Geology of the Leigh Creek Coalfield

FACT SHEET

Leigh Creek Energy's in situ gasification (ISG) demonstration project sits within the Telford Basin of the Leigh Creek Coalfield.

The Leigh Creek area is home to five coal bearing basins, with the Telford Basin also being referred to as Lobe B.

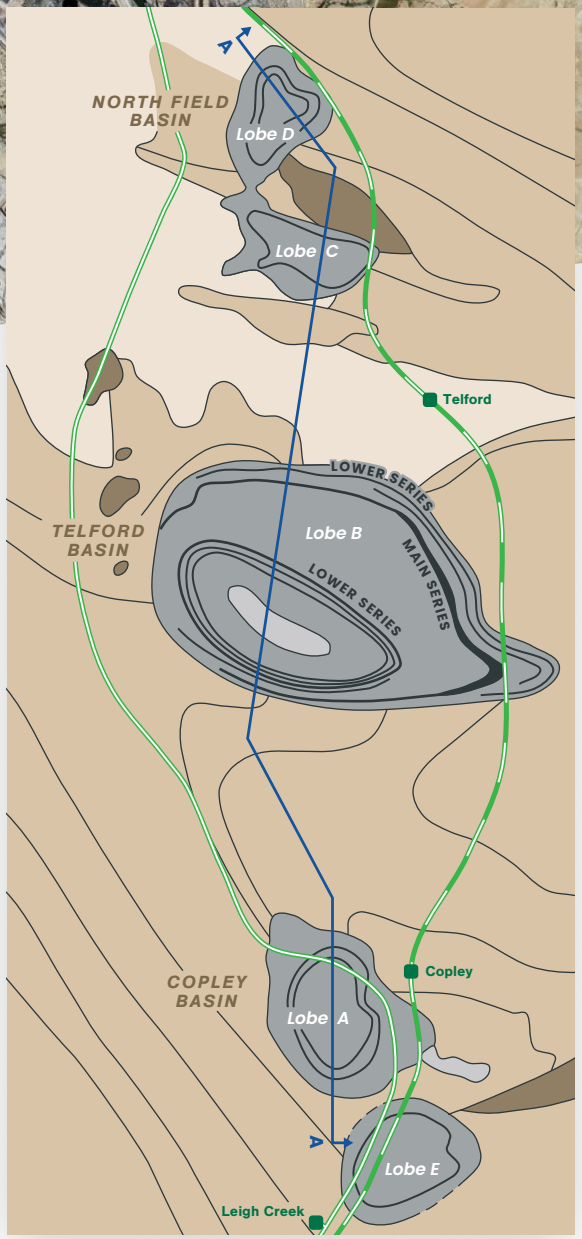
The Telford Basin's geology is unique to the area and has played a major role in shaping the history of South Australia and the townships of Leigh Creek and Copley.

The Telford Basin

The Telford Basin is the largest of the five basins in the Leigh Creek area with each of the five basins sitting (like bowls) within the 540+ million-year-old Adelaidean basement rocks.

The Telford Basin is an asymmetrical, ellipse shaped basin approximately 8km by 5km and reaches depths of up to 1,000m.

The Leigh Creek Coal Measures occur in three main sequences, named in descending order as the Upper Series Coal, Main Series Coal and Lower Series Coal.



UPPER SERIES COAL

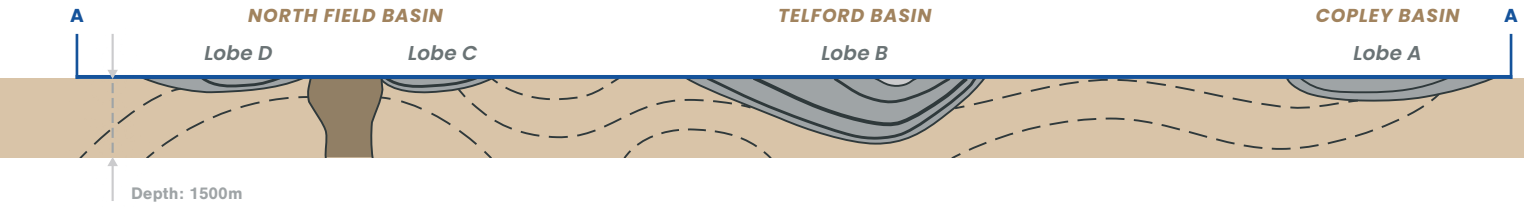
Comprises approximately 100m of interbedded mudstone, siltstone and numerous coal layers with minor fine-grained sandstone.

MAIN SERIES COAL

Comprises a 20m thick zone of coal and some interbedded mudstone.

LOWER SERIES COAL

Contains two coal layers with dark grey, silty mudstone in a zone approximately 60m thick.



The Leigh Creek Coal Measures within the Telford Basin are a result of three depositional phases beginning in the Late Triassic and concluding in the Middle Jurassic periods, sometime between 164–237 million years ago.

TRIASSIC–JURASSIC

Basin sediments: mudstone, coal, sandstone and siltstone

PROTEROZOIC

Basement: sandstone, siltstone, shale and limestone

Diapiric material

History

1800s

Coal was initially discovered at Leigh Creek in 1888 and intermittent testing and mining took place with limited success over the next 55 years.

