Groundwater

FACT SHEET

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

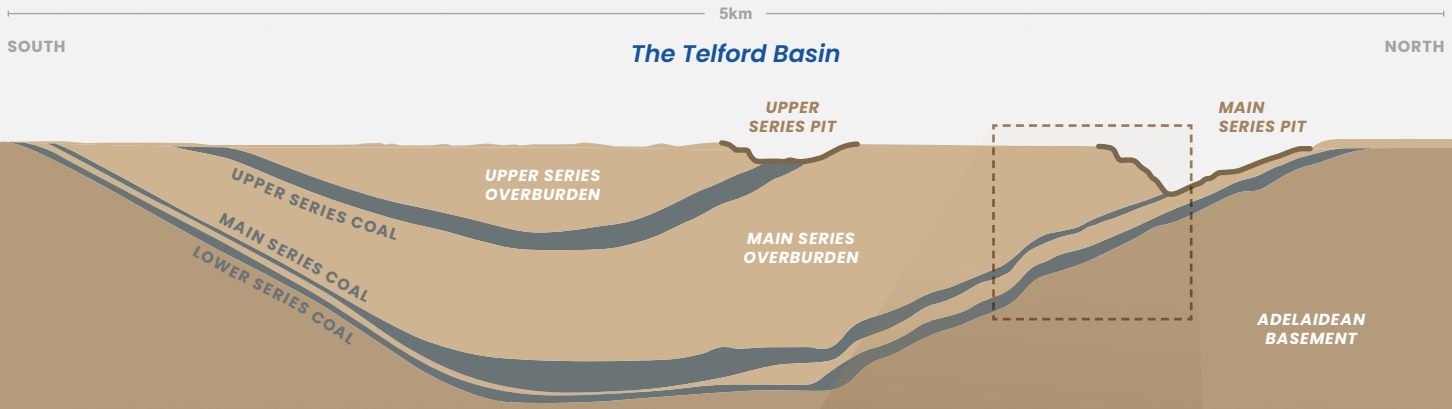
Through historical data and site investigations by Leigh Creek Energy, the groundwater at the operational site of the demonstration plant has been defined as an aquitard, containing small quantities of water which does not move easily due to the tight formations and low permeability. There are also no aquifers at the operational site.

Regional Groundwater

The regional water that surrounds the Telford Basin is defined as a fractured rock groundwater system which means that most of the groundwater flow occurs through joints and faults, and little through the rock itself. The groundwater has been classified as having a generally brackish salinity ranging from approximately 2,000 to 19,000 mg/L. Noted springs in the region are the Aroona, Top Well and Myrtle Springs. These are 8-12 km from the demonstration project site and are at higher hydraulic pressure head height than the Telford Basin so are not sourced from groundwater in the Telford Basin.

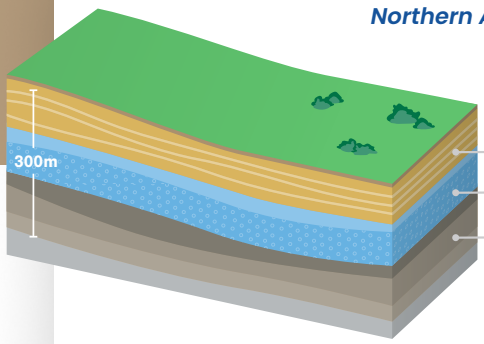
WATER CATEGORY	TYPICAL USE^^	TOTAL DISSOLVED SOLIDS (TDS)* (mg/L or ppm)	LEIGH CREEK & REGIONAL AREA TDS (mg/L or ppm)
Fresh	Limit for drinking water, flowers, fruit and vegetables^	Up to 1,000	*Not found in the operational site.*
Fresh to Brackish	Limit for pigs, poultry, crops and pastures^	1,000–3,000	Some Regional GW (2,000–19,000)**
Brackish	Limit for dairy and beef cattle and couch grass^	3,000–5,000	GW below the target coal seam (4,000–6,000)
Saline	Limit for horses kikuyu grass and sheep^	5,000–35,000	GW in the target coal seam (6,000) GW above the target coal seam (8,000–9,000) Regional GW (2,000–19,000)
Hyper-saline	Limited to mining/ industrial uses	Over 35,000	*Not found in the operational area.*

The specific ISG demonstration site has been tested and samples collected from above and below the Main Series Coal which highlight that all three sections are brackish to saline with the TDS ranging between 4,000–9,000 mg/L.



Groundwater System of the Northern Adelaide Plains†

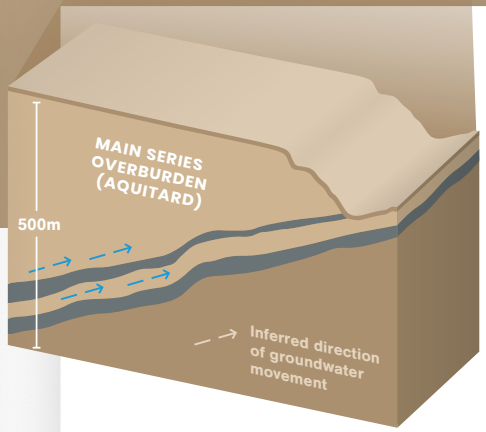
Open basin: 750km²



This groundwater has a high range of beneficial uses by a variety of users and industries.

Groundwater System of the Project Site

Closed basin: just over 30km²



The entire groundwater system is an aquitard.

Groundwater movement velocity is in the order of 1m/year.

No beneficial uses or users.

Site Groundwater

MOVEMENT

Groundwater throughout the Telford Basin is understood to be moving very slowly to the north toward the Main Series Pit. The rate of natural groundwater movement through the area of the site is expected to be in the range of 3cm per year (10^{-9} metres per second flow rate). If groundwater from the demonstration plant gasifier were to ultimately encounter the Main Series Pit (about 600 m to the north of the site) it would take more than 20,000 years, where it would ultimately run into the mine pit and evaporate.

SURROUNDING PASTORAL PROPERTIES

Groundwater to the west (Myrtle Springs Station), east (Leigh Creek Station), and south (Copley area) are at higher elevation than the coalfield and are extracting groundwater from shallow water table systems. Such groundwater will be moving toward the Telford Basin and therefore will not be affected by ISG activities.

Coalfield Groundwater

Petroleum Exploration Licence 650

The location of the Telford Basin within the Adelaide Geosyncline fractured rock province suggests that the groundwater at this site is sourced from local rainfall runoff and infiltration and not connected to other regional groundwater systems such as the Great Artesian Basin (approximately 50km to the north west) or the Copley Basin to the south. The groundwater here has a very low hydraulic conductivity and forms a very thick aquitard, meaning it is a barrier to groundwater flow.

* Source: http://www.epa.sa.gov.au/environmental_info/water_quality/threats/salinity

** Department of Environment, Water and Natural Resources "Water Connect" database (www.waterconnect.sa.gov.au)

^ Maximum to maintain condition only, not support healthy growth.

^^ Source: DWLBC Groundwater Group Fact Sheet "Groundwater Salinity".

† Source: Adelaide Coastal Waters Study, Technical Report No.4 – Estimation of groundwater and groundwater discharge to the Adelaide Coastal Waters Study area.

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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