

The footprint of Coal Seam Gas developments - a case study in two Queensland State Forests.

Coal Seam Gas (CSG) developments bring significant environmental challenges. One of these challenges is the loss of biodiversity and fragmentation of habitat. This occurs as a consequence of the clearing of vegetation for the road and pipeline infrastructure and the clearing of land around the wells (well pads).

CSG has been extensively developed in the Condamine State Forest shown in light green, (Figure 1) south of Miles in Queensland. In this 7,000 ha State Forest, there are 161 well pads. This intensive development takes up approximately 3.2% of the State Forest.

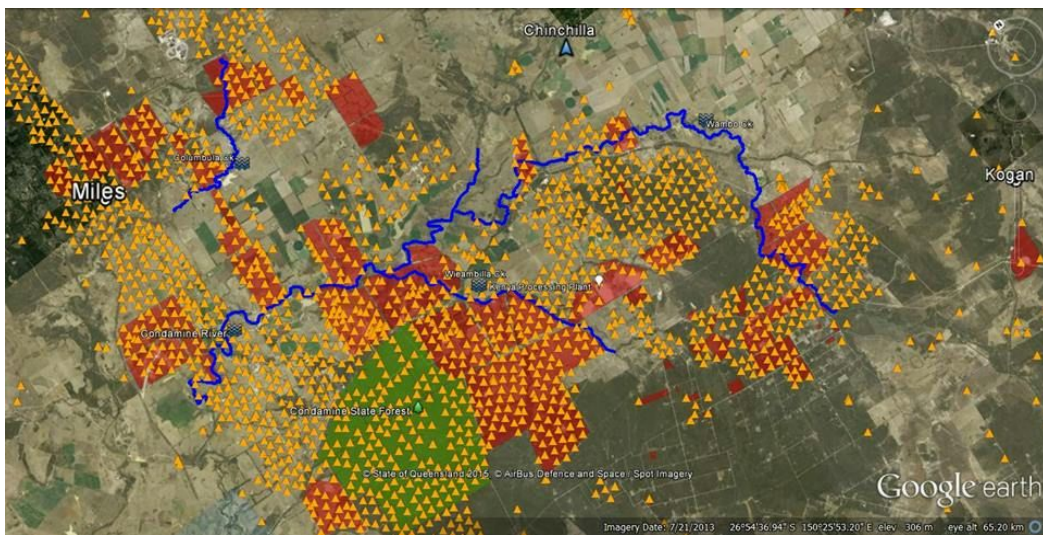


Figure 1. CSG wells in Condamine State Forest and surrounds.



Figure 2 CSG development in and around Kumbarilla State Forest

The CSG development around the Kumbarrilla State Forest (Figure 2) shows the intensive nature of such developments and the broad scale fragmentation of the landscape.

An analysis of the 14,000 ha Braemar State Forest, shown in light green to left of the photograph (Figure 3) reveals that there are 140 wells at an average of 1.4 ha/well that gives a footprint of 196 ha which makes up 1.4% of the State Forest.

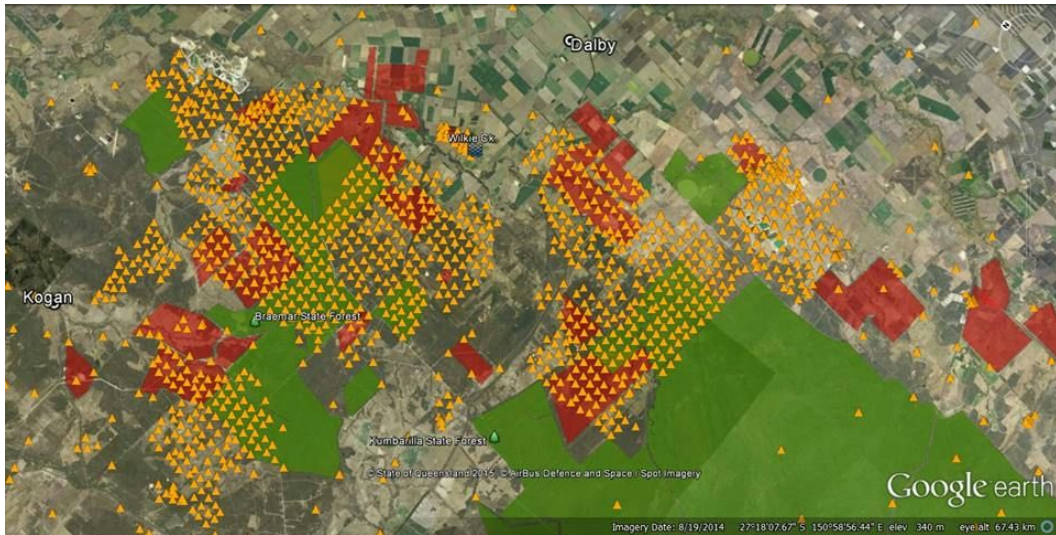


Figure 3. CSG wells in Braemar State Forest and surrounds.

