SEGRA Challenge 2015-16
Securing Adequate Safe Domestic Water for Rural and Remote Regional Australia
Draft Proposal for a Collaborative Research Project

Rationale and Purposes

Over the past decade, water has emerged as consistent theme at ***SEGRA*** conferences and was most prominent in the 2013, 2014 and 2015 ***SEGRA Challenges***. Strong arguments were made by participants at the 2015 ***SEGRA Challenge*** workshop session for *Secure and Safe Water* that the provision of adequate and pathogen free domestic water supplies hinges on four essential variables. Namely:

- reliability and quality of the resource being used
- statutory and governance regimes for water resource management in the specific jurisdiction
- commitment of providers to ensuring that the environment and population health of the communities using the water is protected
- infrastructure and technology used to deliver domestic supplies is appropriate to the particular situation and cost effective.

Australia wide, each of the aforementioned variables differs greatly due to geographic and demographic realities and this makes it difficult to either generalise or draw valid comparisons between jurisdictions and regions. Arguably, it requires a collage of jurisdictional case examples and local 'snap-shots' to build a national perspective on how domestic water is currently being provided in regional Australia. This information is essential for informing 'best practice' for the provision of adequate secure and safe domestic water supplies in rural and remote regions. To this end, the purposes of this proposal for a collaborative research initiative are to:

- raise governmental and community awareness of the population and environmental health dimensions of the need to secure adequate safe domestic water supplies for communities and isolated properties in rural and remote catchment regions
- develop and demonstrate a methodology that can be tailored to geographic and governance realities for systematically gathering information on ambient water quality, current water treatment practices and patterns of consumption
- survey the water quality and level of safe water provision in selected rural and remote catchment regions in Queensland as a first step in building a national perspective
- determine the key impediments being faced by Local Government for the provision of adequate supplies of healthy domestic water to small communities and isolated properties
- suggest a pathway way for collaboratively building a national picture on the quality of water being sourced, treated and used in rural and remote regional Australia from the 'bottom-up' and the 'top-down'

Current and potential development areas to the west of the Great Dividing Range in Queensland (**Map 1**) are largely dependent on poorly understood surface and ground water resources. In this context, primary industry based economic activity in regional areas can be severely imperilled by extreme weather and changing climatic conditions. And these factors can also impact on the provision of domestic water supplies.

For the proposed project, domestic water is defined as: *Water used day to day by people for indoor and outdoor household purposes including drinking, preparing food, bathing, washing clothes and dishes, brushing teeth, garden watering, pools and children's play.* Domestic water is used either as a treated or an untreated resource.

Ground water resources are also problematic for domestic supplies, irrespective of whether it is provided by Local Government Authorities (LGAs) or privately. Specifically, there are a range of water quality issues from aesthetic (colour and odour) to potential health risks due to natural contaminants such as iron, sulphur, manganese, calcium and salinity. As well, there is the potential for the presence of bacteria and pathogenic organisms such as *Naegleria fowleri.* This organism can cause primary amoebic meningoencephalitis (PAM), a rare but severe brain illness, which is usually fatal.

Proposed Project Study Areas

Two major catchment basin areas have been identified for initiating this project. They are: the catchments draining into the Gulf of Carpentaria (the Gulf Rivers Region); and the Darling catchments of the Murray-Darling Basin (MDB), north of the Queensland-NSW border. These areas are delineated on **Map 1** and together they provide a geographic context for linking three areas of issue raised at recent ***SEGRA*** conferences, namely:

- meeting population health imperatives by ensuring that public and private domestic water supplies in rural and remote regional areas are adequate and safe
- understanding the role of adequate and safe domestic water supplies in the economic and social development of North Australia and the Murray-Darling Basin (MDB)
- using integrated water management (IWM) to achieve balanced water resources allocation for the MDB in the face of changing climatic conditions

