

**(Draft) Report on Hydrogeological Investigations  
Dooralong & Yarramalong Valleys  
Wyong, Central Coast, NSW**

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**Submitted to:**

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## EXECUTIVE SUMMARY

Hydrogeological investigations have been conducted in the Dooralong and Yarramalong Valleys, which form the headwaters and recharge zones for the central coast Wyong catchment. These investigations have resulted in:

- i. a more detailed hydrogeological characterisation of the valleys surface and groundwater;
- ii. a more detailed understanding of geological structures present in the valleys;
- iii. greater confidence in the prediction of potential impacts associated with coal seam methane production by Sydney Gas Ltd; and
- iv. development of a conceptual groundwater flow model.

The main issues of environmental significance is the possibility of dewatering groundwater aquifer systems, impacting on stream flow and water quality, land subsidence, damage to riverine ecosystem and leaching of gas during methane gas production.

Investigations indicate groundwater in the Yarramalong and Dooralong Valleys is encountered within four distinct weathered and fresh geological profiles. The near surface shallow colluvium and alluvial aquifers, sandstone aquifers, and deeper rock units, which include Newcastle Coal Measures. It has been concluded that there is a complex hydrogeological system, which nevertheless can be modelled using average and known aquifer hydraulic properties for the purposes of estimating likely impacts through dewatering.

Groundwater is interpreted as moving in a south easterly direction towards the valley lows, here it discharges into incised streams being the Wyong River in the Yarramalong Valley and Jilliby Creek in the Dooralong Valley. The water table is shallow with surface water and groundwater considered a single system that migrates towards the lowlands and lakes district of the central coast.

Water quality in shallow and near surface aquifers is high and of potable quality, as is the surface flows of Jilliby Creek and Wyong River which contribute approximately 50% of the central coast drinking water supply. The water quality of the coal seams is considered saline, highly mineralised and considered of low quality with analytes above the Australian Drinking Water Standard. Any cross contamination from the coal seams to overlying aquifers will impact on the availability and quality of potable domestic supplies for the central coast.

Conceptual hydraulic modelling has shown that dewatering of underlying coal seams in the valleys will impact on the overlying groundwater resource, which in turn has the potential to reduce stream flow and impact on the environmental ecosystem. Geological structures and high permeability values for near surface aquifer systems results in a possibility of higher groundwater velocities within discrete fracture zones within the aquifers, and high volumetric rates of groundwater movement. Modelling confirms the creation of a groundwater void in coal seams will result in waters migrating downwards towards the voids via regional and localised faults, fractures and joints sets. This water will then be pumped along with the low quality coal seam water effectively dewatering the valleys over time. This is particularly true during periods of low flow or during drought conditions.

The lowering of the groundwater table through coal seam dewatering will result in significant impacts to groundwater domestic supply bores, within the zone of influence of the commercial gas

wells, through a reduction in the quantity of available groundwater and the drying up of many wells for potable supplies. Commercial irrigation wells will also be impacted causing significant economic losses in agricultural production.

Environmental impacts to streams through the loss of surface flow caused by lowering of groundwater aquifers have the potential to kill off and reduce stream bank vegetation, trees and the associated loss of species. This impact will be further magnified through methane gas migration away from the well into overlying formations.

As coal seam methane production progresses it is anticipated that the coal will effectively shrink or slump as the hydrostatic pressures are reduced through dewatering. This can result in land subsidence and is highly probable as the Wyong area is a declared coalmine subsidence zone.

The final recommendation to be drawn from this report is that strong scientific fact exists that coal seam methane production in the Yarramalong and Dooralong Valleys, at the scale being proposed by Sydney Gas Ltd, will result in an unacceptable level of social, economic and environmental impact.

A halt to mining is recommended and no further licences issued in the valleys to allow for a full and comprehensive environmental impact study that incorporates a geological, hydrogeological and geophysical investigation to expand on this study. A key requirement of such a study would be long-term water monitoring of between four to ten years to collect an appropriate level of time series groundwater data prior to any further mining licence assessment by government.