Drinking water service annual report – Northern Peninsula Area water supply system

Reporting Period July 2023 to June 2024

*This re*port has been prepared in accordance with the *Guideline for the preparation, review and audit of Drinking Water Quality Management Plans*

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Abbreviations

Term	Definition
ADWG	Australian Drinking Water Guidelines
ADWG Framework	ADWG Framework for management of drinking water quality
CMF	Continuous Micro Filtration
CCP	Critical Control Point
DRDMW	Department of Regional Development, Manufacturing and Water
DWQMP	Drinking Water Quality Management Plan
QCP	Quality Control Point
NPA	Northern Peninsula Area
NPARC	Northern Peninsula Area Regional Council
SCADA	Supervisory Control and Data Acquisition
THM	Trihalomethanes
WTP	Water Treatment Plant
WQIP	Water Quality Improvement Plan (Risk Management Improvement Program)

1 Introduction

This Drinking Water Service Annual Report documents the performance of the Northern Peninsula Area (NPA) water service with respect to water quality and performance in implementing the Drinking Water Quality Management Plan (DWQMP), under the requirements of the *Water Supply (Safety and Reliability) Act 2008* (Qld) (the Act). The information in this report relates to the period 1 July 2023 to 30 June 2024.

The Northern Peninsula Area Regional Council (NPARC) (Service Provider Identification Number 492) is the registered service provider for the water services in the NPA. NPARC is responsible for providing service delivery of the Northern Peninsula Area water supply and for ensuring that the associated infrastructure is managed efficiently and effectively.

During the reporting period, the scheme operated under the approved DWQMP version 11 (dated 10 June 2022). Prior to the approval of version 11, the scheme operated under the approved DWQMP version 9 (dated 16 June 2019). Post the report period the regulator has approved an amended version of the Drinking Water Quality Management Plan Revision 13, on 14th of October 2024.

This report has been prepared based on the *Guideline for the preparation, review and audit of drinking water quality management plans*, published by Water Supply Regulation of Water Operations and Systems, Department of Regional Development, Manufacturing and Water (DRDMW), Queensland 2022.

In July 2022, NPARC engaged Veolia to operate and maintain the scheme.

2 Summary of the NPA scheme

The NPA is located near the tip of Cape York Peninsula. The NPA water supply system serves five communities; Bamaga, Injinoo, New Mapoon, Seisia and Umagico. From catchment to tap, the NPA water supply system overview comprises a raw water intake main and storage; a water treatment plant (WTP); individual storage reservoirs; trunk mains between the communities; and the reticulation network inside the communities either up to the service connection’s stopcock / water meter (if present) or the boundary of the property supplied by the service.

The NPA water supply sources its water from the Jardine River at a point upstream of tidal influence and approximately 15.4 km southeast of the water treatment plant located at Bamaga. The WTP is fed from a purpose-built raw water storage via a duplicated main. The raw water is dosed with soda ash and caustic soda (optional) seasonally during the wet season with the ability to also dose aluminium chlorohydrate (ACH). It is then pumped to a 15 ML lined raw water open storage near the water treatment plant. The Jardine River intake pumps are operated to a lagoon level set point.

The raw water is then pumped from the 15 ML reservoir to the Bamaga WTP. The raw water storage is uncovered and will be exposed to rainfall-intrusion during rain events. Soda ash is dosed between the raw water lagoon storage and the inlet strainer for pH correction.

Bamaga WTP has a maximum production capacity of 6.0 ML/d, utilising a Continuous Microfiltration (CMF) process followed by chlorine gas as disinfection. The Bamaga WTP supplies drinking water to six service reservoirs at Injinoo, New Mapoon, Seisia, Umagico and Bamaga (two reservoirs), ranging from 1.6 ML to 2.0 ML.

Drinking water quality is monitored under the program set out in **Appendix A**. The monitoring program is based on contractual and incident notification requirements and is adapted from the *Australian Drinking Water Guidelines* (ADWG).

3 Actions taken to implement the DWQMP

3.1 Operational and procedure training

Operators are required at all times to adhere to agreed protocols and monitor the Bamaga WTP effectively to ensure that the drinking water quality standards are continuously met. The operators are experienced, appropriately trained and understand their responsibilities in maintaining drinking water quality. The Bamaga WTP operates non-continuously, and protocols and procedures have been developed to ensure assurance of drinking water quality is maintained during start-up and shutdown.

