

# Case Study

## Site Based Competency Assessment for Drinking Water Operators



## Introduction

### Evaluation and Verification of Operator Competency

This case study describes the process of operator **competency development, site-specific competency evaluation and ongoing skills development** at Queensland Bulk Water Supply Authority QBWSA, operating as Seqwater. This is illustrated through Seqwater's training program for Water Treatment Plant (WTP) operators, which involves; **development, support and growth** of operator competence.

A key feature of the training program is the use of a **Site Based Competency Assessment (SBCA)** for WTP operators, which have also been developed for other operational functions in dam and catchment operations at Seqwater. These SBCAs have been developed as an important step in the recognition of the skills, knowledge and experience of trained and competent operators. The support of operator competence through a formal process of site-specific competency evaluation is a progressive approach by Seqwater in supporting WTP operator competency development. The following sections of this case study describe how the Seqwater training program works, as well as analysing the benefits and identifying any future plans for improvement.

### Queensland Bulk Water Supply Authority (Seqwater)

Seqwater was established in 1 July 2008 through the South East Queensland Water (Restructuring) Act 2007. In January 2013, further legislative changes gave Seqwater the management, operation and maintenance of bulk [drinking water pipelines](#) previously provided by [LinkWater](#); the [water grid](#) management services provided by the [SEQ Water Grid Manager](#); and the long-term planning functions of the region's future water needs

Seqwater is the Queensland Government statutory authority responsible for providing a safe, secure and cost-effective bulk drinking water supply for 3.1 million people across the South East Queensland region (Figure C3.1). Seqwater works with water service provider partners - Unitywater, Queensland Urban Utilities, and the water service providers covering Redland, Logan and City of Gold Coast councils. Together these utilities provide safe drinking water to communities as part of an integrated water supply system - from catchment to customers' taps.

Additionally, Seqwater provides irrigation water to around 1,200 rural customers in seven water supply schemes, as well as essential flood mitigation services. Seqwater's operations extend from Gympie to the New South Wales border, and west to the base of the Toowoomba ranges. This makes Seqwater a significant player in Australia's water industry, with a large geographical spread and diverse asset base.

As of August 2018, there were 95 employees of Seqwater, who are responsible for water treatment, organised across three geographical regions and into a further five sub regions.

Similar to many water utilities across Australia, Seqwater faces the challenge of succession planning for an ageing operational workforce, with 25% of its water treatment operators reported to be aged 55+ in 2018. It is expected that operators within this age category will look to retire within the next 5 - 10 years.



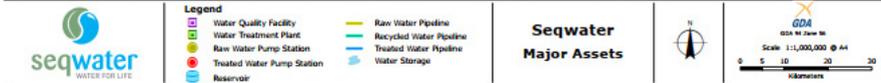
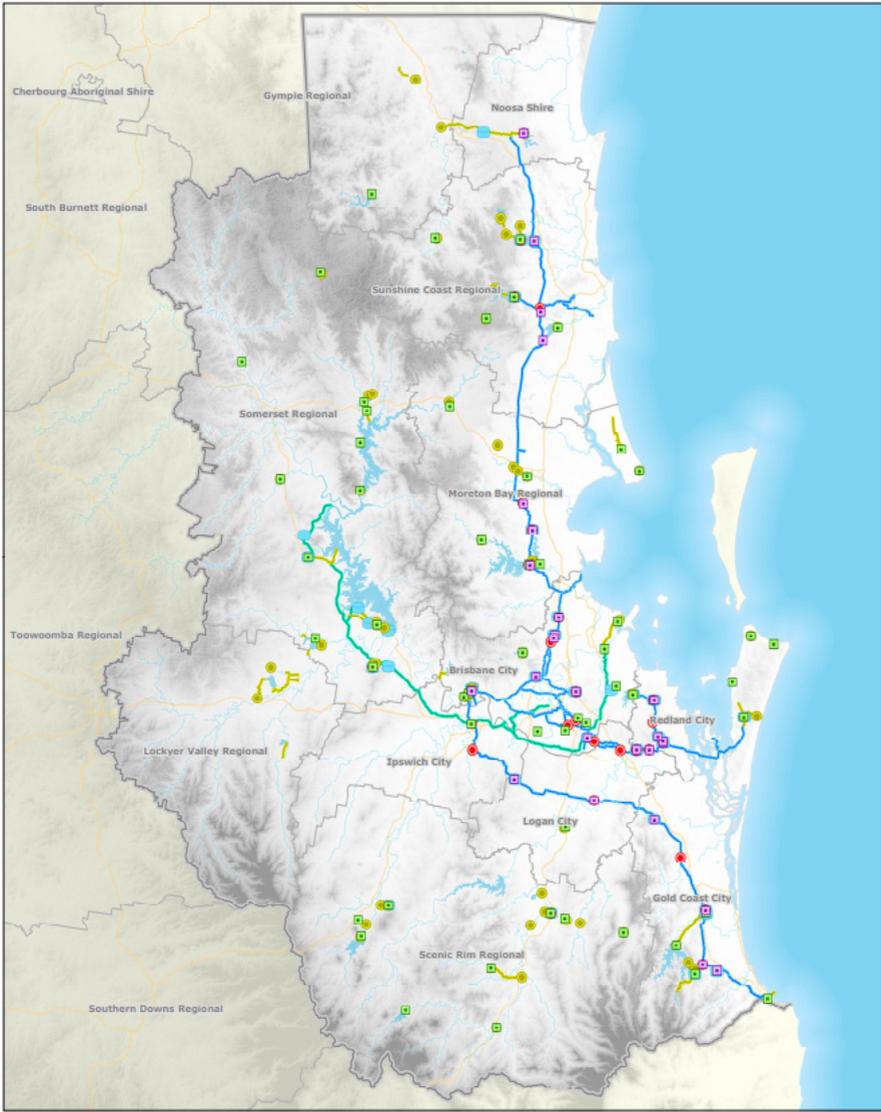


