Coonamble–Gilgandra region

This summary is an initiative by the Office of the Land and Water Commissioner in response to community enquiries about the geology of the Coonamble–Gilgandra region. The enquiries are particularly related to the proposed construction of a Western Slopes gas pipeline, to connect the Narrabri area to the existing Moomba–Sydney pipeline, which passes near Condobolin.

This geological overview of the area around the proposed pipeline is based on publicly available geological data obtained by the Geological Survey of NSW and private companies during exploration. The NSW Government collects and archives all geological data from exploration activities in NSW to enhance understanding of the geology of the state.

Narrabri is located east of the Coonamble–Gilgandra area. Six coal mines operate in the Narrabri–Gunnedah region and coal seam gas extraction is proposed in the Narrabri area. Data from Narrabri is included for comparison with that in the Coonamble–Gilgandra region.

Any enquiries about this document should be directed to the NSW Land and Water Commissioner.

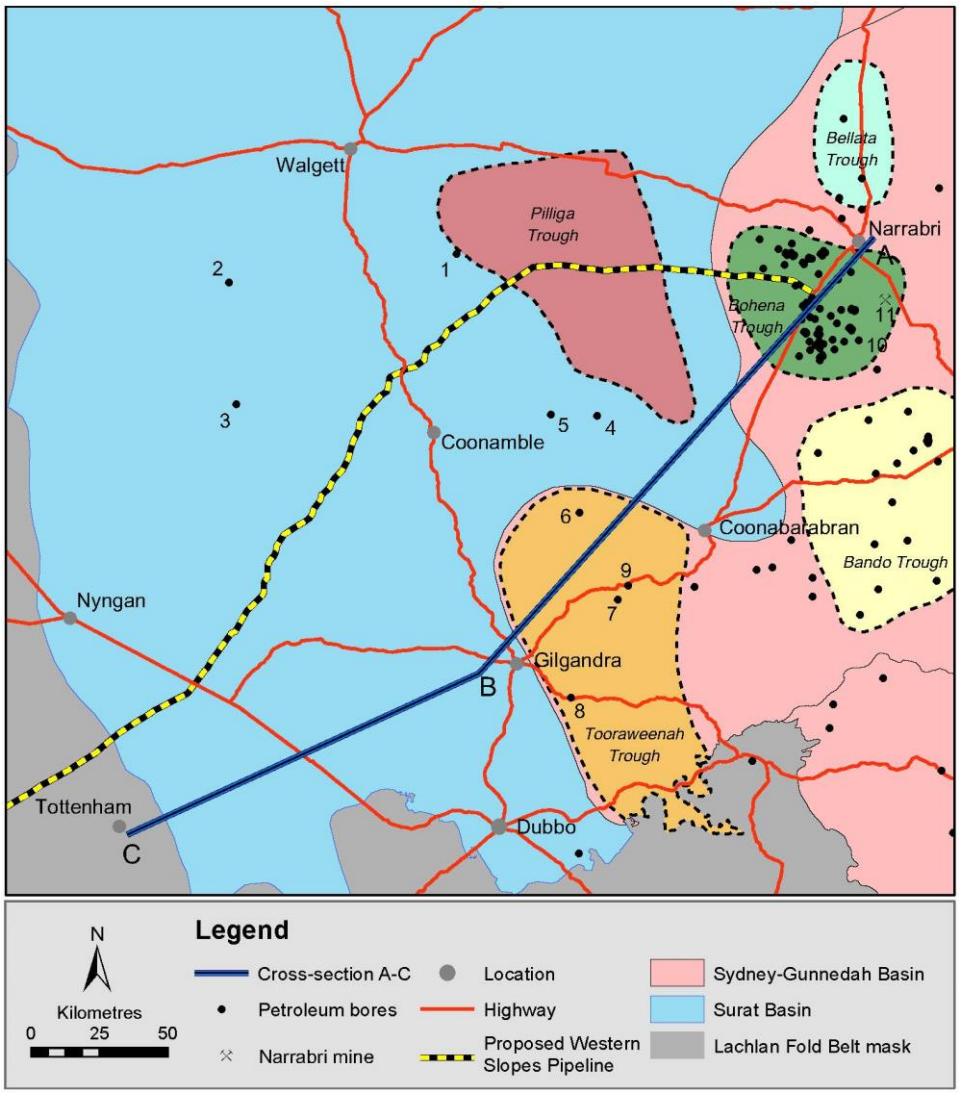

Figure 1. Simplified geological map of the Coonamble–Gilgandra region.