Operational procedures and Work Instructions (WIs) for the Bamaga WTP have been developed for all major operational activities. These procedures guide operators in providing safe drinking water of compliant quality. Control procedures and Programmable Logic Controller (PLC) logic is detailed in the control sequence manual for the Bamaga WTP.

All employees are familiar with the location of the WIs and trained in their implementation. A summary of all WIs can be found in the Bamaga operations Work Instructions index on site.

3.2 Operational monitoring

Key processes have been identified as Critical Control Points (CCPs), and are continuously monitored via the Plant's SCADA system. Alert limits and alarms are in place to prevent CCPs exceeding Critical Limits, an alarm is relayed via text message to operators. This alarm identifies the CCP that is non-compliant or exceeded its Critical Limit and at what location. SCADA alarms relating to CCPs are to take operational precedence at all times to ensure water quality compliance. Additional, more stringent limits provide early warning in order to apply corrections prior to an exceedance of a Critical Limit.

Guidelines for appropriate operational response to these alarms are detailed in Bamaga DWQMP. The general operational monitoring of the Bamaga WTP including the daily Routine Readings & Inspections and water quality sampling are also outlined in the DWQMP.

3.3 Corrective action

The operator will perform any required corrective in response to water quality non-conformances or NPARC feedback. All corrective actions relating to NPARC breaches are documented.

Corrective action can result from:

- water quality exceedances, plant process/performance failures and the outcomes of their respective incident investigations
- short-term evaluation of drinking water quality monitoring data
- client and consumer feedback
- workplace assessments
- calibration
- training.

3.4 Maintenance

Maintenance of plant and equipment is undertaken to ensure equipment performs reliably. An Operations and Maintenance plan outlines preventative maintenance requirements for all plant and equipment. All preventative and corrective maintenance undertaken by the operator is documented and reported in the monthly operations reports.

3.5 Materials and chemicals

Chemical suppliers are evaluated and selected on their ability to supply chemicals not only in accordance with the required specifications, but also with respect to their security of supply. The operator seeks chemical suppliers' evidence of how the quality of the chemical against the specification can be assured, and evidence to demonstrate that security of supply can be maintained.

The control of chemicals and chemical delivery systems at the Bamaga WTP is important for drinking water quality. Chemical stock management is managed by the Plant Manager, who is also responsible for the reordering of chemicals. Certificates of compliance are supplied with each delivery via email or hard copy by the supplier. The most recent SDSs for each chemical are stored on site and available in Chemalert..

Chemical delivery contractors are required to complete a site induction that outlines general site OHS hazards and risks. A Job Safety and Environmental Analysis (JSEA) is also required. In addition to chemicals, lubricants and oils used on mechanical equipment could contaminate drinking water. Prevention of inadvertent contamination from chemicals and other materials is managed through approved maintenance procedures and work instructions.

4 Progress against the Water Quality Improvement Plan

Throughout the reporting period, work continued to address areas for improvement identified in the Water Quality Improvement Plan (WQIP). The WQIP is regularly updated to reflect the current status against each action, and others included as they are identified through various processes including risk assessment and audits.

The WQIP is maintained as a tab in the water quality risk assessment register. The revision current at the end of the reporting period is replicated in **Table 1**.

Table 1 Water quality improvement plan

Blue text indicates changes made since the improvement plan was reported in the prior annual report.

Item #	Old item #	Source	Improvement Actions	Priority	Target date(s)	Actions taken to date (Updated 30/11/2023)	Status	Responsible Party
1	37	Bamaga WQ Risk Assessment - Network	Clarify details of project to replace ageing AC mains	Short-term	Mar-19	Currently planned to continue next phase in Q1 2025	In progress	Led by State Gov, coordinated with Operations / Projects
2	8	Bamaga WQ Risk Assessment - Network	Check water corrosivity calculations.	Short-term	Jan-19	Heavy metals monitoring added to the verification monitoring program at quarterly frequency (and currently performed monthly). Alkalinity adjustment to be considered in WTP strategy.	In progress	Operations / WQ / S&T
3	ES.4.2.e	Audit OFI	Introduce pH buffering. This can be done using the existing Soda Ash chemical on site.	Medium-term	Dec-19	Soda ash dosing in the raw water. Heavy metals monitoring added to the verification monitoring program at quarterly frequency (and currently performed monthly). Alkalinity adjustment to be considered in WTP strategy.	In progress	Operations / WQ / S&T
4	27	Bamaga WQ Risk Assessment - Network	Reduce excessive water demand via preparing a Demand Management Program. This program will include (but not be limited to) a public education program, including how it will be implemented and who will be responsible.	Medium-term	Jul-19	Water Demand Situation Analysis is completed. Preliminary results have allowed identification of major leaks and other key sources of consumption. The development of public education programs is in progress.	Ongoing	Operations / NPARC
5	ES.4.2.a	Audit OFI	Create a main flushing procedure	Medium-term	Dec-19	Work instruction under development based on other Veolia schemes	In progress	Operations
6	ES.4.2.a	Audit OFI	Create a main flushing procedure	Medium-term	Dec-19	Work instruction under development based on other Veolia schemes	In progress	Operations