Figure C3.1: Seqwater geographical region and major assets

## Key objectives of the Operations Development Program

Seqwater's role is to deliver safe, secure and cost-effective water and catchment services to customers and communities across South East Queensland. Seqwater's source water is treated at 37 water treatment plants (WTPs) and Seqwater is focussed on delivering a safe secure water supply to its customers 24/7.

Seqwater has developed a robust training and competency assessment program, which aims to meet a number of key business objectives:

- Objective 1 – Develop and foster a Skilled and Committed Workforce
- Objective 2 – Address workforce demographic challenges
- Objective 3 – Link training and competency requirements with career development and remuneration
- Objective 4 – Keep pace with changes to regulation and legislation

### Objective 1: Develop and foster a Skilled and Committed Workforce

Seqwater's current Strategic Plan (2018 – 2023) has several Outcome Areas which drive Seqwater's operational priorities. The first of these is to *develop and foster a Skilled and Committed Workforce*. This entails a workforce which is motivated, empowered and agile, driving change and delivering for customers and communities.

Key issues identified as critical for Seqwater's long-term business performance include:

- attraction and retention of a skilled and committed workforce
- a customer focused workforce that understands and meets customer expectations
- planning and operating water supply assets in a challenging climate and during extreme weather events.

### Objective 2: Address workforce demographic challenges

A critical issue for Seqwater is its ageing workforce and challenges in maintaining a full complement of skilled operators.

Training competent operators requires a substantial lead time, particularly for those that fulfil the role of a duty operator, who is often required to work independently when responding to plant alarms after hours. In addition to experiencing an ageing workforce issue, Seqwater also experiences competition from other industries, which have lured some operators away for either more remuneration and/or career development opportunities.

### Objective 3: Link training and competency requirements with career development and remuneration

To be formally recognised as a fully skilled operator at Seqwater an employee must have attained a Certificate III in Water Operations, the minimum standard that applies to become a duty WTP operator. This has been formalised into recent Seqwater Enterprise Bargaining Agreements, as the level of qualifications for the Duty Operational Officer Classification Stream. In 2012, Seqwater introduced a pilot Operations Trainee Program, which includes a Certificate II in Water Industry Operations for its trainees. As a result of these initiatives, Seqwater now has qualifications linked to operational career progression. The pathway for training is linked to the National Water Package (NWP) and covers Certificate II through to Certificate IV.