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For more information on NSW Government geological data visit the Division of Resources and Geoscience website: www.resourcesandenergy.nsw.gov.au

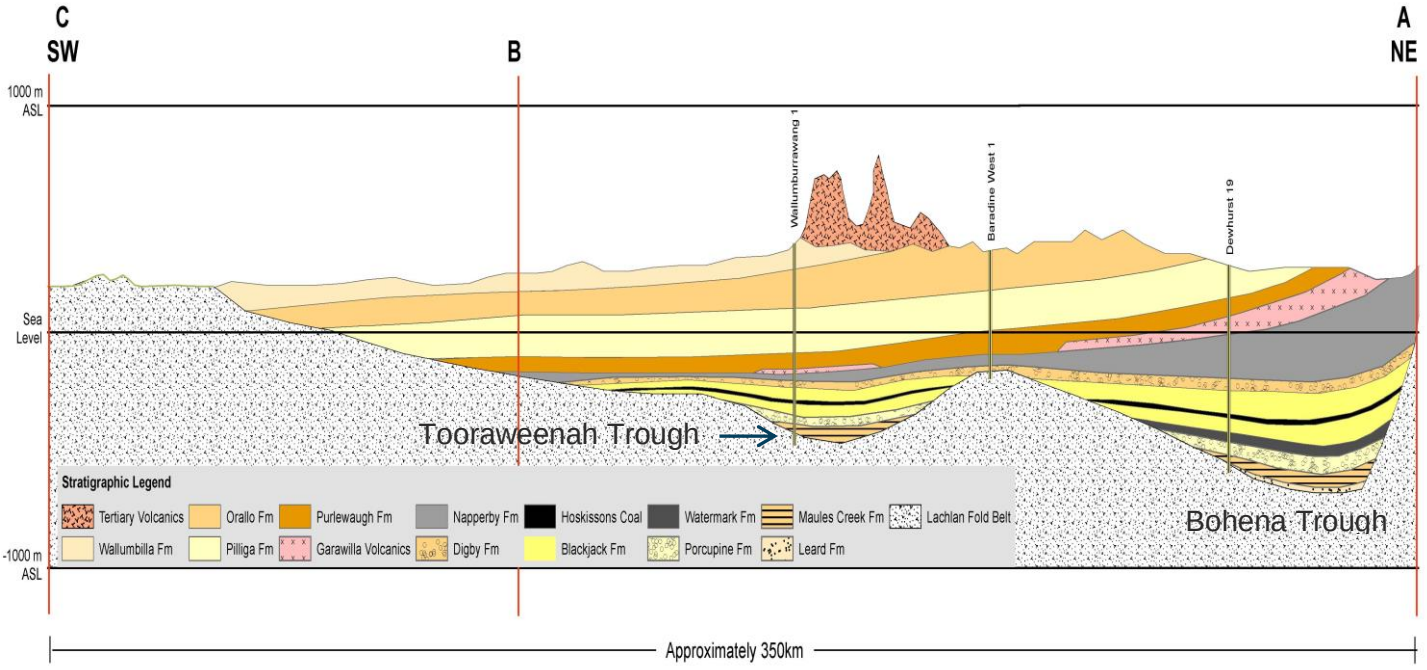

Figure 2: Cross-section of Coonamble–Gilgandra region (A-C). Note: A vertical exaggeration of 175x has been applied to this section. Locations of the three wells (Wallumburrawang 1, Baradine West 1 & Dewhurst 19) have been projected onto a flat surface, so rock unit depths may not match drilled data exactly.

Geology and exploration

The geology of the Coonamble–Gilgandra region consists of mainly sandstone, with limited thin coal seams where the Wallumbilla Formation and parts of the Purlewaugh Formation are present. Coal is common in the Blackjack and Maules Creek formations, in the east.

A few exploration boreholes have been drilled in the Coonamble–Gilgandra region. Typically, explorers in an area with limited data will drill one or two 'reconnaissance' holes to look for a resource. Depending on what type of rocks are found, they may run tests on the drillcore from the hole and/or decide to drill more holes. If the geology is not suitable to host a resource, exploration will move to another area.

Within the Walgett, Coonamble and Gilgandra local government areas (LGAs), only nine boreholes have been drilled under petroleum exploration licences. Within these three LGAs only one borehole has been drilled for coal exploration. There is very little available drilling data, but it suggests relatively low potential for development of coal and coal seam gas resources in this area.

