

## A Multi-Disciplinary Assessment of Hydrogeological Connectivity between Coal Measures and an Overlying Water Supply Aquifer, and Potential Impacts of Coal Bed Methane Development in Queensland, Australia

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The groundwater resources of the Condamine River Alluvial Aquifer (CA) in Queensland, Australia have been extensively developed over the past 60 years, primarily for use in local agriculture. Current and proposed coal bed methane development in Queensland's Surat Basin extends beneath the western edge of the CA footprint and involves depressurisation of the Walloon Coal Measures (WCM), which directly underlies the CA. Depressurization of the WCM has the potential to impact groundwater in the CA, and the magnitude of this impact is dependent in part upon the hydrogeological connectivity between these two units.

An initial assessment of potential groundwater impacts across the Surat Basin was published in 2012 in the Surat Underground Water Impact Report (UWIR), completed by the Queensland Office of Groundwater Impact Assessment (OGIA). Since 2012, OGIA, with the support of Arrow Energy, has been leading an extensive assessment of the hydrogeological connectivity between the CA and the WCM.

This assessment includes multiple lines of investigation aimed at improving understanding of the geology, hydrogeology and geochemistry of the CA/WCM interface. Studies included in this assessment are: geological modelling to map the distribution of materials along the CA/WCM interface; drilling and test pumping to assess the distribution and hydraulic conductivity of these materials; multivariate hydrochemistry analysis to assess potential intermixing of water between the CA and the WCM; and collection and mapping of piezometric data to assess hydraulic gradients.

These studies collectively suggest that there is limited hydrogeological connectivity between the CA and the WCM, and that there has not been extensive mixing of groundwater between these two units despite large vertical hydraulic gradients across the CA/WCM interface. Outcomes of this assessment will be incorporated into an updated regional groundwater flow model of the Surat Basin Cumulative Management Area, which will in turn be used to improve upon the predicted potential groundwater impacts presented in the 2012 UWIR.

### Josh Moncrieff

Josh Moncrieff is a consulting hydrogeologist with over nine years of experience working with Klohn Crippen Berger in Canada, the UK and Australia. His work includes groundwater and surface water assessment and management for mines, oil and gas and oil sands projects, and water resource developers. He recently completed a year-long secondment with the Office of Groundwater Impact Assessment in Queensland, Australia, where he was involved with most aspects of the Condamine Connectivity Research Project.