## Objective 4: Keep pace with changes to regulation and industry standards

Seqwater recognises that the actions of its drinking water operators have a direct impact on water quality and consequently may impact the public health risk to its communities and consumers. This is consistent with Seqwater's Drinking Water Quality Management Plan (DWQMP). Increased drinking water quality standards such as new Health Based Targets proposed in the next update of the ADWG may result in much tighter process and operational standards and or investment in infrastructure than is currently in place.

## The Program – Operations Development Program

In 2011, there was an internal driver for Seqwater to establish a structured training program for new entrants to the water industry, but also establish minimum standards for all its existing Operations employees. Alongside this, Seqwater recognised that there was a skills shortage in the water industry as a whole and realised it needed to equip its new and existing workforce with the skills required to deliver this critical essential service into the future. Seqwater's training program "Operations Development Program" is an initiative in designing a program to foster a sustainable workforce, now and into the future.

### Development of operator competence

Seqwater recognises that in order to increase the efficiency, productivity and competitiveness of their workforce, an ongoing commitment to skills development is required (Figure C3.2). As a starting point Seqwater requires its operators to have the appropriate NWP qualifications, where the fundamental underpinning knowledge of WTP operation theory is learnt. This is developed further by on-the-job training (primarily via mentoring by more experienced operators) to embed local knowledge of the treatment plants. Knowledge that is passed on by more experienced operators includes: characteristics of source waters, the risks associated water sources, the role of Seqwater's DWQMPs and Hazard Analysis Critical Control Point (HACCP) Plans.

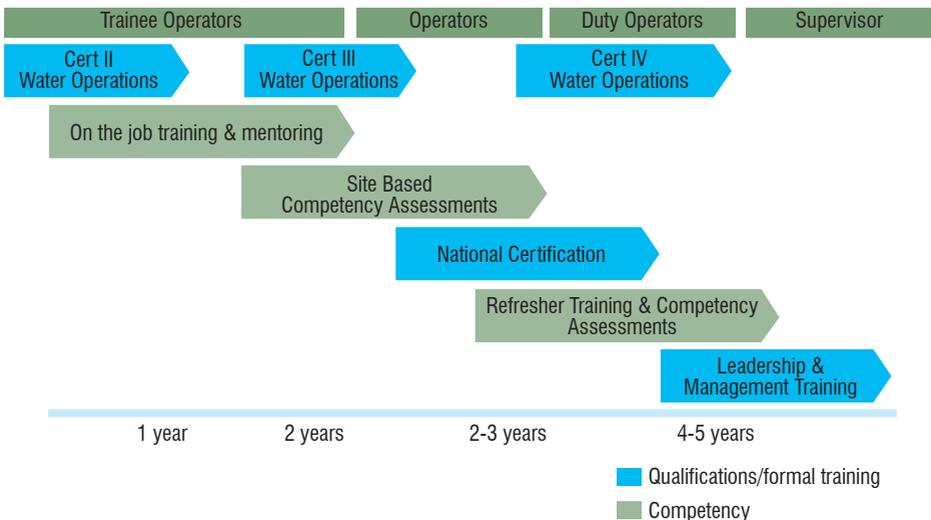


Figure C3.2: Example of training, experience and development progression for operator competency

Trainee operators that start working for Seqwater are expected to complete the Certification II in Water Industry Operations as an entry level qualification. As trainees become competent and more experienced in basic treatment plant processes, the level of supervision by Supervisors and more experienced Operators is reduced. Trainees in their second year work towards completion of the Certificate III in Water Industry Operations. Upon successful completion of the traineeship, their Cert III and a Site Based Competency Assessment (SBCA) the trainee can go into a duty operator role. This is contingent on a specified minimum period of time as assistant plant operator including being deemed competent by the sub region supervisor.

There is provision for progression in remuneration for operators from Level 2 to Level 3 via completion of a Certificate III and SBCAs as determined in the Seqwater Enterprise Agreement. Seqwater’s aim is to ensure that all operators have achieved a Certification III level qualification from the NWP and can demonstrate their capability through industry experience at the workplace.

Certificate IV in Water Industry Operations can be obtained for operators that aim for an additional qualification level with a focus on the assessment and optimisation of drinking water treatment processes. The highest certification level is the Diploma which is recommended for a supervisory level to develop into a leadership role.