7	ES.4.2.c	Audit OFI	A procedure needs to be in place to ensure that all drinking water materials purchased are Standards or are WaterMark approved.	Medium-term	Dec-19	Work instruction under development	In progress	Operations
8	ES.4.2.h	Audit OFI	Undertake a mock incident event for a water quality incident. Include management team and external stakeholders in the exercise	Short-term	Jul-19	Water Quality team is trained with assisting in managing water quality incidents. Mock incident activity under consideration.	In progress	WQ
9		RCA for THM exceedance	Continue with weekly monitoring of raw water quality, chlorine and THM monitoring of treated water, adjust tank level to reduce water age THM action plan	Medium-term	Nov-21	The described monitoring is currently included in the verification monitoring program and will continue. THM formation to be considered in Bamaga WTP upgrade strategy.	In Progress	Operations / WQ / S&T
10		2022 Audit Report (OFI)	Consider dropping the test for fluoride	Short-term	July 2024	Plan to remove at end of financial year 2023	In progress	Operations / WQ
11		2022 Audit Report (Minor)	Ensure that THMs are managed by following the Emergency Action Plan for high THMs, and follow the BAA-WI-L004 Trihalomethanes management plan. Ensure that THM results can be correlated with operational and verification testing by using the same water sample. If there is an issue with different test results, have the operational test kit checked by a laboratory to determine if the test disparity is method or equipment related.	Long-term	July 2026	Referenced documents replaced by Veolia procedures (refer to revised DWQMP). THM formation will be considered in the Bamaga WTP upgrade strategy. All THM analyses are now performed by the laboratory.		Operations / WQ / S&T
12		2022 Audit Report (Minor)	Ensure that the chlorine residual is above the ADWG minimum value of 0.2 mg/L in the reticulation system	Short-term	July 2024	Being monitored and managed as required	Ongoing	Operations / WQ
13		2022 Audit Report (OFI)	Consider raising the minimum chlorine residual to 0.5 mg/L to control Naegleria fowleri and include it in the next DWQMP revision	Short-term	July 2024	Being monitored and managed as required	Ongoing	Operations / WQ
14		2022 Audit Report (OFI)	Consider regular DWQMP meetings to keep track of obligations and to progress improvement items	Short-term	July 2024	Quarterly meetings planned	Ongoing	Operations / WQ
15		2022 Audit Report (OFI)	Consider moving the reticulation verification sampling locations to lower turnover areas in conjunction with a flushing program and water security	Medium-term	July 2025	Proposed changes to sampling points included in revised DWQMP Rev 13.	In progress	Operations
16		2022 Audit Report (OFI)	Consider changing the type of sample tap at the Bamaga Hospital and Bamaga Primary School to an industry-accepted alternative	Medium-term	July 2025	Sample tap locations for these two sites will be relocated and will use the appropriate fixtures.	In progress	Operations

