

NORTHERN WATER

GREAT ARTESIAN BASIN REDUCED EXTRACTION STUDY – PROJECT SCOPE

SUMMARY

Infrastructure SA (ISA) has engaged the Goyder Institute to investigate the impacts of reduced groundwater extraction from the Great Artesian Basin. The overall objective of the work is to determine how a reduction in groundwater taken from the aquifers of the GAB impacts well pressure and subsequently spring pressure levels and flow rates. The study will use the GAB hydrogeological model developed by the SA Department for Environment and Water (DEW) to conduct predictive scenario analysis of the response of aquifer pressure to reductions in water extraction.

BACKGROUND

Water availability underpins the cultural, economic, environmental, and social values of water dependent ecosystems and is a critical factor limiting the growth of the South Australian economy through the Food, Wine and Agribusiness, and Energy and Mining sectors. Climate change and enhanced competition for finite water resources will further limit future water availability.

The Great Artesian Basin provides water for pastoral use, the Olympic Dam wellfields, and co-produced water associated with oil extractions in the Cooper Basin. There have been significant impacts on important cultural, economic, environmental, and social values of some of the GAB mound springs due to the extractions, as well as degradation by cattle and feral herbivores.

The GAB springs are listed under the EPBC Act. Action has been taken to reduce the impact of water extractions on the springs through Commonwealth, state and pastoralist investment into bore remediation/decommissioning and stock water piping systems to reduce water wastage, and improve water efficiency to recover artesian water pressures. Further, regulation and management aimed at judicious use is underpinned by the Far North Prescribed Wells Area Water Allocation Plan (WAP) (2021).

The South Australian Government established the Northern Water project to investigate the feasibility of a desalination plant and pipeline to supply water to the north of the state to support mining, energy, defense, and agricultural activities. The project has the capacity to provide an alternative water supply to end users that currently extract water from the GAB.

SCOPE

Key Objective

This study will provide an initial assessment of the impacts of reduced water extractions on the pressure heads around springs and can provide a broad indication concerning impacts on mound spring flow at the super group, group, or complex level (Gotch. 2013).

Knowledge Gaps

A key knowledge gap limiting this research is the understanding of the relationship between aquifer water pressures and spring artesian head and groundwater discharge from springs.

While Green and Berens (2012) recognised the complexity inherent in spring conduit formation and maintenance means there is no direct correlation between spring flux and pressure head, the study recognised and discussed the importance of the primary relationship between pressure head and spring flow and therefore spring robustness. Green et al. (2012) recommended that ongoing measurement and interpolation of pressure head near springs should be a key monitoring and management protocol for spring conservation.

A key limitation for Green and Berens (2012) to further explore the relationship between pressure head and spring flow from a risk assessment perspective was the lack of a suitable tool to undertake such an assessment. Such a tool required an adequate degree of sophistication that cumulative drawdown impacts across a complex hydrogeological architecture and hydrodynamic regime could be factored into assessment.

Approach

The South Australian Department for Environment and Water (DEW) has developed a GAB groundwater model to assess the response of aquifer pressure to different water extraction regimes. This includes the cumulative impacts from various users on pressures in the vicinity of springs' complexes.

This model can simulate aquifer pressure responses to reductions in water extraction from the Olympic Dam wellfields found in the GAB. This includes the likelihood of increased flows and/or recovery of flows from springs that have expired, which can later be used to explore the cultural, economic, environmental, and social responses to the different water extraction scenarios.

The research team will investigate the use of the DEW model for assessing the impact of reduced extraction from the GAB. The following activities will be undertaken:

- Literature review and gap analyses of the relationship between aquifer pressure and spring pressure and flow rate and hydrogeological conceptualisation of the GAB.
- Initial water extraction scenario modelling utilising DEW's regional model to gauge likely artesian pressure recovery due to reductions in extractions and accounting for cumulative impacts from other sectors.
- Development of potential future extraction scenarios in collaboration with Infrastructure SA, DEW and relevant stakeholders based on current and potential future water allocations and potential water extractions. Up to 6 different modelling scenarios will be run regarding the rection of groundwater taken from the GAB aquifer.

- Analysis of potential changes in the robustness of mound springs pertaining to groundwater pressure. Utilise the model to infer the possible increase in spring-associated flux due to changes in water extraction at the spring group or supergroup level and better define the relation between spring flow and pressure change.

PROJECT OUTCOMES

The Northern Water project aims to provide an alternative source of water to users in the Far North of the State. The main outcome of the Goyder project is to provide Infrastructure SA with an independent and scientifically rigorous assessment to determine if positive environmental benefits may be realised for mound springs in the region if the alternative source of water is available and users reduce extraction from the GAB. This assessment will assist in the justification for investment in the Northern Water project.

The project will not make any conclusions or recommendations about the sustainability or otherwise of past, current, or future groundwater abstraction.