### Support of operator competence

To support the application of skills in the field, new operators are supervised and mentored on site by more experienced operators/site supervisors to ensure that they can apply the site-specific application of the theoretical knowledge they have gained through training. The validation of the application of operator’s skills and knowledge at a particular plant is assessed via the SBCA. These SBCAs are undertaken when a new operator is being given responsibility to operate a plant, in particular before they can go on call After Hours. SBCAs have been developed for each WTP across Seqwater, as well as for other operational functions including Catchment and Dam Operations (See Tables C3.1 and C3.2). The assessment is carried out by a nominated Subject Matter Expert (typically the sub-region Supervisor) then approved by the relevant Operations Coordinator.

Table C3.1: Excerpt from the Molendinar WTP HACCP Plan – Coagulation/Flocculation CCP

Process Step	CCP QCP	Monitoring	Action Limit Corrective Actions guidance	Critical Limit Corrective Actions guidance
Coagulation	CCP	Refer to HACCP Plan & Operator checklists	<p><b>WTP Operator:</b></p> <ul style="list-style-type: none"> <li>- Perform grab sample to verify result immediately. If confirmed, notify Regional Operations Coordinator</li> <li>- If low alkalinity – increase lime dose</li> <li>- Check dosing systems (alum, lime, CO<sub>2</sub>, polyDADMAC) are operating effectively. Check chemical flows and/or perform drop down test</li> <li>- CO<sub>2</sub> dosing failed – revert to lime dosing only mode of operation</li> <li>- Check for changes in raw water quality (turbidity, colour, pH, temperature etc.) and consider reducing raw water flow</li> </ul>	<p><b>WTP Operator:</b></p> <ul style="list-style-type: none"> <li>- Confirm result. If confirmed, notify the Regional Operations Coordinator</li> <li>- SHUTDOWN plant and request Supply System cease taking water from WTP</li> <li>- Refer to Molendinar WTP ERP – Loss of Supply Contingency Plan</li> </ul>

Process Step	CCP QCP	Monitoring	Action Limit Corrective Actions guidance	Critical Limit Corrective Actions guidance
Coagulation (Cont.)	CCP	Refer to HACCP Plan & Operator checklists	<b>WTP Operator:</b> <ul style="list-style-type: none"> <li>- Check clarifier performance including sludge blanket and flocculator and make adjustments if required</li> <li>- Pay close attention to filter performance</li> <li>- Check raw water flow trend</li> <li>- Consider reducing supernatant return flow rate</li> </ul>	<b>WTP Operator:</b> <ul style="list-style-type: none"> <li>- The Clarifier and other downstream processes may require draining</li> <li>- Perform Action Limit Corrective Actions</li> </ul>

Table C3.2: Excerpt from the Molendinar SBCA, relating to the CCP shown in Table C3.1

Skills Assessment		
Process Area: Coagulation Sedimentation	Competent? Y/N	Assessor Initials
Participant's Name:		
Learning Outcome: Monitor, operate and control coagulation sedimentation processes		
Competency Questionnaire		
1. Identify risk factors, potential hazards and mitigation, including use of appropriate safety and personal protective equipment associated with this process area?		
2. Describe the coagulation sedimentation processes at Molendinar WTP:		
3. Explain the impact of Raw Water pH on coagulation sedimentation:		
4. Describe the Alum dosing control system:		
5. Demonstrate a raw water polymer system volumetric test (drop test) and calculate current dose rate against raw water flow. Show workings below.		
6. Describe below one inspection task and one testing task associated with this process area?		

Seqwater is focused on competency not just on qualifications, which is a large driver of why the SBCAs were originally developed, to facilitate a consistent approach to each of Seqwater's assets. Each SBCA is a controlled document which is scheduled for regular review for currency and applicability via Seqwater's corporate document control system. To develop the SBCAs, input is given from a variety of sources/functions e.g. process engineering support, regional coordinators, line management and learning and development to build a robust and effective tool for determining competency for a specific location based on the risk profile of that particular catchment / plant.

### Growth of operator competence

Seqwater is managed through three geographic regions, which in turn is broken down into practical sub regions. Within these sub regions there can be a diverse range of WTP operational assets. The water treatment operators in each sub region are required to operate more than one WTP, often different in its design, and importantly, can have very different source waters, which can challenge an operator as he or she strives to optimise treatment plant performance.

