium and the Walloon Coal Measures: A hydrogeological investigation report, OGIA, August 2016'

CDIL is understandably highly concerned about the future integrity of the Condamine Alluvium. If compaction (settlement) resultant from CSG mining were to occur in the Alluvium, it would be irreversible, permanently reducing its storage capacity.

"compaction of the aquifer system, may permanently decrease its capacity to store water. Even if water levels rose, compacted sediments would remain as-is; most compaction that occurs as a result of historically low groundwater levels is irreversible"⁴³

Once the Alluvium's storage capacity is lost, it is lost forever.

CSG-induced subsidence not only risks significant impacts and consequences to farm land, farm production, farm profitability, farm viability and the mental health of farmers and their families, but it also represents significant risks to regional environmental values such as groundwater and surface water resources.

Subsidence – Scientific Uncertainty

Subsidence, or reservoir compaction, is a relatively novel field of research, with much still to be learnt.

As explained above, it is caused primarily by the removal of gas and water (fluid extraction) from the coal seams. However, it is a highly complicated process due to the numerous varying geological factors that contribute to its occurrence, characterisation and magnitude, rendering predictions to be the subject of a large degree of uncertainty:

"Subsidence is the manifestation of subsurface compaction driven by fluid extraction and the resultant interaction of the remaining fluid and porous solid. Consequently, predictions of

⁴³ https://www.arrowenergy.com.au/__data/assets/pdf_file/0005/32909/ASCRG-Presentation-March-2020.pdf

*subsidence (or uplift) require an approach that considers both of these coupled processes (i.e. fluid dynamics and solid mechanics). By extension, the quality of subsidence predictions is heavily dependent on the quality of predictions of water (and in the context of CSG production, gas) flow in the subsurface. The geomechanical response of a compressible formation depends on the geological characteristics of the in-situ rock and the tectonic stress environment, which in combination with the pressure and temperature variation profile, defines the stress path controlling elastic and inelastic behaviour. **However, real geometries are large and complex, and the properties required for making predictions are commonly subject to a large degree of uncertainty.***⁴⁴

Despite the Office of Groundwater Impact Assessment's (OGIA) earlier statements that subsidence will be relatively uniform⁴⁵, the IESC has since demonstrated that non-uniform compaction and subsidence is possible:

*“Formation heterogeneity, both in terms of geometry and permeability (i.e. propensity for depressurisation), **can result in non-uniform compaction of a geological unit. At the surface, this can manifest as variation in subsidence as well as net horizontal movement.** Extreme cases of differential surface movement, vertically or horizontally, could induce ground failures such as surface faults and earth fissures (Holzer, 1984).”*⁴⁶

In fact, the heterogeneity or variation is particularly evident in the Walloon Coal Measures of the Surat Basin, upon which our farms sit:

*“In reality, the subsurface is often extremely heterogeneous, but this heterogeneity can be difficult to capture in the models used to predict the pressure changes used in calculations of subsidence. As an example of this, one can consider the **Walloon Coal Measures** (i.e. the target of CSG production in the Surat Basin). It has been noted (e.g. by Cardwell (2018)) that **the coal measures vary significantly between wells at relatively short (e.g. 50 m) spacing**, with entire coal packages appearing or disappearing over this distance. This clearly presents a challenge when trying to create models based on data gathered at a more typical CSG well spacing of 750 m.”*⁴⁷

Compaction and resultant subsidence are of significance in the younger Surat Basin compared with the older sedimentary Bowen Basin due to its higher permeability geological units, where produced water is subsequently greater in the Walloon coal seams compared with those of the Bowen.⁴⁸

As seen from this table taken from Vinks et al: *Scoping Study: Groundwater Impacts of Coal Seam Gas Development – Assessment and Monitoring*, the water content is considerably higher in the Walloon Coal Measures:

⁴⁴ Consultation on IESC Information Guidelines Explanatory Note: Subsidence Associated with Coal Seam Gas Mining, Commonwealth of Australia, 2023 (**IESC CSG Subsidence Explanatory Note**) – p60/105
<https://www.iesc.gov.au/sites/default/files/2023-04/consultation-subsidence-associated-with-csg-mining.pdf>

