



Environmental
Defenders Office

**Submission on the draft *Information Guidelines*
Explanatory Note: Subsidence Associated with Coal Seam
Gas Production and the Draft National Minimum
*Groundwater Monitoring Guidelines***

9 June 2023

About EDO

EDO is a community legal centre specialising in public interest environmental law. We help people who want to protect the environment through law. Our reputation is built on:

Successful environmental outcomes using the law. With over 30 years' experience in environmental law, EDO has a proven track record in achieving positive environmental outcomes for the community.

Broad environmental expertise. EDO is the acknowledged expert when it comes to the law and how it applies to the environment. We help the community to solve environmental issues by providing legal and scientific advice, community legal education and proposals for better laws.

Independent and accessible services. As a non-government and not-for-profit legal centre, our services are provided without fear or favour. Anyone can contact us to get free initial legal advice about an environmental problem, with many of our services targeted at rural and regional communities.

www.edo.org.au

Submitted to:

IESC Secretariat

By email: IESCsecretariat@dcceew.gov.au

For further information on this submission, please contact:

Rachel Walmsley

Head of Policy and Law Reform

T: (02) 9262 6989

E: rachel.walmsley@edo.org.au

Acknowledgement of Country

The EDO recognises First Nations Peoples as the Custodians of the land, seas, and rivers of Australia. We pay our respects to Aboriginal and Torres Strait Islander Elders past, present, and emerging, and aspire to learn from traditional knowledge and customs so that, together, we can protect our environment and cultural heritage through both Western and First Laws. In providing submissions, we pay our respects to First Nations across Australia and recognise that their Countries were never ceded and express our remorse for the deep suffering that has been endured by the First Nations of this country since colonization.

Executive Summary

Environmental Defenders Office (**EDO**) welcomes the opportunity to comment on the draft *Information Guidelines Explanatory Note: Subsidence Associated with Coal Seam Gas Production* and the *Draft National Minimum Groundwater Monitoring Guidelines* released by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (**IESC**).

EDO supports the development and publication of comprehensive and robust explanatory notes and guidelines as an important element of the IESC in fulfilling its role to provide scientific advice to the Australian Government Environment Minister in relation to development proposals that are likely to have a significant impact on a water resource.

We note that the IESC states that it welcomes feedback on the content, usability and applicability of the draft explanatory note and guideline. In particular, feedback is sought on:

- the technical content within the draft Explanatory Note. Are there any areas that are missing or not captured adequately?
- the relevance to your specific area of work; and
- potential options to increase uptake and adoption.

This submission has been prepared with input from the EDO Scientific & Expert Advisory team and from solicitors providing advice to clients in relation to coal and coal seam gas impacts. We focus on the first area of feedback sought, in particular identifying where further detail is required to ensure the Note and Guidelines are comprehensive. EDO regularly provides legal advice to landholders and community groups who are concerned about the impacts on both surface and ground water from large coal and coal seam gas (**CSG**) projects. It is of benefit to both proponents and the community to ensure explanatory notes and guidance are comprehensive and include sufficient detail and specific guidance on the full range of relevant impacts and processes.

This submission identifies key issues in relation to:

- *Information Guidelines Explanatory Note: Subsidence Associated with Coal Seam Gas Production* (**Explanatory Note**)
- *Draft National Minimum Groundwater Monitoring Guidelines* (**Draft Guidelines**)

We make a number of recommendations in relation to additional issues that should be addressed in the Explanatory Note and Draft Guidelines.

1. Information Guidelines Explanatory Note: Subsidence associated with coal seam gas production

EDO is concerned that this Explanatory Note downplays the occurrence and impacts of subsidence caused by CSG. We note that this is summarised in the statement on p.1 of: “independent sources have confirmed that CSG production does induce subsidence” but that the magnitude of subsidence is “more than one order of magnitude less than that associated with underground longwall coal mining operations.” At the same time it is acknowledged how little research has been conducted on the topic and the high level of complexity involved in predicting CSG subsidence. This creates a dissonance throughout the Explanatory Note, with potential and observed impacts reported at a general level that adds little useful information.