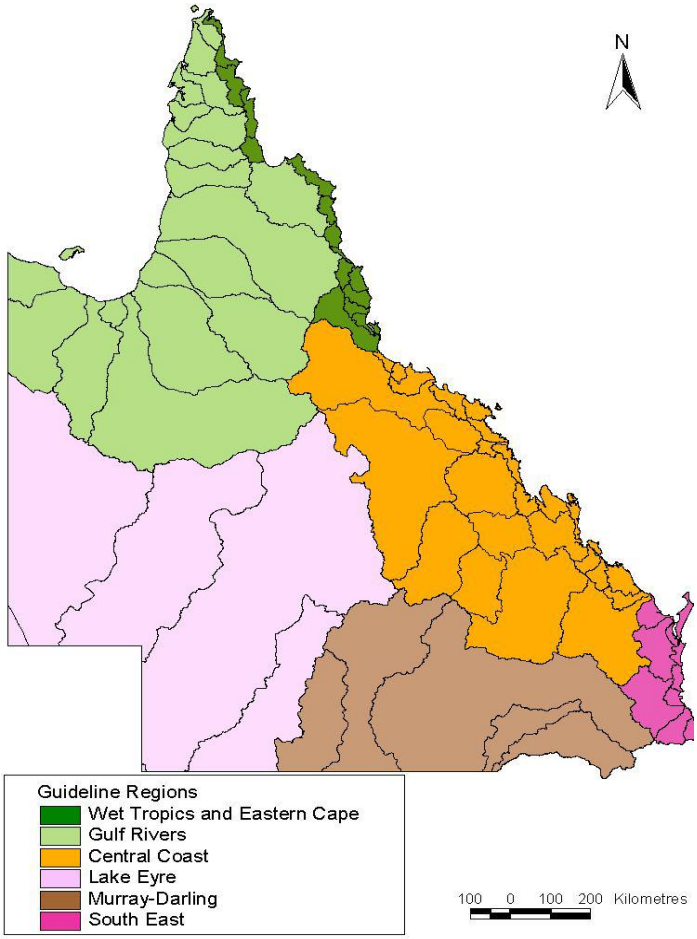
Water Quality and Drinking Water: Statutory Realities and Guidelines

Statutory management of all sources and uses of water in Queensland is pursuant to the Water Resources Act 2000 and is done on a regional basis. A surface water quality network has been operating since 1969 with sampling stations in most major catchments. Data can be accessed and reviewed online through: http://www.qld.gov.au/environment/water/quality/monitoring/. And this should be done as a scoping task at the initiation of the project.

The publication by the Queensland Department of Environment and Heritage Protection (DEHP) titled *Queensland Water Quality Guidelines* (DEHP 2009) reports that: *For most human uses of waters (e.g. drinking, recreation, irrigation) guideline values are generally applicable across all of Australia and therefore national guidelines for these uses will remain the main source of guideline information.* DEHP (2009) provides a compilation of the relevant national and state level guidelines for human use of water and notes that 'state-level guidelines would normally take precedence over national guidelines'. National guidance on water quality is provided in NHMRC/NRMMC. (2011) *Australian Drinking Water Guidelines Paper 6 National Water Quality Strategy*. National Health & Medical Research Council, National Resource Management Ministerial Council, Commonwealth of Australia, Canberra.

Proactive guidance with a specific focus on health risks is provided in Water Services Association of Australia (2015) *Project Report: Drinking Water Source Assessment and Treatment Requirements, Manual for the Application of Health-Based Treatment Targets*, WSA 202—2015-1.2, September. Specifically, WSAA (2015) state that: *The application of a Health Based Target in this manual is*

restricted to consideration of the source challenge and water treatment capability and performance. This is in line with the 2009 NHMRC discussion paper and overseas practice (e.g. WHO and USEPA). The objective of the guidance in this Manual is to ensure that drinking water entering the distribution system meets the HBT.



Map 1: Regions Adopted for the Queensland Water Quality Guidelines
Source DEHP (2009)

They go on to say that: *This Manual should not be interpreted as diminishing the responsibility and obligation for utilities to manage water quality risks from catchment to consumer. The obligation still rests with utilities to prevent deterioration of water quality in distribution systems by implementing appropriate safeguards and practices to maintain a sealed system and manage ingress, cross connection and backflow risks*.

Drinking Water Quality Management Plans

The Queensland *Water Supply (Safety and Reliability) Act 2008* applies to all drinking water service providers in Queensland. In general, *this includes all councils or businesses involved in treating, transmitting or reticulating water for drinking purposes*. For rural and remote Queensland, either LGAs or private bodies such as Indigenous communities or tourist enterprises or mining companies are responsible for providing a safe and reliable water supply and rectifying any problems that may occur.

Under the Act, the regulator neither manages drinking water supplies nor has any operational control of individual provider's systems. Also, the regulator will not intervene on behalf of customers/consumers when issues arise over the quantum and quality of supply. Each provider is required to have a Drinking Water Quality Management Plan (DWQMP) in place, and comply with the details of the plan. As the 'Queensland Water Supply Regulator', the Department of Energy and Water Supply cooperates with providers to ensure their plans meet the requirements of the Act.

