

Tight gas and oil: managing potential impacts

This factsheet covers the main considerations associated with tight gas and oil activities in Queensland, including managing hydraulic fracturing, well integrity, groundwater, flaring and emissions, water use, noise, light, land disturbance and subsidence. It also explains how these issues are managed through Queensland's regulatory approvals framework.

Overview

Resource companies operating in Queensland must hold an Environmental Authority (EA) issued by the Queensland Government under the *Environmental Protection Act 1994* (EP Act) before commencing operations. The EA approval process involves assessing the potential environmental risks and impacts of the proposed activities and sets conditions on how they are to be conducted, monitored and reported. The EA applies for the life of the project including decommissioning and rehabilitation.

Hydraulic fracturing

Hydraulic fracturing involves pumping water-based fluid at high pressure into isolated sections of target rock. The pressure creates fractures which are typically a few millimetres across, and sand or ceramic particles (proppant) are pumped in to hold the fractures open, allowing gas to flow. The technique is generally required for tight gas and oil production because target rock formations have low permeability and gas and oil does not readily flow without stimulation.

Fracturing fluids are predominantly water and sand - typically around 98-99% by volume - with a small proportion of common chemical additives for purposes such as reducing friction, preventing bacterial growth and thickening the fluid to carry sand into fractures. In Queensland, the use of BTEX chemicals (benzene, toluene, ethylbenzene and xylene) in fracturing fluids is effectively prohibited under the EP Act.

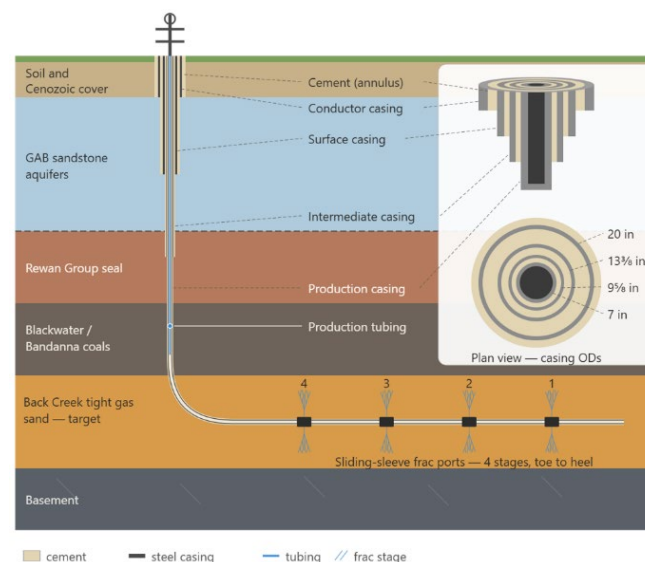
Under resource legislation, the company must notify the Queensland Government and affected landholders of their planned activities at least 10 days before fracturing begins and then lodge a second notice within 10 days of completion outlining the actual additives and volumes used during the fracturing.

The company must then provide the Queensland Government with a more comprehensive, technical 'hydraulic fracturing activities completion report' within six months. Additionally, the Queensland Government has strict controls on fracturing requirements.

Well integrity

The Code of Practice for the Construction and Abandonment of Petroleum Wells and Associated Bores in Queensland (the Code) provides standards for constructing tight gas wells and monitoring well integrity.

Well integrity refers to the ability of a well to contain fluids and prevent unintended movement of gas or fluids between underground formations throughout its life. Tight gas and oil wells are constructed with nested steel casing strings, each cemented in place to isolate or protect different rock layers. The steel casing and surrounding cement is designed to provide a minimum of two independent barriers between fluids inside the well and any groundwater-bearing formations.



Schematic illustration of a tight gas well (source: OGIA)

Each casing section (string) is pressure-tested before drilling proceeds deeper. In most cases acoustic logging tools are used to assess cement bonding quality. During operations, pressures between casing strings are monitored at the wellhead, and any unexpected build-up in pressure must be investigated and managed in accordance with the operator's Well Integrity Management System.

Queensland's Code of Practice for the Construction and Abandonment of Petroleum Wells sets mandatory standards for decommissioning activities. These standards help ensure that well barriers continue to perform as intended over the long term, including after active monitoring has ceased.

When a well is permanently abandoned, cement plugs are placed at multiple intervals throughout the wellbore, including across every water-bearing zone penetrated during drilling. This is to restore the natural isolation that existed before the well was drilled.

