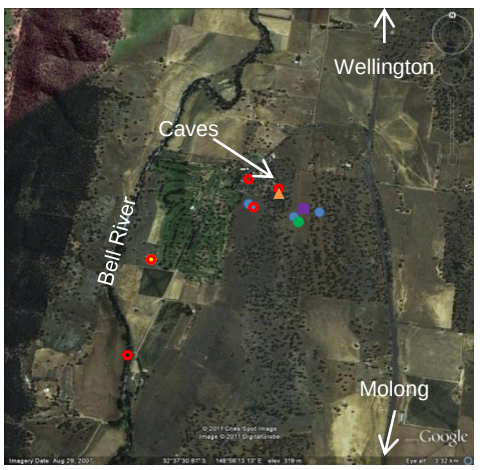
The Super Science Initiative at Wellington Caves

Understanding groundwater systems has always been hampered by a lack of data. Groundwater investigations in other areas of the world have been spear-headed by research at focus sites, where a very high density of information has been obtained. The intensity of data obtained at these sites led to significant research breakthroughs, particularly in understanding processes of contaminant movement through aquifer materials. The new knowledge thus obtained could then be applied at other sites that did not contain such high density of installations.

Until now, Australian groundwater research has not had the benefit of such highly instrumented sites, and has usually been limited to data obtained from existing government observation bores. In 2010 the University of New South Wales, a partner of National Centre for Groundwater Research and Training (NCGRT), has received $15 million funding from Department of Innovation, Industry, Science and Research (DIISR). This Super Science funding is to be spent on advanced monitoring field infrastructures at five sites throughout Australia. This will give Australia a number of sites with a high intensity of data, which will provide a focus for groundwater research over the next few decades. The sites will be the focus of research into groundwater flow and solute transport processes, interactions between groundwater and river systems, and between groundwater, vegetation and climate. It is anticipated that research findings from these sites will provide knowledge and methodologies that can be applied throughout Australia, and greatly assist implementation of the National Water Initiative.

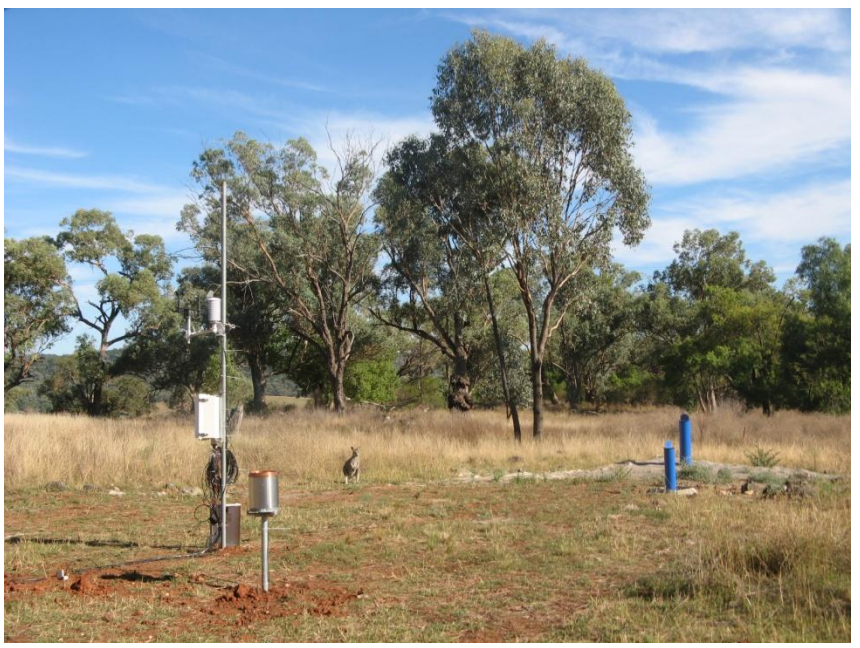
WELLINGTON CAVES

Wellington Caves is one of the three sites comprising the larger Wellington Super Science site. Wellington Caves are located in the Devonian age (approximately 400 Million year old) limestones of the 'Garra formation'. The caves are notable for the fact that they intercept the groundwater at several locations, with significant amounts of cave passage only accessible to divers. The caves therefore provide unique direct access to the groundwater, and the groundwater flow systems at Wellington are considered to be representative of the extensive limestones that exist in NSW.



- New borehole
- New borehole with water level and temperature logger
- Existing NSW Office of Water borehole
- Existing borehole with water level and temperature logger
- Water level and temperature loggers in caves
- Drip loggers
- Limestone core
- Automatic weather station

Wellington Caves also provide an insight into the connectivity of groundwater and surface water. Overlying the Garra formation are alluvial sediments and the Bell River. The Bell River is typical of rivers which flow over limestone in that it has intermittent flow indicating connectivity with the rock below. However the extent to which the river water and groundwater in the alluvial sediments and limestone are connected is poorly understood.



Super Science funding at Wellington Caves includes the following infrastructure:

- A series of boreholes between the Mitchell Highway and the Bell River, passing just south of the limestone caves at Wellington. The groundwater pressure distribution is being established by water level loggers in the bores and where groundwater is intercepted in the caves.
- Numerous drip loggers have been installed in Cathedral Cave to determine the nature of water movement through the limestone.
- A climate station has been established above the caves to quantify the local water budget, and is part of a larger climate monitoring network at the three Wellington Super Science nodes.

ACKNOWLEDGEMENTS

The Department of Innovation, Industry, Science and Research (DIISR).

For further information: www.groundwater.com.au/ncgrt/super-science
www.connectedwaters.unsw.edu.au

An Australian Government Initiative

NATIONAL CENTRE FOR GROUNDWATER RESEARCH AND TRAINING

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