17		2022 Audit Report (OFI)	Consider moving the Bamaga Primary School meter and sample tap to the property boundary	Medium-term	July 2025	Sample tap location for this site will be relocated as advised.	In progress	Operations
18		2022 Audit Report (OFI)	It is suggested that the recording of verification information to worksheets be automated by using electronic tablets	Long-term	July 2026	Under consideration	In progress	Operations
19		2022 Audit Report (OFI)	Determine the status of CMF C and whether there are membranes inside the tubes that require maintenance	Medium-term	July 2025	CMF C to be scrapped and full upgrade to provide additional capacity under consideration	In progress	Projects
20		2022 Audit Report (Major)	Commence soda ash pre-dosing to protect the membranes from further damage, and investigate each membrane's current capability to act as a barrier in terms of drinking water quality protection	Short-term	July 2024	Soda ash pre-dosing is occurring. Membranes have been investigated. Performance of membranes will be considered in Bamaga WTP upgrade strategy.	In progress	Operations / WQ / S&T
21		2022 Audit Report (Major)	Complete RMIP actions, and reopen those that were not properly actioned	Short-term	July 2024	In progress	In progress	Operations / WQ / Projects
22		2022 Audit Report (OFI)	There needs to be a quality assured batch certificate for all chemical deliveries which identifies the concentration of chemical being supplied. Each delivery docket number must link to that certificate. The service provider must also be checked for ongoing quality compliance.	Long-term	July 2026	Process being implemented to capture delivery docket and match to the batch certificate	In progress	Operations
23		2022 Audit Report (OFI)	Consider increasing hardness by considering lime addition which will assist with pH control. The existing Soda Ash chemical on site may assist with further pH control if required but may require acid addition. Consider this with other factors including aluminium levels and membrane fouling. Include (reinsert) this in the risk assessment.	Long-term	July 2026	Increase in hardness is being considered in Bamaga WTP upgrade strategy	In progress	Operations / WQ / S&T
24		2022 Audit Report (OFI)	Create a jar testing procedure for ACH (future enhancement) and PAC (existing backwash recovery). Include test frequency	Medium-term	July 2025	Jar testing was completed for ACH upgrade work and performed during the wet season. Creation of procedure in progress.	In progress.	Operations
25		2022 Audit Report (OFI)	Add Jar Testing results to an operations spreadsheet or SWIMs to ensure that these results are kept, can be used for reference purposes during high turbidity events, and to demonstrate that action is taken once the raw water turbidity CCP/QCP has been triggered	Medium-term	July 2025	Creation of procedure in progress	In progress	Operations

26		2022 Audit Report (OFI)	Undertake extra training such as with WIOA	Medium-term	July 2025	Training (VOC) has occurred throughout the year. Additional Cert III training planned.	In progress	Operations
27		2022 Audit Report (OFI)	Create a mains flushing procedure	Medium-term	July 2025	In progress	In progress	Operations
28		2022 Audit Report (OFI)	Ensure that (there) is a procedure for disinfection and flushing of mains after a repair has occurred	Medium-term	July 2025	Disinfection procedure developed for clearwater tank bypass system. Planned to revise this for mains flushing procedure	In progress	Operations
29		2022 Audit Report (OFI)	Provide training for management staff in new roles in the water department for incident management, and specifically DWQMP awareness directly relating to the system	Short-term	July 2024	New corporate WQ training package for frontline workers currently being finalised	In progress	WQ
30		2022 Audit Report (OFI)	Undertake a mock incident event for a water quality incident. Include the management team and external stakeholders in the exercise.	Medium-term	July 2025	Planned to occur 2024	In progress	Operations / Projects / WQ
31		2022 Audit Report (OFI)	PFAS has not been added to the risk assessment although this is likely to be of no concern for the area	Medium-term	July 2025	PFAS planned to be assessed in 2024 water quality risk assessment. Currently understood to be of low inherent risk.	In progress	Operations / WQ
32		2023 Compliance Assessment	Develop a procedure for progressing RMIP items, from identification to completion. Consider regular DWQMP staff meetings to keep track of the status of RMIP items, compliance with conditions and changes in the drinking water service operation.	Short-term	July 2024	Quarterly meetings planned	In progress	Operations / WQ / Projects
33		2023 Compliance Assessment	Replace the current in-house coliform/*E. coli* presence/absence test kit with an enhanced product, e.g., the Colilert or Colisure Quanti-Tray method, which provides an enumerated test result (Most Probable Number/MPN).	Medium-term	July 2025	*E. coli* and total coliform analyses performed by Cairns laboratory. Not currently performed in-house. Currently investigating the use of ColiSure in-house.	Ongoing	Operations / WQ
34		2023 Compliance Assessment	Council should explore acquiring enhanced E. coli testing equipment, e.g., the Colilert or Colisure Quanti-Tray products, through the Queensland Health WASH support program and request support from TPHS Cairns to provide a training program for drinking water service staff conducting E. coli tests in-house.	Medium-term	July 2025	*E. coli* and total coliform analyses performed by Cairns laboratory. Not currently performed in-house. Currently investigating the use of ColiSure in-house.	Complete	Operations / WQ

