Arrow understands the importance of water resources to local communities and has a comprehensive strategy to manage the potential impacts of our activities. Understanding the geology and hydrogeology is important to our business as well as the environment.

Coal seam gas and water

Extraction of coal seam gas and water

Coal seam gas (CSG) is natural gas, trapped in underground coal seams by water and ground pressure. Reducing the water pressure allows the gas to flow out of the coal and up a steel-cased well to the surface.

Wells are drilled in stages using a series of different sized drill bits and steel casing, which is cemented in place to isolate aquifers and various geological layers. The steel casing is perforated at the target coal seams to allow gas and water to flow up the well in separate systems and through buried pipelines to treatment facilities.

Zonal isolation

As well as being present in coal seams, groundwater is also stored in shallow aquifers in the Bowen Basin. These aquifers are generally limited in extent i.e. there is not the same abundance of readily accessible, good quality, shallow groundwater supplies as in the Surat Basin. Coal seams are deeper underground and isolated from aquifers by layers of impervious rock. This means connectivity between aquifers and coal seams is low.

Bowen Gas Project coal seam water will be piped to a purpose-built water treatment facility, sited near to the project’s main gas processing facility.

Arrow designs and operates its gas wells to preserve zonal isolation between the geological layers. The technology is very advanced and has been tested around the world.

Coal seam water treatment

The raw coal seam water is treated using processes such as reverse osmosis and membrane filtration to reduce salinity and correct mineral balances to suit its intended end use.

Following treatment, the water will be provided to a third party so it can be reused, not wasted.
Salt management
Coal seam water contains salt – mostly chloride, sodium and carbonates. The amount of salt depends on the location and age of the coal seam. Typically the water has between one-sixth and two-sixths the salt content of sea water.

The coal seam water treatment process removes this salt. Arrow is committed to removing all its produced salt in the Bowen Basin to a regulated waste facility.

Protecting groundwater
Groundwater in the Bowen Basin
Bowen Basin coal seam water is typically brackish, alkaline water containing trace metals and ions. The amount of water varies significantly depending on coal seam geology. Quantities of produced coal seam water in the Bowen Basin are significantly lower than in other production fields in Queensland.

Groundwater monitoring
Arrow conducts groundwater monitoring through two networks of dedicated bores:

- monitoring of infrastructure (i.e. dams) to satisfy conditions associated with environmental authorities through a network of 50 shallow bores
- monitoring of water extraction as described in the Underground Water Impact Report (UWIR), a copy of which can be found on Arrow’s website. This network includes seven shallow bores used for monitoring of infrastructure, an additional four deep monitoring bores installed in 2014 and another five dedicated bores to be installed in 2015/16. The results of this monitoring are provided to the Queensland Department of Environment and Heritage Protection.