Groundwater

Groundwater obligations are managed through the *Water Act 2000*. Protecting groundwater is of utmost importance to landholders, regulators, industry and communities. Gas and oil companies have statutory obligations to monitor and protect groundwater. Before activities that trigger these obligations begin baseline assessments of potentially affected landholder water bores are undertaken. This documents what conditions were like before production commences and provides landholders with a basis for identifying any future change.

While conditions vary depending on the site-specific nature of an activity, environmental authorities generally include a condition which prohibits the unauthorised release of contaminants to waters and may include conditions for groundwater protection, hydraulic fracturing and environmental monitoring.

An extensive underground water management framework exists under Chapter 3 of the Water Act 2000. The framework includes the assessment and monitoring of groundwater impacts, make good obligations for affected water bores, and Underground Water Impact Reports that predict groundwater impacts likely to occur in both the immediate and long term.

The Office of Groundwater Impact Assessment (OGIA) prepares cumulative groundwater impact assessments for the Surat Cumulative Management Area (CMA), which covers coal seam gas (CSG) and coal mining in the Surat and southern Bowen basins.

Water Requirement

Water use is another key component of tight gas activities, as hydraulic fracturing requires volumes of water to be used, potentially around 10 – 30ML per well. This water must be sourced by the resource company through appropriate water authorisations under the *Water Act 2000*, administered by DLGVW. Companies are expected to identify and secure their own water sources, which may include licensed water providers, purpose-drilled supply bores or treated recycled water.

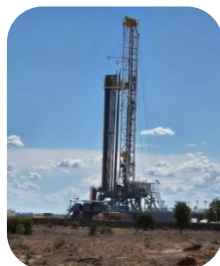
Companies cannot use or acquire water from landholders' stock and domestic bore allocations for industrial activities such as fracturing. Tight gas and oil targets in Queensland sit below a substantial thickness of rock that separate them from shallower groundwater systems. The extent to which this provides protection depends on well design, local geology and operational practice, and is subject to regulatory oversight throughout the project.

Flaring and emissions

Flaring involves burning off excess gas to prevent uncontrolled releases for safety. It is characterised by a vertical stack or pipe with a burner at the tip, and can be seen at processing plants, drilling rigs, and appraisal and exploration wells. By burning methane rather than venting it directly to the atmosphere, flaring reduces the overall greenhouse impact, although it still produces CO₂ emissions. This is important because methane is a much more potent greenhouse gas than carbon dioxide over the short term. Operators must ensure flaring of waste gas is done in a manner consistent with their EA conditions.

Noise, light and land

Developing tight gas wells requires continual drilling operations, generating noise impacts from rigs, generators and other onsite equipment. Ongoing production may involve compressors, wellhead pumps or other equipment that may operate continuously.



Noise limits and management requirements are nominated in the EA. Lighting must be directed downward and contained to the site boundary. Land disturbance from pad construction, pipelines and access tracks must be progressively rehabilitated.

Subsidence

Subsidence is the gradual lowering of the land surface and may occur as a result of mineral or resource extraction. In tight gas production, target formations are much deeper than CSG, and the multi-layered rocks are typically stronger than coals, so subsidence is expected to be less prevalent than what has been experienced in CSG production. Monitoring requirements and regulatory obligations in this area are continuing to evolve.

Biosecurity

Biosecurity considerations apply across the entire resource project lifecycle, from planning and access arrangements through to operations, decommissioning and rehabilitation. Resource companies and landholders have responsibilities for managing biosecurity risks, including the spread of weeds, pests and diseases. Both parties have a General Biosecurity Obligation under the *Biosecurity Act 2014*.

Where can I find out more?

Contact Coexistence Queensland on 1300 548 021 or visit www.cqld.org.au, including for information on Make Good Agreements and baseline assessments.

More information on environmental approvals for petroleum activities is at:

www.qld.gov.au/environment/management/environmental/impacts-approvals/impacts-petroleum

Queensland's policy on fracturing requirements and BTEX prohibition is at: www.detsi.qld.gov.au/_global/policy-register/policy-register-pdf?getdoc=1565&name=rs-is-fraccing-and-btex.pdf

Useful resources

- [Coexistence Queensland tight gas and oil factsheet series](#)
- [Understanding groundwater impact, Office of Groundwater Impact Assessment](#)
- [The Surat CMA, Office of Groundwater Impact Assessment](#)
- [Queensland Government Taroom Trough Development Plan](#)
- [Environment and water, Queensland Government](#)
- [The Gas Guide, Coexistence Queensland](#)