ASSESSING AQUIFER COMPARTMENTALISATION IN THE DALY RIVER BASIN, NORTHERN TERRITORY: A HYDROGEOPHYSICAL APPROACH

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The presence of Neogene fault systems can have a significant impact on hydraulic connectivity of aquifers, juxtaposing otherwise disconnected aquifers, enhancing recharge and/or discharge or acting as barriers to flow and consequently compartmentalising groundwater resources. Previously, regional airborne electromagnetics (AEM) transects allied with groundwater investigations have pointed to the potential for localised compartmentalisation of the Daly River Basin groundwater systems. However, existing data is sparse, and equivocal.

In this context, the main aim of the Daly River Basin Project is to determine if compartmentalisation of the aquifers is a significant factor and thus should be explicitly considered in groundwater modelling and water allocation planning. The objectives of the project main goals of the project are to: (1) map Neogene faults through the use of airborne electromagnetic (AEM) and morphotectonic mapping, and (2) assess the permeability and transmissivity of mapped fault zones and their role in potential groundwater system compartmentalisation. Data acquisition includes 3325 line-kilometres of new AEM and airborne magnetics, ground (ground magnetic resonance (GMR)), and borehole geophysics, drilling, groundwater sampling and hydrochemical analysis, geomorphic and morphotectonics mapping. Hydrogeophysical, geomorphic and hydrogeological data will also be used to better understand groundwater-surface water connectivity and the potential for managed aquifer recharge schemes to replenish extracted groundwater resources. The outcomes of this project will inform decisions on water allocations and underpin effective and efficient groundwater use. This paper specifically reports on the ability of AEM and morphotectonics mapping to identify Neogene fault systems in the Daly River Basin.