NSW Health

Guidance for LWUs on assessing groundwater source protection level

This guidance is intended to assist local water utilities (LWU) in characterising the level of protection of their groundwater sources and the public health risks associated with pathogenic microorganisms in those sources. This information in combination with the NSW Health *Cryptosporidium* risk assessment model is required for a reliable assessment of the source's microbial health-based target (HBT) catchment risk category, to meet the requirements of the *Australian Drinking Water Guidelines*.

LWU's should assess as much information available, as described below, to better understand their sources. Depending on the aquifer type, not all the information may be needed to make a determination. The information compiled should be used to answer key questions about the potential health risks from groundwater:

- How does the aquifer get recharged? What type of aquifer is it? Is there any hydrogeological evidence that the aquifer is confined and sufficiently protected from downward flow?
- Are there pathogen risks in the predicted recharge area for the bore?
- How much protection from surface influence is provided by the soil and rock overlying the aquifer?
- Do bore construction details and casing integrity condition prevent cross-contamination by water ingress from surface and other water-bearing zones to the target aquifer?
- Is water from the bore usually low in turbidity and have there been reports of dissolved material that might interfere with effective disinfection?

If limited information is available to inform the level of protection of the groundwater source, the water utility should consider engaging an external contractor to gather the outstanding information and assess the level of risk from pathogens. Potential activities can include downhole inspection, aquifer testing or hydrogeological assessment, potentially also including a predictive contaminant transport and decay model where relevant.

Utilities should share reports from such investigations with their local Public Health Unit, along with their self-assessment of the level of protection of the groundwater source and associated risks. There may be benefit in some cases for the LWU to conduct a dedicated risk assessment, with the Department of Climate Change, Energy, the Environment and Water and Public Health Unit participation, into which the compiled information could feed.

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Information needed	*Parameters of interest*	*Possible source of information*
Bore details	Total depth	Drilling and construction logs Downhole inspection reports Bore rehabilitation reports Utility records
	Depth to top of screens	
	Screened interval length	
	Presence of a grout seal above the screens	
	Current bore state (overall, casing integrity, protective bore head presence and integrity)	
	Age/history of repairs/ maintenance	
Hydrogeology/ geology *How much protection from surface influence is provided by the soil and rock overlying the aquifer?*	Aquifer name and material	Hydrogeological investigation report Drilling logs for this and nearby bores Aquifer testing report Geophysical studies Australian Groundwater Explorer from Bureau of Meteorology
	Confined/ partially confined/ unconfined	
	Permeability, transmissivity	
	Depth to groundwater; does this change in response to rainfall?	
	Depth to top of aquifer and aquifer thickness	
	Soil type and thickness	
	Predominant material in the vadose (i.e. unsaturated) zone	
Pumping regime	Seasonal / year-round, and pumping rate	Council utility manager & operators
Groundwater vulnerability	Existence of an established wellhead protection area (WHPA)	Utility wellhead protection planning
	Town water supply groundwater vulnerability assessment and index	Modified DRASTIC index and Land Use index from DCCEEW's Town Water Supply Groundwater vulnerability assessment framework and tool
	Evidence of groundwater-surface water interaction	Hydrogeological investigation reports
Water quality information	Radiological activity	Gross alpha and gross beta screening (NATA accredited)
	PFAS concentrations	NATA accredited laboratory test
	Indicators of faecal contamination Inorganic chemical concentrations Physical characteristics; how do these characteristics change in response to rainfall? Pesticide concentrations	NSW Health Pathology groundwater investigation project

Information needed	*Parameters of interest*	*Possible source of information*
Distance to contamination sources	Is the bore located in a flood-prone area? If so, how often does flooding occur?	Hydrological reports Australian Groundwater Explorer from Bureau of Meteorology GIS Mapping Council records (DWMS risk assessment, onsite systems) NSW EPA contaminated land record of notices NSW EPA list of notified sites
	Distance to potential sources of groundwater contamination (point-source/ diffuse source/ surface water infiltration zone)	

New bore testing guidance

When commissioning a new bore it is important to assess the risks from the recharge area to identify any chemical characteristics that need testing, especially pesticides and PFAS. Contact your local Public Health Unit to discuss setting up a project to support testing a new drinking water bore. This can include providing barcodes for samples that are tested at other laboratories.

Samples should be collected when field tests such as pH and temperature indicate that water being pumped from the bore has settled to consistent quality. This water should be representative of the aquifer from which the bore is drawing.

Collect samples for:

- *E. coli* and total coliforms for testing by NSW Health Pathology
- the regular inorganic chemistry suite by NSW Health Pathology
- gross alpha/gross beta screening through an appropriate laboratory, by ANSTO or ARPANSA
- pesticides through NSW Health Pathology, where indicated by the risk assessment
- PFAS through a laboratory that can test to below the *Australian Drinking Water Guideline* values, where indicated by the risk assessment
- other organic compounds as identified through risk assessment e.g. BTEX where there is a risk of contamination from fuel storage, where indicated by the risk assessment

A wider range of inorganic characteristics can be tested by NSW Health Pathology if indicated by the risk assessment.

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