This is a characteristic of Seqwater’s asset base. Seqwater helps its operators to gain knowledge and skills to operate differences in design, raw water supplies, age of technology etc.; these are all factors that Seqwater believes help to grow its operator’s competence.

Continuous training with allocated budget is provided for the operator workforce. The delivery of the NWP as workforce development to Seqwater employees is currently conducted in-house by preferred Registered Training Organisations.

The preference for training is generally in-house tailored to Seqwater operations. Logistically it is easier, but also gives the operators real practical experience using their own plants and processes as the training venue. The value gained is that consistent skills and knowledge is imparted, and everyone receives the same refresher.

There is a need for Seqwater employees to have opportunities for ongoing learning and development (L&D). This can be achieved by having the ability to identify that you do not have a certain skill and what opportunities there are to respond to any gaps in skills potentially identified to remedy this. The open L&D environment at Seqwater allows employees to encourage each other and share knowledge and learnings. This helps to safeguard against complacency for operators that might spend a lot of time at WTPs with very stable water quality and may forget how to apply the knowledge and potentially get caught out if a raw water quality changes dramatically.

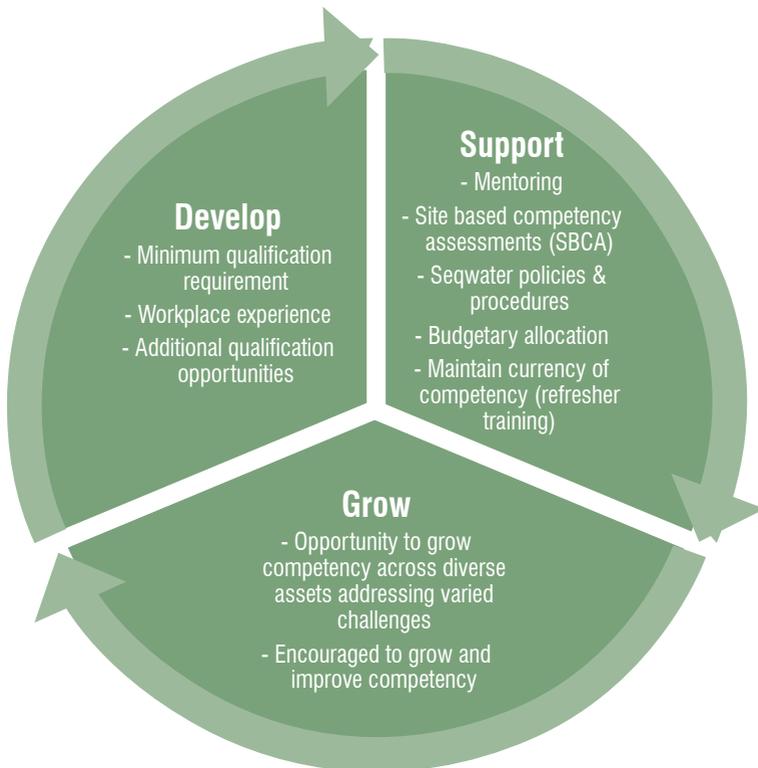


Figure C3.3: The Seqwater operator competency development model “Develop, Support, Grow”

## Discussion

### Competence currency with the fundamentals

A key factor in the setup of the Seqwater operator training program has always been to ensure that Seqwater was sourcing high quality accredited training. It has been a challenge trying to find quality trainers and Registered Training Organisations (RTOs). Seqwater regularly reviews the RTO training quality and works collaboratively with other water utilities to share experiences and recommendations of suitable trainers and RTOs to meet the training needs of their workforce.

Ongoing challenges for Seqwater, indeed all water businesses, is in finding suitable trainers amongst the limited number of Registered Training Organisations (RTOs) delivering the water package in Australia. Seqwater is part of the Queensland Water Skills Partnership and is getting more involved with the partnership, to promote sharing across the Qld Water Entities. Seqwater also see the need to do more in terms of getting their people to provide feedback on the quality of the training.

It can be quite evident when Seqwater recruits an experienced operator from another state – on paper they are qualified as having a Certificate III Water Industry Operator, but do not have the local knowledge and experience to operate Seqwater plants. Therefore, after a period of time and by using tools such as the SBCA, the local sub regional Supervisor can then be assured that based on the plant profile, the operator can be deemed competent for that plant. Seqwater has such a variety of treatment assets from quite basic plants with very few processes, to conventional and advanced WTPs where the complexity and local knowledge required at each of these sites can vary significantly.