35		2023 Compliance Assessment	Develop a complete set of work instructions to provide or display appropriately in the WTP and in the operator's offices and use as a basis for refresher training of existing operators and induction training for new staff.	Medium-term	July 2025	In progress pending completion of the Bamaga WTP upgrade strategy	In progress	Operations / Projects
36		2023 Compliance Assessment	Council should implement and include in its DWQMP, a chemical management plan, which should include: - procurement and re-ordering protocols. - delivery and disposal arrangements. - a documented, step-by-step job safety analysis guide for the storage, handling and transferring of hazardous chemicals.	Medium-term	July 2025	Revised DWQMP now describes that the site should maintain 3-6 months' of chemical supplies) PRO-123 Hazardous Materials and Chemicals governs our storage, handling and transfer of hazardous chemicals. WIS-15344 NPAWSS - Unloading and Recording Bulk Chemical Deliveries (document to be completed in BMS) Chemical procurement & reordering procedures are currently in development.	In progress	Operations
37		2023 Compliance Assessment	Ensure a quality assured batch certificate, which identifies the concentration of chemical supplied and the manufacturing/packaging date, is provided with all chemical deliveries.	Long-term	July 2026	Process being implemented to capture delivery docket and match to the batch certificate	In progress	Operations
38		2023 Compliance Assessment	Consider regular DWQMP meetings to keep track of related compliance obligations and changes in the operation of the drinking water service.	Short-term	July 2024	Quarterly meetings planned	In progress	Operations / WQ / Projects
39		2023 Hydrological report	Establish a raw water sampling point closer to the plant.	Short-term			Completed	Veolia Operations
40		2023 Hydrological report	Fix the raw water flow meter.	Short-term		All flow meters have been replaced and installed. Feedback to SCADA in progress.	In progress	Operations

41		2023 Hydrological report	Replace measurement of apparent colour with measurement of true colour.	Medium term	July 2023	External laboratory notified 10th May 23 to change from apparent to true colour as of the 1st July 2023. Internal laboratory also changed from apparent to true colour	Completed	Operations
42		2023 Hydrological report	Implement a more comprehensive and well considered raw water quality monitoring program. This should include at a minimum: Daily Turbidity (In house) True colour (In house) pH (in house) Weekly UV254 (In house via online instruments or portable instrument) Soluble and total manganese (In house) Soluble and total iron (In house) Monthly Alkalinity (External laboratory) DOC (External laboratory)	Short-term		Turbidity, true colour; pH - completed UV254 - in progress - training in August - completed Mn is done externally by lab - we can revise to monthly metals. We decline doing in-house as it requires a poisons licence. Fe - in progress - training in August - completed Alkalinity - currently quarterly - will be changed to monthly - Declined Alkalinity and Calcium Hardness testing on the lab sink weekly inhouse and quarterly external DOC - declined - we will use UV254 instead	Completed	Operations
43		2023 Hydrological report	Locate and physically isolate the bypass pipeline to avoid any potential for raw water to bypass the treatment and disinfection unit processes.	Short-term		Completed	Complete	Operations
44		2023 Hydrological report	Develop an Operating Procedure as to how and under what conditions the raw water bypass would be used.	Short-term		Added to DWQMP ver 13, Section 2.1 ('Plant bypass')	Complete	Operations

45		2023 Hydrological report	There needs to be a quality assured batch certificate for all chemical deliveries which identifies the concentration of chemical being supplied.	Medium term			Completed	Operations
46		2023 Hydrological report	Ensure that a chemical register is kept and concentrations are logged.	Medium term		Every chemical is listed in ChemAlert system, including concentration.	Complete	Operations
47		2023 Hydrological report	Continue to investigate options for improved pretreatment and in particular for the removal of sponge spicules and iron.	Short-term		WTP upgrade strategy	In progress	Operations
48		2023 Hydrological report	Create a jar testing procedure for ACH.	Short-term		Complete	Complete	Operations
49		2023 Hydrological report	Add jar testing results to an operations spreadsheet or SWIMs to ensure that these results are kept, can be used for reference purposes during high turbidity events.	Medium term		Complete	Complete	Operations
50		2023 Hydrological report	Replace the four post jar tester with a six post jar tester.	Medium term		Declined - four is sufficient	Complete	Operations