The purpose of a DWQMP is to *implement a risk-management approach to maintaining drinking water quality*. Templated guidelines are provided to assist with the preparation of DWQMPs. The Department states that there are no exemptions from preparing a plan; and the requirement can be brought forward at the regulator's discretion. Ideally, this statutory framework should ensure that domestic water supplies in rural and remote regions are secure and safe. However, this may be difficult for the Gulf Rivers Region (delineated in **Map 1)** because it is a major region for which there is little or no local water quality data and local water types have not yet been defined. The 2009 policy of the Department of Environment and Heritage Protection (DEHP 2009) takes the position that the ANZECC default characterisation of freshwater types are not particularly useful for the Gulf rivers region and that *the ANZECC 2000 Guidelines may not be particularly appropriate and the collection of at least some local data is strongly recommended*.

There are no Queensland Water Quality Guidelines (QWQG) for either the Gulf Rivers or the Darling catchments and DEHP (2009) notes that although users may default to the ANZECC 2000 Guidelines these are unlikely to be appropriate, particularly for intermittent and ephemeral streams. On this basis, LGAs in the Gulf Region, for example, have been strongly encouraged to seek governmental or other research institutional support collect local data and develop local guidelines for collation and dissemination at regional and sub-regional scales. This is essential for setting standards and the preparation of DWQMP's and meeting other statutory requirements.

In October 2015 Queensland Health issued technical advice for rural property holders on health risks and how to manage them in the publication *Safe water on rural properties*. This document will underpin the 'action plan' to be put in place prior to the pilot water quality scanning to be undertaken in Etheridge Shire. The action plan will provide guidance on immediate responses to be taken by property holders in the event of unsafe domestic water being found on their properties.

Role and Responsibilities of Local Government

Across Queensland the quantity and quality of water in towns and communities is a major challenge for LGAs who have accepted statutory responsibility for providing domestic supplies. State and territory governments are largely responsible for the provision of public water supply services in rural and areas of the other Australian jurisdictions. Albeit often in collaboration with Local Government.

Addressing the provision of secure and safe domestic water is vexed area of issue for regional LGAs in Queensland. Specifically, LGAs are responsible for domestic water services in towns and settlements but in many cases where the populations are small they are under resourced to adequately meet either statutory requirements or community expectations and needs.

Farming and pastoral properties in regional Queensland are expected to meet their own household requirements and ensure that the water is not a health risk. And this is done in the absence of any regulatory requirements. LGAs often provide water using water tankers to rural properties when supplies run out in times of prolonged drought. This situation currently applies to areas in the

proposed subject catchments (**Map 1)**. The safety of domestic water used on these properties is unknown and is one of the challenge to be addressed through this collaborative research proposal.

Aim and Objectives of the Project

The overarching aim of the project could be to: *support the sustainable provision of adequate safe domestic water supplies for people in rural and remote regional Queensland.*

The objectives to be achieved to attain the aim are as follows.

- Document community attitudes, understanding and behaviour with respect to the provision of adequate secure and safe domestic water supplies.
- Provide broad quantitative and qualitative information on water quality conditions and levels of water treatment being used by LGAs to meet statutory water planning and services requirements.
- Document the status of water quality conditions and water treatment provisions for remote settlements and isolated properties in the subject catchment areas.
- Propose long term measures to ensure that domestic water supplies for communities and individual homesteads are adequate and safe.

The renewed global agenda for development, the Sustainable Development Goals (SDGs), overtly embraces two critical features of Integrated Water Resources Management (IWRM), system-thinking and local participation, representing a significant step towards water decisions that are holistic and sustainable. And SDGs provide an aspirational underpinning for the proposed initiative.

Approach, Phases and Timelines

The problems being confronting the sustainable provision of adequate secure and safe domestic water are long standing and it will require a carefully staged program to identify, test and evaluate solutions. An integrated adaptive assessment and management (IAA&M) approach could be followed under an overarching framework of IWRM. By following this approach, knowledge and experience will increase iteratively and a practical pathway towards sustainable adequate and safe domestic water supply solutions can be developed. And this will be done within the ambit of Queensland and Australian drinking water guidelines.

IWRM is a *process* that *"promotes the coordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems"* (see Global Water Partnership (2000), *Integrated Water Resources Management*, Global Technical Advisory Committee, Background Paper no.4). The aim of IWRM is to provide a holistic approach whereby all social, economic and biophysical aspects of decisions are considered. And this includes the provision of adequate safe supplies of domestic water.

Methodologically, an IWRM approach that embeds community water planning (CWP) and Health Based Target (HBT) could be considered for LGAs in the Gulf Rivers Region and the Upper Darling (**Map 1**) for developing DWQMP's and other statutory documentation. This approach would be informed by the WSAA Manual and the NHMRC 2011 *Australian Drinking Water Guidelines - Community Water Planner: A tool for small communities to develop drinking water management plans.* The Community Water Planner (the Tool) is a web-based tool developed collaboratively by NHMRC and the National Water Commission to assist managers of remote community water supplies in managing microbiological, physical, chemical and radiological water quality risks.