⁴⁵ Underground Water Impact Report for the Surat Cumulative Management Area 2021, OGIA

⁴⁶ IESC CSG Subsidence Explanatory Note – p28/105

⁴⁷ IESC CSG Subsidence Explanatory Note – p66/105

⁴⁸ IESC CSG Subsidence Explanatory Note – p60/105

Measure	Gas production (Mm ³ /well/year)	Water production (ML/well/year)	Water: Gas production	2P Reserve/area (Mm ³ /km ²)
Bandanna	20.0	64.6	3.2	40
Baralaba	4.3	0.5	0.1	14
Walloons	1.6	36.4	22.7	45
Moranbah	2.8	10.0	3.6	21

49

It is understood that higher initial coal permeability (like that in the Walloons) permits higher gas production and more gas desorption. This in turn results in a greater depleted region around the vicinity of the well-bore and subsequently leads to larger ground subsidence.^{50 51}

In the Surat it can take much longer to reach the target seam pressure (up to months), which could be a proxy for greater compaction associated with production.⁵²

Compaction has a greater probability in sandstones and claystones, therefore despite compaction being expected to be greatest within the dewatered coal seams, the compaction of other formations, and their contribution to subsidence, cannot be discounted.⁵³

Subsidence modelling and predictions is an ongoing area of research and there is still much to learn in regards to the contribution of gas desorption induced coal shrinkage:

“Nevertheless, the total displacement at the ground surface is the sum of all compaction mechanisms occurring within multiple geological units. It is dependent on the magnitude and direction of compression (which are dictated by pressure changes from extraction of associated water and desorption of gas from coal seams), the depth and depth-interval over which compression occurs, and the geomechanical properties of the geological units throughout the entire depth profile. Whilst the desorption-induced shrinkage of coal is well understood at the laboratory scale, including the stress-dependence of the processes at work (Liu et al., 2017), the degree to which this behaviour translates to the reservoir scale in CSG production is an ongoing area of research.”⁵⁴

The evolving nature of this area of research and the level of scientific uncertainty is highlighted by the fact that up until recently, the OGIA were only factoring in the removal of water (depressurisation) in

⁴⁹ Scoping Study: Groundwater Impacts of Coal Seam Gas Development – Assessment and Monitoring; Sue Vink, Nadja Kunz, Damian Barrett, Chris Moran; January 2011; Document reference: P08-010-002.doc – p20

⁵⁰ Numerical simulation of ground surface subsidence due to coal-bed methane extraction, Ayodeji Jayeoba, Durham University, UK, 2020 – p131

⁵¹ A discussion on analytical and numerical modelling of the land subsidence induced by coal seam gas extraction; Guojun Wu, Shanpo Jia, Bailin Wu, Diansen Yang – p9-10

⁵² IESC CSG Subsidence Explanatory Note – p60/105

⁵³ IESC CSG Subsidence Explanatory Note – p60/105

⁵⁴ IESC CSG Subsidence Explanatory Note – p28-29/105

their subsidence modelling⁵⁵. However, it is understood that gas desorption-induced coal shrinkage is likely to contribute up to 70% of the total subsidence extent.⁵⁶

The properties of the localised coal (depth, thickness, porosity, permeability, gas content etc) are needed to be known to be able to determine the potential shrinkage capacity. CDIL understands that there is very limited stratigraphic core hole data from the east of the Horrane Fault. What is more, this area contains the Horrane Trough, which is a half-graben depression, reaching a maximum thickness of approximately 1300m in a subdued depocentre⁵⁷, with unique geological characteristics that has been described as containing Permian sub-basin like properties.⁵⁸

The lack of available data across the proposed CSG development area and therefore the inability to comprehensively and effectively predict CSG-induced subsidence is highlighted by *Coffey Environments Australia* on a number of occasions in their Subsidence Technical Report for Arrow Energy's Surat Gas Project:

*"It should be noted that these assessments do not necessarily represent the encompassing range of settlement, as the linkage between settlement and drawdown **is based upon very limited information**. Other data might provide a different range. The assessments of modulus **are based on limited field records** and the assessment of volume loss due to coal seam gas loss for the coal components of the profile **is based on a single published result which may not reflect the conditions in the Surat. As a result, the settlement predictions carry uncertainty.**"*⁵⁹