Table 1: Rock units in the Coonamble–Gilgandra region

Rock unit	Major rock types
Soils	Alluvium: gravel, sand and silt
Warrumbungle Volcanics	Basalt flows
Wallumbilla Formation	Sandstone and minor coal seams
Orallo Formation	Sandstone, siltstone and minor coal seams
Pilliga Formation	Sandstone with occasional thin coal seams
Purlewaugh Formation	Sandstone with minor coal seams
Garrawilla Volcanics	Basalt flows
Napperby Formation	Siltstone and sandstone
Digby Formation	Pebbly sandstone
Blackjack Formation (including Hoskissons Coal)	Coal, sandstone and siltstone
Watermark Formation	Siltstone and claystone
Porcupine Formation	Sandstone and pebbles, minor siltstone
Maules Creek Formation	Coal, sandstone and siltstone
Leard Formation	Claystone and sandstone
Lachlan Fold Belt	Metamorphosed marine sedimentary rock

Exploration data from the Coonamble–Gilgandra region

Table 2: Selected wells and drilling data

LGA	Label on map	Well Name	Total Depth	Year drilled	Intersected coal seam/s	Coal ash%	Gas content m^3 / t	Further information search digsopen.minerals.nsw.gov.au (using record number below):
Walgett	1	Baradine Creek 1	805m	2010	Minor coals within the Bungil Fm	20.4-22.4	1	GS2011/0437
	2	Carinda 1	354m	2011	Thin coals. Net coal of 6.92m.	Not tested	Not tested	GS2011/0973
Coonamble	3	Sandy Camp 1	739m	1963	Minor thin lenses	Not tested	Not tested	WCR070
	4	Baradine West 1	592m	1963	Minor thin lenses	Not tested	Not tested	WCR074
	5	Baradine West 2	503m	1963	Minor thin coals	Not tested	Not tested	WCR076
	6	Tenandra 1	876m	2009	Hoskissons Coal	Not tested	Not tested	GS2010/0378
Gilgandra	7	Dilly 1	738m	2010	Hoskissons Coal 8.7m @ 504m depth	31	~1	GS2011/1122
	8	Ellendale 1	426m	2010	Hoskissons Coal 6.5m @ 350m depth	20	<1	GS2011/1140
	9	Wallumburrawang 1	979m	2009	Breeza Seam: 2.77m @732m depth	Not tested	Not tested	GS2010/0377
Example-Narrabri gas field well	10	Dewhurst 5	823m	2008	Bohena Seam: 18m @ ~780m	3.6 - 15.6	7 – 12.7	GS2010/0478
Example – Narrabri Coal Mine	11	(operating coal mine)	-	-	Hoskissons Coal 4.2m mined @ 160−340m	12	3.5 – 7.5	See company webpage: http://www.whitehavennews.com.au/

Coal and coal seam gas considerations

NSW has extensive deposits of coal, but for mining or extraction of gas from a coal seam to be commercially viable, a combination of conditions must be met. Some important geological factors are the seam depth, thickness and quality.

These factors vary from place to place because of how the coal formed. It formed from organic matter in swamps on floodplains, deltas and behind beaches, taking many thousand (to over a million) years to produce very thick coal seams. Over such long time frames rivers alter course, sea levels change and the climate varies, contributing to the variability in coal seams in NSW.

Depth: Coal seam gas extraction and coal mining (open cut or underground) are influenced by depths of the coal seams. Open cut mining generally requires shallow coal seams; underground mining generally occurs at depths of 200 to 650 metres; and coal seam gas extraction typically requires coal seams to be between 450 and 850 metres deep.

Seam thickness: Generally, a thicker coal seam will potentially yield a greater volume of coal seam gas or more mineable coal. Mining or gas extraction from seams that are too thin (or don't cover relatively large areas) are usually not commercially viable.

Ash (quality): Other rocks (e.g. claystone) can occur as discrete bands within coal seams, and coal naturally contains microscopic particles of inorganic matter such as clay and rock fragments. When the coal is burnt (e.g. for power generation) these rock bands and inorganic matter are left over. This is called 'ash'. Coal seams with lower ash contents are more valuable as they burn more efficiently.

Gas content: Coal seams with high gas content are attractive targets for coal seam gas extraction. All other things being equal, a coal seam with high gas content is more economically viable than one with low gas content. The gas content measured in exploration wells in the Coonamble–Gilgandra region is significantly lower than that recorded where production occurs or has been proposed.