51		2023 Hydrological report	Provide training for the extended operational team on how to conduct jar tests. Most Certificate III training is deficient in this.	Short-term		Complete Additional training in August	Complete	Operations
52		2023 Hydrological report	A routine monthly jar test is recommended to ensure the operators remain familiar with jar testing. Other jar tests should be carried out whenever raw water quality changes.	Short-term		Complete	Complete	Operations
53		2023 Hydrological report	Ensure the units of UVT are consistent on the wall read out and the SCADA system. Suggested preferred units are % transmission.	Short-term		Completed unit updated to % trans	Completed	Operations
54		2023 Hydrological report	Continue with the ACH project	Medium term		To be developed (flow-paced dosing)	In progress	Operations
55		2023 Hydrological report	Reestablish the old PACl dosing point and trial dosing ACH at that point.	Short-term		WIll be subject to review during plant upgrade process. Unlikely to proceed due to concerns related to THM formation.	In progress	Operations
56		2023 Hydrological report	Obtain analytical kits for iron (and manganese) testing.	Short-term		Complete for Fe Declined for Mn - not doing in-house	Complete	Operations

57		2023 Hydrological report	Commence regular in-house measurement of soluble and total iron initially at the following sites: Raw water prior to ACH dosing Water leaving the Raw Water Lagoon Treated water leaving the membranes Treated water post chlorine disinfection.	Short-term		In progress Training in August - Completed Sample points are Raw water, Treated Water, Lab Sink and Community	Completed	Operations
58		2023 Hydrological report	Replace the membranes.	Short-term		Complete	Complete	Operations
59		2023 Hydrological report	Once the membranes are replaced, implement frequent PDT.	Short-term		Complete, performed every 24 hrs as part of CCP	Complete	Operations
60		2023 Hydrological report	Determine the TMP trigger for backwashing and ensure the value is displayed on the SCADA screen and is operator adjustable.	Short-term		Complete; TMP trigger is in place; Available and adjustable on setpoint screen	Complete	Operations
61		2023 Hydrological report	The backwash timer “run-on” period should be determined and displayed on the screen. The actual run-on time should also be displayed when activated.	Short-term		Time between backwashes is displayed; during backwash it displays sequence number and time.	Complete	Operations
62		2023 Hydrological report	All timed backwash steps should be shown on the SCADA screen and progress through each step clearly shown on the SCADA screen.	Short-term		Complete	Complete	Operations

63		2023 Hydrological report	Ensure that individual backwash steps are documented in a backwash procedure.	Medium term		Complete CMF Manual documents the backwash	Complete	Operations
64		2023 Hydrological report	Commence soda ash pre-dosing to protect the membranes from further damage.	Medium term		Soda ash is pre-dosed for pH correction.	Complete	Operations
65		2023 Hydrological report	Determine the status of CMF C and whether there are membranes inside the tubes that require maintenance.	Medium term		Completed; unit C membranes will not be used	Complete	Operations
66		2023 Hydrological report	Provide plant specific training on all aspects of the CMF plant.	Short-term		Key personnel are trained in CMF operation; any new personnel onboarded will be trained	Complete	Operations
67		2023 Hydrological report	Re position the chlorine dosing point away from the top of the Clear Water Tank.	Short-term		Complete	Complete	Operations
68		2023 Hydrological report	Re-establish the original chlorine dosing point.	Short-term		Declined - current position for chlorine dosing (filtrate line) is optimal for mixing and Ct in comparison to original dosing point.	Complete	Operations

69		2023 Hydrological report	Separate the post soda ash dosing from the chlorine dosing line.	Short-term		Declined. Current arrangement provides stable pH and chlorine concentration.		Operations
70		2023 Hydrological report	Establish feedback PID control of pH for the post soda ash dosing.	Medium term		Complete	Complete	Operations
71		2023 Hydrological report	Update the third person on the SCADA contact list.	#N/A		Complete	Complete	Operations
72		2023 Hydrological report	Create an access procedure for manager rights to be only allowed to change set-point values	Medium term		Authorisation levels are within SCADA; Engineer, Operator, Viewer. Any setpoint change needs to be confirmed with the Plant Manager. This aspect will be be covered in a procedure.	In progress	Operations
73		2023 Hydrological report	Add a process to alert the administrator if someone leaves or changes roles.	Short-term		Operations Manager controls SCADA access - rights granted / rescinded as part of on-boarding / off-boarding	Complete	Operations
74		2023 Hydrological report	Continue with plans to lock the chlorine high and high-high set points to not exceed 5 mg/L.	Medium term		Complete	Complete	Operations

