How will climate change affect the design of major infrastructure works?

Investigation into climate change impacts on groundwater levels to assist development of the construction brief for the Torrens Road to River Torrens infrastructure profect

This project was undertaken using the SA Climate Ready data, which is helping to improve planning and decision making and make South Australia the most climate ready State in the nation.

Project partners:

Government of South Australia

Department of Environment, Water and Natural Resources

Department of Planning, Transport and Infrastructure

Project Case Study: C.1.1.6/2015

Changing rainfall patterns in the future will influence groundwater recharge rates and the depth to groundwater as well as the size and frequency of floods in Metropolitan areas. Better planning and design now will save costly retrofitting of major infrastructure in the future.

Why undertake the project?

Adelaide's North-South Transport Corridor runs between Gawler and Old Noarlunga. The next part of the corridor will be a 3.7 km section of road between Torrens Road and the River Torrens. This project will significantly improve travel times along South Road.

The Australian and South Australian Governments have committed $896 million to construct the Torrens Road to River Torrens Project.

The Torrens Road to River Torrens project includes a lowered non-stop motorway, set approximately 8 metres below the existing surface of South Road, intercepting the level of water table. Investigations were required to determine the risk of local groundwater rising above historically observed levels, under projected future rainfall patterns.

What was done?

The project used models to convert rainfall information into estimates of the depth to groundwater at the construction site. Using the SA Climate Ready data for intermediate and high emissions scenarios, the project team compared historical depth to groundwater with projected changes in depth to groundwater for the period 2015 to 2090.

What did we learn?

The modelling found that groundwater levels at the site of the lowered roadway are projected to decline due to rainfall changes.

Under the intermediate emissions scenario by about 2055, 90% of all model results showed groundwater levels would be permanently below historic water levels (1980-2014). Under the high emissions scenario, this occurred by 2035.

By 2070 the median projection was for groundwater levels to fall by 3 m at the site due to rainfall decline under the intermediate emissions scenario, and by 6 m under a high emissions scenario, compared with recent historic groundwater levels.

The implications of this analysis are that the project can proceed with a low chance that future climate change will increase water levels in a way that could damage the lowered roadway.

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The Goyder Institute for Water Research is a partnership between the South Australian Government through the Department of Environment, Water and Natural Resources, CSIRO, Flinders University, University of Adelaide and the University of South Australia.

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