

FORM TITLE – Project Scope Development (PSD)

	Description	Provide Comments
Title	Understanding future water quality risks under low and variable water level conditions	
Project Type	<input checked="" type="checkbox"/> State-of-knowledge <input type="checkbox"/> Problem Definition <input checked="" type="checkbox"/> Knowledge Generation <input checked="" type="checkbox"/> Knowledge Transfer <input type="checkbox"/> Knowledge Adoption <input type="checkbox"/> Benefit Realisation	
Problem	Water levels in dams and reservoirs are likely to be consistently lower and more variable in a future climate where rainfall-runoff will decrease and become more sporadic in many areas of Australia. Demand for water supply and recreation may also intensify in some areas with changing demographics and demand for recreational water use, as well as having to maintain water levels to provide for ecosystem life-supporting capacity in some cases. These changes are likely to present major challenges for the water industry to manage water quality and quantity.	
Background/ Description:	There is potential for water quality to be impacted by lower and more variable water levels in dams and reservoirs. Importantly, there is some evidence that recovery of water quality from extremely low water levels may not occur or may at least be delayed. Symptoms of poor water quality relate to increased occurrence of cyanobacteria (=blue-green algae) blooms, and particulate (e.g., inorganic sediment) and dissolved organic matter, including taste and odour producing compounds, as well as increased potential for short-circuiting of pathogens and other contaminants from inflows to dam and reservoir offtakes.	
Objectives:	<ul style="list-style-type: none"> • Desktop summary of the effect of low water levels on dam and reservoir water quality, including review of tools / current numerical models • Develop and validate conceptual models for select case studies • Develop risk assessment tool using Bayesian network • All tools to be web based 	
Scope/ Deliverables:	<p>This project will develop a comprehensive understanding of water quality impacts from low and variable water levels. The project will include five main components:</p> <p>1) Gathering literature and key examples of effects of low water levels on dam and reservoir water quality from utilities across Australia, to provide a basis for a comprehensive review on this topic. International literature may be included where it is directly relevant.</p> <p>2) Through the review in (1) and in workshops and consultation with water utilities, developing a theoretical underpinning and proposing a conceptual model to help guide utilities in assessing the likely effects of low water levels and selecting suitable mitigation actions.</p>	

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	<p>3) Leveraging current and recent numerical model applications to dams and reservoirs in Seqwater, SA Water and Melbourne Water, and summarising outputs related to climate change and water level scenarios. This work will support and validate the conceptual models developed in (2). Additional modelling will be undertaken for a select number of cases (i.e., specific dams and reservoirs) to further explore water level variations and develop consistent climate change scenarios (e.g., with respect to Global Climate Models, Representative Concentration Pathways (RCP) scenarios and the future period of interest).</p> <p>4) Use of the conceptual framework (from (2)) and model sensitivity analysis (from (3)) to identify parameters that have greatest uncertainty and the processes that are poorly represented in the models. This work will provide the basis for more focused field and modelling research on these processes.</p> <p>5) Development of a risk assessment tool which may include use of alert levels (e.g., based on water levels or rate of water level change) to help inform management, including implementation of water restrictions and necessity to adjust water treatment processes. A Bayesian Network will be used in the risk assessment and to characterise some of the uncertainties around water quality predictions.</p>	
Stakeholders	Seqwater / Melbourne Water / SA Water etc.	
Investigative or Research approach	Our research methodology is mostly aligned with the five aims given above (Scope/deliverables).	
Indicative Funding required:	<input type="checkbox"/> Small (<\$100k) <input checked="" type="checkbox"/> Medium (\$100-\$500k) <input type="checkbox"/> Large (>\$500k)	
Duration/Start	<input type="checkbox"/> Short (<6 months) <input checked="" type="checkbox"/> Medium (6-18 months) <input checked="" type="checkbox"/> Long (>18 months) Start: March 2020	