### Effectiveness of Seqwater's WTP operator training

The effectiveness of Seqwater's WTP operator training is primarily measured through experienced operators and supervisors observing the application of other operator's knowledge. Successful completion of the SBCAs and maintaining the currency of their competency by using the SBCA tool on a regular basis, can be triggered by a change at a plant or if a site supervisor has any concerns about the depth of knowledge of an operator in a particular aspect of a plant's operations.

Another measure of the effectiveness of the training is when Seqwater's operators have demonstrated their knowledge and skills when the WTP is being stressed, e.g. operating close to its DWQMP operating limits due to a heavy storm event resulting in significant changes in raw water quality and or equipment failure. The 2011 and 2013 flood events had a significant impact on Seqwater Operations which highlighted the need for Seqwater to ensure it has adequately trained operators that have the capability to respond to events. These flood events also identified potential vulnerabilities in the depth of capability across Seqwater's workforce which has contributed to the focus on supporting operational skills development and assessment.

Seqwater recognises that by investing in the skills and capabilities of its people, it can ensure it has a technically competent operations workforce that is able to respond to these changes in water supply risk.

Equally important is the need to monitor Seqwater's organisational culture and the level of commitment and engagement of its staff to effectively manage supply risk to the community.

## Seqwater's outlook for WTP operator training

For all the work done in the past and currently, the important question is 'What about the future? What are the risks if Seqwater does not continually develop its operators?'

- Seqwater runs the risk of losing the fundamental skills that are not used on a regular basis e.g. jar testing during dirty water quality events
- Change is inevitable, and if Seqwater does not train adequately, Seqwater is in danger of being left behind and not up to date with the latest technology
- Supply and demand for Seqwater's product is increasing which can lead to increased stress on water supply assets
- The role of an operator in 2030 vs. 2018 – automation, technology, environment, growth, tighter standards of service e.g. Health Based Targets
- Defining the skills Seqwater needs to move with these technological changes.

These are examples of what is driving Seqwater's focus on the currency of competency on a regular basis and the desire to achieve a level of consistency across Seqwater's operators. Seqwater also recognises that by implementing incremental changes on a regular basis rather than large sweeping changes it is easier to implement and lessens the load of large amount of knowledge/skills required to move with these changes.

Discussing these trends in strategy planning activities, will help Seqwater to foster its skilled and committed workforce that embraces change and, more importantly, is competent and capable of applying themselves to any change outcomes that relate to the provision of safe drinking water supply.

## Conclusion

The Seqwater Operations Development Program training program is an example of how **competency development, site-specific competency evaluation and ongoing skills development** can be used effectively to ensure operators have relevant site-specific knowledge and skills to perform their role safely and competently. Key aspects of Seqwater's program encompass the following L&D principles:

- Confidence that individual operators:
  - Have the skills, knowledge and ability to confidently operate their WTPs.
  - Are receiving quality training and instruction from both Seqwater's and external water supply technical experts.
  - Are receiving one or more nationally recognised qualifications and transferrable skills within the water industry.
  - Have opportunity for development and learning new skillsets from different assets and treatment processes.
  - Are provided with enhanced career pathway opportunities within the water industry.
  - Have pride in their vocation – not just a job.
  - Are able to make a difference for the community.

- Confidence that the organisation:
  - Has operators qualified to a consistent and minimum standard.
  - Has a knowledge and skill base to ensure competency across a diverse workforce and asset base.
  - Performs well in benchmarking and industry best practice.
  - Fosters a level playing field for operators and is committed to their career development.
  - Has reduced organisational risk to the lowest levels practicable.
  - Can achieve reduced incidents and water quality risks.
  - Board and Executive have confidence in the workforce
  - Reputation and brand within the community is one that is respected.
  - Becomes an employer of choice in South East Queensland, showing a strong commitment to training and development.
  
- Confidence that the community
  - Are reassured that they consistently receiving safe drinking water supply, minimising the risk of public health to consumers.
  - Are reassured WTPs are operated and managed efficiently and effectively.

## Acknowledgements

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## Technical Competency Project Supporters