75		2023 Hydrological report	Establish an alarm summary page on SCADA.	Short-term		Complete	Complete	Operations
76		2023 Hydrological report	Develop a weekly performance report (turbidity and Ct, or target chlorine residual) on the operation of the WTP on SCADA.	Medium term		Weekly retic monitoring program. Daily plant testing. All logged in daily logsheet which is reviewed daily. Overview page on SCADA summarise performance and are reviewed and trended routinely.	Complete	Operations
77		2023 Hydrological report	Ensure that SCADA alarms align with the latest DWQMP.	Short-term		Complete	Complete	Operations
78		2023 Hydrological report	Thoroughly review the critical process steps in the Bamaga water supply system, establish appropriate limits and ensure these limits are reflected in the DWQMP.	Short-term		Complete	Complete	Operations
79		2023 Hydrological report	Develop a procedure for full testing the alarms. The testing should be established formally in VAMS.	Short-term		Alarms are tested where it does not adversely impact plant performance. Testing occurs upon any change through the Management of Change process.	Complete	Operations
80		2023 Hydrological report	Replace all the old altitude valves at each of the Treated Water Reservoirs. Include smart PLC coding to better control flow and storage of water through the extended system.	Short-term		Flow meters have been updated throughout the system. New PLC RTU program roll-out. Altitude valves are included in current minor capital works program.	In progress	Operations

81		2023 Hydrological report	Establish a regular inspection program for the Treated Water Reservoirs in VAMS.	Short-term		WO in VAMS (external integrity checks)	Complete	Operations
82		2023 Hydrological report	Install permanent ladder access to the top of each Treated Water Reservoir.	Medium term		In progress	In progress	Operations
83		2023 Hydrological report	Install mixers in the Treated Water Reservoirs. Given the remote locations these could be static directional nozzles.	Short-term		Declined. Reservoirs not designed for mixers.	Complete	Operations
84		2023 Hydrological report	Modify the platforms on top of the Treated Water Reservoirs to allow access to the sensors, or move the sensors to an alternative accessible location.	Medium term		In progress	In progress	Operations
85		2023 Hydrological report	Check the NPAWTP clear water storage tank for vermin access points;	Short-term		WO in VAMS (external integrity checks)	Complete	Operations
86		2023 Hydrological report	Bamaga No.1 Tank fix hole	Short-term		In progress - Bamaga service reservoirs will be complete by end of 2024. Other reservoirs are complete	In progress	Operations

87		2023 Hydrological report	Check all reservoirs for mesh protection for all whirly birds.	Short-term		Mesh and whirlibirds being replaced as part of the liner replacement project	In progress	Operations
88		2023 Hydrological report	Consider installation of residual trim dosing on each system Treated Water Reservoir.	Medium term		Declined - site power / logistics make this infeasible. We manage network residual compliance closely.	Complete	Operations
89		2023 Hydrological report	Install one or more remote online chlorine residual monitoring units at key sites in the reticulation system.	Short-term		Declined - weekly sampling program	Complete	Operations
90		2023 Hydrological report	Implement a more complete and extensive reticulation system monitoring program including an increased number of sample sites in each community and an increased number of parameters. Free and total chlorine (Target ratio >0.9 Critical limit 0.8) Heterotrophic Plate Counts (HPC 22) (Target <100 Critical limit 500 cATP (Target <1 pg/mL Critical limit 10 pg/mL) Turbidity (Target <1 NTU Critical limit 5 NTU) pH	Short-term		Declined - Monitoring program is based on ADWG guidance on population size. ATP declined - no guideline value / triggers / resourcing, etc. Risk is covered by existing monitoring of E. coli, total coliforms, HPC, chlorine.	Complete	Operations
91		2023 Hydrological report	Consider moving the reticulation verification sampling locations to lower turnover areas in conjunction with a flushing program and water security	Short-term		Some sample locations are low turnover (e.g. Holiday Park).	Complete	Operations