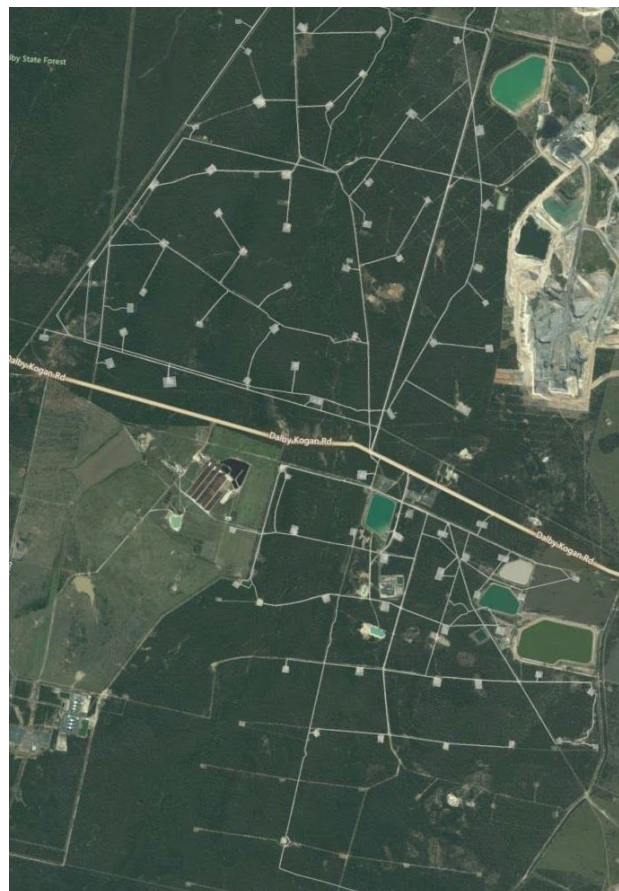


Figure 4. CSG development near Dalby. The photo is 6.8km across.

The issue is not only the loss of between 1-3% of the State Forests but the additional fragmentation of the ecosystem. This is demonstrated in Figure 2 and Figure 4, that shows a CSG development near Dalby.

By enlarging the photo in Figure 4, it was possible to measure the size of the well pads and obtain an average estimate of an 80m x 80m clearing, ie an average of 6,400 square metres for each well pad. It was then possible to measure the length of roads servicing 44 wells (34km) and estimate that each road was 10m in width. This is probably an underestimate. This gives an average footprint of 1.4 ha/well. It is assumed that pipelines follow the roads but this may not be the case.

Hence the total forest cleared to develop 44 wells in Condamine State Forest is 225 ha. This is 3.2% of the 7,000 ha State Forest. In Braemar State Forest the footprint of 140 wells takes up 1.4% of the State Forest.

It has been stated by Williams and Stubbs that for CSG developments in Australia the average footprint is approximately 1.1 well pads and 1.6 km of road per square km. This estimate shows the footprint to be 1.5% per square km. This could be an underestimate if the development shown in Figure 4 is typical of CSG development in Australia. In a 9 square km section of the development there are 23 wells taking up 3.5% of the area under consideration. In a second 9 square km area there were 28 wells taking up 4.3%. CSG well pad and road infrastructure can be seen in Figures 5-7.



Figure 5 CSG infrastructure

Thus in those parts of both State Forests where there is intensive CSG development, around 4% of native vegetation is lost. This highlights the intensive nature of the development in the Condamine State Forest.

Establishing CSG infrastructure entails the removal of native vegetation to allow access, to clear a firebreak and to clear workspace around the well site. As with any other activity that requires land clearing, this leads to the introduction of invasive species especially weeds and cuts into the home or breeding ranges of native fauna such as reptiles and birds. A number of scientific studies have confirmed the negative impacts of fragmentation of bushland, regardless of the activity, on native fauna.



Figure 6 Cleared forest for CSG infrastructure

Where a landscape has already been extensively cleared for urbanisation or agriculture, the vegetation that is left is often of high ecological value. Clearing for a single well pad and the associated service road and pipeline may intrude into but not badly fragment a patch of bushland. Clearing enough space for many well pads, roads and pipelines in a single patch of bushland results in cumulative fragmentation.

The Native Vegetation Acts in both NSW and Queensland, prior to recent revisions, dealt well with issues of clearing of native vegetation, but CSG operations are exempt from these Acts. If there is a particular threat to threatened species then the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 applies, as does state threatened species legislation. However, these Acts do not easily deal with broad-scale fragmentation and cumulative loss of habitat.



Figure 7 CSG infrastructure access road or pipeline corridor.

Productive farming for food and fibre is also perceived to be at risk from the cumulative fragmentation and potential resource-contamination impacts of CSG operations. Both fragmentation and contamination reduce the usability of valuable agricultural land and water resources.



Figure 8 CSG infrastructure showing access

A further issue of concern is the loss of access to State Forests. As can be seen in Figure 8, access to CSG developments is prohibited. This is partly for safety reasons as gas does leak

from the well heads. However due to the broad scale nature of the developments, there is limited or no access to large parts of State Forest. Given the analysis above, approximately 25% of Condamine State Forest would be inaccessible.

This paper has drawn heavily upon the discussion paper by Williams and Stubbs; Coal Seam Gas Production: Challenges and opportunities.

http://wentworthgroup.org/wp-content/uploads/2013/12/BREE_Coal-seam-gas-production_WILLIAMS-etal-.pdf

The maps showing the Condamine, Kumbarilla and Braemar State Forests are from Gas Pel Maps Australia.

Photographs by Sheena Gillman

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