1900s

Open cut mining officially commenced in 1943 under the management of the Engineering and Water Supply Department (EWS) until the Electricity Trust of South Australia (ETSA) took control of the Coalfield in 1948 as part of the process of developing the Port Augusta Power Station.

2000s

Mining ceased in November 2015, following a decision to close the mine as it had become increasingly uneconomic. From that time, the Leigh Creek Coalfield undertook closure and rehabilitation activities.

THE ADELAIDEAN BASEMENT

The Leigh Creek Coal Measures and associated mudstones located in the Telford Basin were deposited between 240 and 150 million years ago during the Triassic and Jurassic periods. They were deposited directly on top of a group of rocks referred to as the Adelaidean meta-sediments (Adelaidean Basement) of the Adelaide Geosyncline fractured rock province. The Adelaidean Basement is Neoproterozoic in age, meaning that they were deposited between 700 and 540 million years ago.

Due to the Telford Basin not allowing water to flow through easily (low hydraulic conductivity) and not being able to transmit groundwater in quantities sufficient for use as a water supply (forming a very thick aquitard), it is a barrier to groundwater flow. It is anticipated that historically most of the regional groundwater would have flowed around and beneath the Leigh Creek Coal Measures, rather than through it, which means the Telford Basin plays very little role in the regional groundwater flow patterns.

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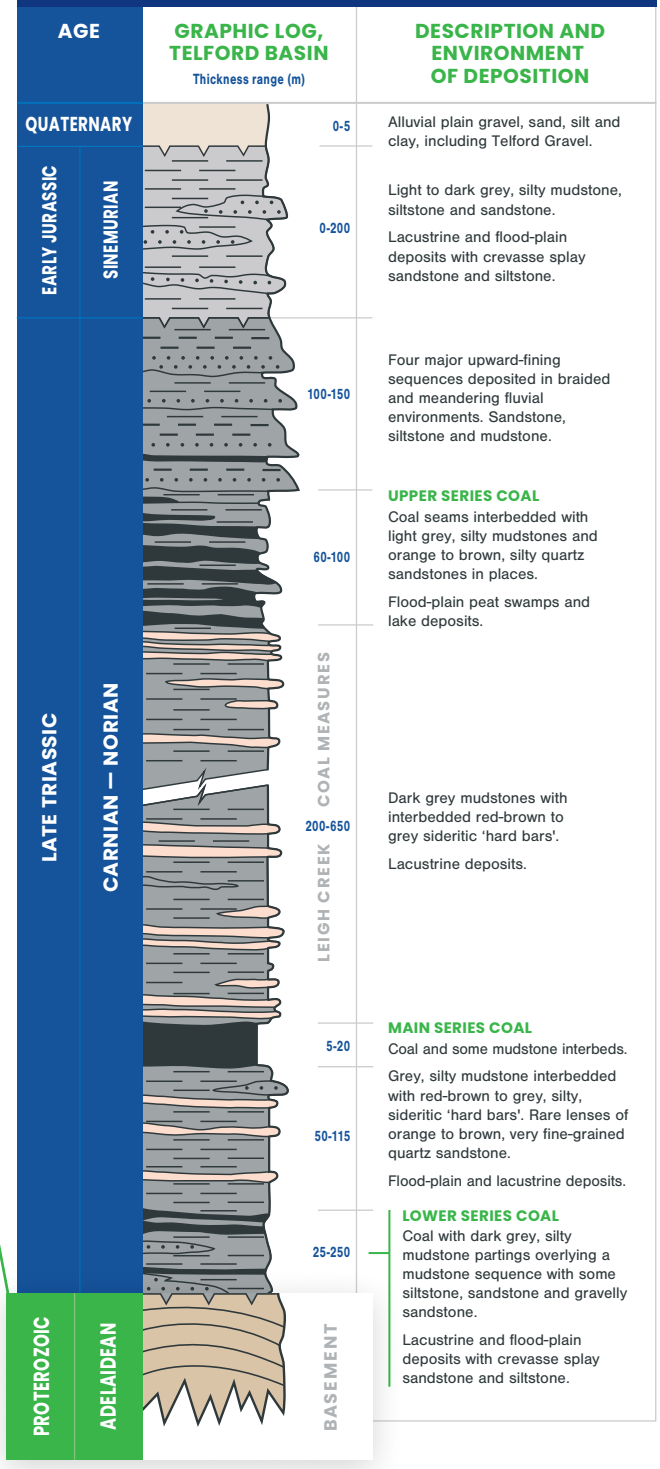

Images taken from; The geology of South Australia, Vol 2 The Phanerozoic, 1995.

To obtain information to inform the design for a commercial facility, Leigh Creek Energy proposes to construct, operate and decommission a small-scale ISG demonstration plant. This facility will involve the construction of an above ground plant (and associated service infrastructure) and the establishment of a below ground single ISG gasifier chamber. The demonstration plant would be commissioned and operated for a short period to produce syngas, so that the technical and environmental performance of the process can be confirmed.

Leigh Creek Energy acknowledges and respects the Adnyamathanha people, the Traditional Owners of the land on which our operations occur and pays our respects to their Elders past and present.

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