In this context, **Stage 1** could be a four phased project commencing April and to be completed by December 2016. The phases and key tasks are as follows.

Phase I: *Scoping and Project Inception (April-June)*

- Confirm project partners and responsibilities
- Agree priority inputs and outputs from each partner and deadlines
- Finalise survey instruments
- Confirm water quality parameters to be measured and sampling protocols
- Collate and review existing surface and groundwater monitoring data (eg as through http://www.qld.gov.au/environment/water/quality/monitoring/)
- Develop and initiate community engagement and awareness strategy
- Pilot the conditions survey in the Gulf Rivers Region and water quality data collection in Etheridge Shire
- Evaluate input material from survey and data collection
- As necessary, recast engagement, communications and data collection to fit with resource realities

Phase II: *Project Implementation (July-September)*

- Extend community engagement and awareness strategy to cover the subject catchments
- Roll-out the conditions survey and water quality sampling in the Upper Darling Catchments and the Gulf Rivers Region.
- Review effectiveness of methodology and re-cast approach if appropriate

Phase III: *Information Consolidation and Interim Reporting (October)*

    - Collate material from community engagement and awareness activities
    - conditions survey
    - water quality survey

- Review effectiveness of methodological approach, identify information gaps and remediate if appropriate
- Synthesise material and draft interim report

Phase IV: *Project Evaluation, Reporting and Re-planning (November-December)*

- Evaluate and document effectiveness of community engagement and awareness activities
- Document and review water service provision, water quality and patterns of use
- Assess and document sustainability technology requirements to ensure domestic water is adequate and safe
- Prepare a consolidated project report and provide a recommended path forward to:

    - meet the requirements of the Lake Eyre draining catchments (**Map 1**)
    - address concerns arising from community engagement activities and water quality conditions work
    - propose and rationalise future stages

Potential Partners and Resources

Collaborating scientists and engineers as well as strategic advice and in-kind support could come from (for example):

- University sector
    - Institute for Land, Water and Society (ILWS), Charles Sturt University
    - School of Earth, Environmental and Biological Sciences, Faculty of Science and Engineering, Queensland University of Technology
    - School of Science and Engineering, Faculty of Science, Health, Education and Engineering, University of the Sunshine Coast
    - Institute for Agriculture and the Environment, University of Southern Queensland
- Queensland State Government bodies,
    - Queensland Health,
    - Department of State Development
    - Department of Local Government
    - Department of Energy and Water Supply
    - Department of Natural Resources and Mines
    - Department of Environment and Heritage Management
- Community organisation sector
    - SEGRA Foundation
    - Local Government Association Queensland (LGAQ)
    - Murry-Darling Association (MDA)
    - Northern Gulf Resource Management Group
    - Southern Gulf Resource management Group
    - Queensland Murray-Darling Committee Inc
- Water industry sector
    - Advanced Water Group (AWG) Pty Ltd
    - Water Engineers Sustainable Solutions (WESS) Pty Ltd
    - Aeramix Pty Ltd

Etheridge Shire Council (ESC) would be the location for pilot scale community awareness activities and information collection and collation and initial water quality scanning.

The level of funding and the commitment and in-kind contribution of collaborating partners is unknown. Budget planning and human resources to be committed will be determined when:

- an adequate level of research funding to initiate the project has been secured
- the project governance and contribution of collaborating partners has been negotiated
- the deliverables of individual researchers is agreed
- the information dissemination pathways have been identified

Measurable Output and Outcomes

Product from the collaborative integrated research could include:

- documentation of the effectiveness of engagement, communications and information dissemination methods and techniques used
- hard data on what are the domestic water supply conditions in the subject catchments
- identification and evaluation of sustainable supply and treatment systems suited to drought stressed rural and remote locations
- peer reviewed papers and innovative communications and awareness materials

Outcomes seen as indicators of the success of ***Stage 1*** of the project could include the following.

- Measureable improvement in the quality of water being used for domestic purposes.
- Better informed community conversations on domestic water supply provision as measured by articles in the media, complaints to local authorities and letters in local papers.
- Reduced presentations to primary health care providers and hospital of people with sickness resulting from the consumption of unsafe water.
- Timely positive changes in governance to ensure that LGAs are better resourced to meet their statutory requirements in the provision of domestic water supplies.
- Measured increases in the level of investment in sustainability technology to ensure that domestic water supplies are safe.

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5 April 2016