The Executive Summary states that “the potential impacts of subsidence on adjacent industries, particularly agriculture, must be managed.” While this is obvious and should be explored further¹, we note the purpose of the IESC is to give advice on impacts on water resources within the context of the *Environment Protection & Biodiversity Conservation Act 1999* (**EPBC Act**). Therefore it is disappointing to see that “environment” is not mentioned once in this Explanatory Note (apart from references to titles of the department and the EIA process). Impacts to the natural environment, biodiversity and other matters of national environmental significance are wholly ignored.

The section on impacts to water resources is inadequate in terms of detail provided. Impacts on groundwater dependent ecosystems are not even mentioned. We note that even when the surface expression of subsidence is small, changes to groundwater flow may occur that have catastrophic effects on groundwater dependent systems. EDO **recommends** that such impacts and effects should be acknowledged and addressed in the Explanatory Note.

Most of the document is concerned not with the impacts or the magnitude of the impacts themselves, but with modelling methods. The section on potential modelling methods is useful. However, Section 7 – Approaches to Subsidence Assessment – is written in a noncommittal, academic style. As this document will undoubtedly be cited by proponents with regard to standard practice, at a minimum, EDO **recommends** that a table of the assumptions and limitations of each method, and their repercussions on subsidence estimates should be included.

Table 9 is a summary list of estimated subsidence modelling predictions by several CSG operators in Queensland (p72). Experience shows that there is typically a large difference between predicted and observed impacts. These listed projects are up to 11 years old; observed impacts should be included in the table for most of them.

We note that Khanal and Hodgkinson (2021)² provide a summary of the occurrence of subsidence across multiple industries, and the requirements for estimating subsidence in EISs in Australia. They find that subsidence was under-predicted in almost 2/3 of the available data. Moreover, they found an obvious lack of transparency due to the lack of publicly available data, as post-audit reporting of subsidence is not typically required.

¹ See: Gasfield Commission Queensland: [GFCO_Regulatory-review-of-coal-seam-gas-induced-subsidence-report_FINAL.pdf](#)

² Khanal, M and JH Hodgkinson, (2021). Subsidence prediction versus observation in Australia: A short comment, *Environmental Impact Assessment Review*, 86. <https://doi.org/10.1016/j.eiar.2020.106479>.

An additional gap relates to whether there are there any ‘baseline’ monitoring techniques that could be applied after operations commence. The Explanatory Note should identify how existing operators can start monitoring for subsidence where baseline assessments were not yet done prior to commencing the activities. This kind of data is essential for ongoing monitoring and to provide evidence for enforcement in the event that subsidence is caused by the operations . Such monitoring data that relates to baselines should be publicly accessible.

Given these observations, EDO **recommends** that this Explanatory Note should more carefully consider whether advice is given on EIS requirements, mandatory reporting of observed subsidence and how that data should be reported, and modelling requirements. The goal should be to identify and address the remaining knowledge gaps on subsidence impacts from CSG, not just summarise data on what *can* be done.

2. Draft National Minimum Groundwater Monitoring Guidelines

EDO is concerned that the Draft Guidelines are written in a way that is too general to be of use in preventing or assessing groundwater impacts from industry. EDO **recommends** that more specific guidance should be given on a range of relevant topics for the specific settings and industries that the IESC reports on. This could, for example, be done as a series of decision trees with certain standards for each scenario.

The IESC requests feedback on potential options “to increase uptake and adoption” of these guidelines. However, the guidelines as written, are a simple compendium of available monitoring methods, with no actual suggestions of standard operating procedure for any scenario. For example, the subject of land subsidence, which has caused massive change to groundwater flow and quality at a wide range of Australian coal mines, receives only 6 sentences on p.99 suggesting that monitoring should occur.