*"While the predicted subsidence would not breach the adopted investigation levels **it must be recognised that the assessment is based on limited data and contains significant uncertainty**. The assessment is sensitive to the adopted values of:*

- Modulus of the coal measure rocks.
- Volume loss of coal associated with removal of coal seam gas.
- Predicted groundwater drawdown."⁶⁰

Currently, the true extent of CSG-induced subsidence cannot be established across our region due to the extensive heterogeneity within the Walloon Coal Measures and the lack of available data across the entire prospective CSG development area.

⁵⁵ Exploring the contribution of coal shrinkage to coal seam gas-induced subsidence: A research update paper, OGIA, April 2023

⁵⁶ Hummel N., Rai U.B., Dudley J.W., Schutjens P.M.T.M., Gear I., Sutton H., McKelvey P. – *Unlocking methane desorption effects in reservoir compaction and subsidence computations for coal seam gas development* – featured in 82nd EAGE Annual Conference & Exhibition 2021

⁵⁷ Geology and 3D geological models for Queensland's Surat and southern Bowen basins, OGIA, December 2021

⁵⁸ <https://www.energynewsbulletin.net/archive/news/1050727/investor-profile-arrow-energy-shoot-for-new-surat-basin-play>

⁵⁹ https://www.arrowenergy.com.au/_data/assets/pdf_file/0006/30003/Appendix-K-Subsidence-technical-memorandum.pdf - p29

⁶⁰ https://www.arrowenergy.com.au/_data/assets/pdf_file/0006/30003/Appendix-K-Subsidence-technical-memorandum.pdf - p43

It is also a possibility, yet to be established, that there could be an uptick in the level of subsidence towards the end of gas production in an area:

“In the context of subsidence, this suggests that the desorption-induced shrinkage component of coal seam compaction may increase as the reservoir pressure approaches its end state. This has been reported internally by the industry (Rai & Hummel, 2019)”⁶¹

As aforementioned, to add to the magnitude of risk of subsidence, deviated drilling, which is proposed across the majority of the floodplain where depths allow, also increases the magnitude of subsidence due to the larger surface area in contact with the coal seam and results in a larger degree of non-uniformity in the subsidence seen at the surface (different shapes of the subsidence bowl).⁶²

As noted by *Coffey Environments Australia*, Arrow Energy’s commissioned technical experts:

“the subsidence process is considered to be largely irreversible.”⁶³

Likewise, the potential consequences of reservoir compaction and surface subsidence are often irreversible and will be far-reaching. The damage to priority agricultural land uses (PALU) will not be a one-off event, but rather a stream of continual impact over the extensive time during which subsidence occurs, creating a high risk of continual interruption to farming practices and requiring continual adaptation across multiple land holdings.

All in all, CSG-induced subsidence and its scientific uncertainty is a significant issue in the Surat Basin, and exponentially so across the Condamine Floodplain which is highly vulnerable to any change in landform. Just slight changes in surface topography risk negative effects on drainage, the effective application of irrigation water and overland flow pathways which are all pivotal to optimal crop production. In our region, subsidence impacts will have far-reaching and long-term consequences on productivity, leading to significant economic losses, not only due to the decrease in crop yields but also the costs of trying to rectify the change in land form, if at all feasible. Furthermore, there is the potential risk to the integrity of farm infrastructure like water storage dams and the ensuing production and economic losses that could result.

It is unacceptable that landholders are expected to assume such an unquantified and substantial risk to their properties and livelihoods, economic viability and ongoing productive capacity.

The science and legislation are playing catch-up while the risks to high-value assets are permitted to occur. Further comprehensive and evidence-based research under a precautionary principle approach must be carried out before further development is contemplated.

⁶¹ IESC CSG Subsidence Explanatory Note – p29/105

⁶² Subsidence: An overview of causes, risks and future developments for coal seam gas production, Jubert A. Pineda & Daichao Sheng, July 2013

⁶³ https://www.arrowenergy.com.au/data/assets/pdf_file/0006/30003/Appendix-K-Subsidence-technical-memorandum.pdf - p29