EDO **recommends** further guidance on monitoring is required. In the absence of such guidance, it is impossible to adequately protect groundwater resources from harm in fulfillment of the EPBC Act. The following represents a (non-exhaustive) list of common groundwater impacts from coal mines that require specific monitoring guidance:

- Inter-aquifer connectivity: how many bores are required and where? What should be measured, and how frequently? How much fieldwork needs to be done to adequately understand aquifer heterogeneity, aquifer hydraulic parameters, and the properties and continuity of aquitards? The discussion on this topic in the draft Guidelines is too vague to be of use.
- Faults: how should faults be characterised? How much fieldwork represents the minimum requirement to adequately capture a fault system within a model? Is fieldwork required to prove whether a fault behaves as a barrier or a conduit?
- Subsidence: what are the minimum requirements for understanding the subsurface impacts of subsidence on groundwater flow and quality? Although subsidence impacts may not reach to the surface, what work is required to demonstrate whether significant alterations to groundwater pathways have occurred? What happens when the monitoring infrastructure fails during mining activities (and how to prevent this)?
- Ash dams: what groundwater quality constituents should be monitored and where?
- How to determine impacts on neighbouring aquifer/potential water compensation issues or quantification of use?

There are a range of such groundwater monitoring failures for existing mines such as for the New Acland Coal mine and the Metropolitan Coal mine (Peabody project in Illawarra). The undertaking for Maules Creek provides examples of specific monitoring requirements in relation to groundwater/surface water interactions.³

EDO **recommends** that the Draft Guidelines also need to provide far more specific detail in relation to gas projects. Natural gas production is rapidly expanding in Australia: “LNG production in Australia has tripled since 2012, doubled in the two years to 2017 and is expected to grow another 18% this year.”⁴

Potential groundwater impacts that need definitive monitoring guidance (ie, what methods should be used, how frequently, and where?) within the gas production context include the following⁵:

- Water quality contamination through surface spills, including frack water or formation water (which is often salty and may be contaminated with drilling fluids) stored onsite;
- Contamination of shallow aquifers due to transport of hydraulic fracturing fluids or geogenic contaminants through geological layers overlying the gas-bearing formations;
- Depletion of shallow aquifers and streams due to direct pumping to meet water demands or as a result of leakage between formations during production;
- Between gas-bearing formations and overlying shallow aquifers include natural and induced fractures, faults, sandy layers through aquitards and leaky wells;
- What quality control is necessary to confirm the veracity of measurements? For example, how should downhole dataloggers be maintained to ensure good time series data is obtained?

EDO **recommends** that these issues be included in the Draft Guidelines.

*Thank you for the opportunity to make this submission.
Please do not hesitate to contact our office should you have further enquiries.*

³ See: https://www.dpie.nsw.gov.au/_data/assets/pdf_file/0003/415065/enforceable-undertaking-maules-creek-pty-ltd.pdf For example, at 3(iv) - undertaking-multi-level monitoring and reporting of shallow soil and rock moisture content at three locations within the main stream bank of Back Creek (one for each geological unit traversed by the creek) for the purpose of providing records for the calibration of surface water and groundwater management models for the area and the purpose of estimating and managing the Mine's surface water and groundwater effects. Each location monitored should record daily-average soil moisture at 0.5m, 1.5m, 3m and 6m depths. See also: <https://www.maulescreek.org/wp-content/uploads/2018/04/Appendix-2-Groundwater-Peer-Review.pdf>.

⁴ 'Problem in waiting': why natural gas will wipe out Australia's emissions gains. The Guardian, 13 November 2018. <https://www.theguardian.com/environment/2018/nov/13/problem-in-waiting-why-natural-gas-will-wipe-out-australias-emissions-gains>

⁵ Shanafield, M., Cook, P. G., & Simmons, C. T. (2019). Towards quantifying the likelihood of water resource impacts from unconventional gas development. *Groundwater*, 57(4), 547-561.