92		2023 Hydrological report	Consider changing the type of sample tap at the Bamaga Hospital and Bamaga Primary School to an industry-accepted alternative	Medium term		Hospital sample tap is being relocated - in progress. Bamaga primary school is not sampled any more. Replaced with appropriate standard tap at Bamaga council office.	In progress	Operations
93		2023 Hydrological report	Consider moving the Bamaga Primary School meter and sample tap to the property boundary	Short-term		Relocated to council office.	Complete	Operations
94		2023 Hydrological report	Ensure that the chlorine residual is above the ADWG minimum value of 0.2 mg/L in the reticulation systems (at all times)	Short-term		Complete	Complete	Operations
95		2023 Hydrological report	Ensure the operators enter the reticulation system monitoring data directly into SWIMLocal or another Information Management System.	Medium term		Complete - logbook	Complete	Operations
96		2023 Hydrological report	Introduce Colisure/Colilert kit testing for E. coli.	Short-term		In progress	Completed	Operations
97		2023 Hydrological report	Engage a specialist to fully upgrade all reticulation system drawings. As part of the contract, label all valves in the field and include direction of opening and whether they are normally closed or open.	Medium term		Declined. Resourcing / funding not available.	Complete	Operations

98		2023 Hydrological report	Update procedures to include machinery disinfection prior to use in water management situations where cross-contamination may be a risk.	Short-term		Spray packs with chlorine solution available. Drinking water-only machinery is provided to plumbers if required. DWQMP now includes reference to hygiene procedures.	Complete	Operations
99		2023 Hydrological report	Ensure that there is a procedure for disinfection and flushing of mains after a repair has occurred.	Short-term		Complete	Complete	Operations
100		2023 Hydrological report	Implement hygienic work practices in the reticulation system, including storage of fittings and pipes. The free WIOA video available from the Water Industry Operators Association website (http://wioa.org.au/resources/#video) which demonstrates best practice Safe Water, Water Mains Repairs should be used as a guide to all work in the reticulation system.	Short-term		Complete	Complete	Operations
101		2023 Hydrological report	Carefully check the system for possible backflow or cross connections. Remove any cross connections, and fit backflow prevention devices where required.	Short-term		Three RPZ backflow prevention devices on WTP. Planned for replacement. New service connections use industry standard meters, installed by licensed plumber. Cross-connections less relevant.	Complete	Operations
102		2023 Hydrological report	Continue with the 3 monthly mains flushing program.	Short-term		VAMS WO for routine mains flushing.	Complete	Operations
103		2023 Hydrological report	Create a mains flushing procedure.	Short-term		Drafted, to be kept in BMS.	In progress	Operations

104		2023 Hydrological report	Ensure there are air gaps for all the outflows from all the online instruments.	Medium term		Complete - all go to drain	Complete	Operations
105		2023 Hydrological report	Create a procedure to include date checking of lab testing chemicals for expiry;	Medium term		VAMS WO. Checking / disposing / reordering.	Complete	Operations
106		2023 Hydrological report	Establish a weekly work task in VAMS for cleaning of online instruments. Appropriate training also needs to be provided.	Short-term		VAMS WO.	Complete	Operations
107		2023 Hydrological report	Formalise the Hach annual calibration of online and bench instruments as a work task in VAMS	Medium term		Complete. Records kept in Google Drive.	Complete	Operations
108		2023 Hydrological report	Formalise daily operation inspections by including this information in an operational spreadsheet or using the SWIMLocal database. (Or Veolia has access to the ID database system. This is the preferred option for storage of process monitoring data.)	Short-term		Complete	Complete	Operations
109		2023 Hydrological report	Clean up the treatment plant compound and some parts of the CMF building.	Medium term		Complete	Complete	Operations

110		2023 Hydrological report	Fully label all pipes, valves, sampling points, dosing points in large font, English labels. The labels should be consistent with labels on the SCADA screens.	Short-term		Complete	Complete	Operations
111		2023 Hydrological report	Enter all plant and reticulation process monitoring data direct to an IMS using smart tablets.	Medium term		Declined - information is collected and entered at the plant	Complete	Operations
112		2023 Hydrological report	Provide operator training on how to quickly extract data from the IMS.	Medium term		Complete - training is available for BMS and Google Drive	Complete	Operations
113		2023 Hydrological report	Develop a detailed plant performance monitoring report. This should include at a minimum, simple statistical analysis and reporting against WSAA Health Based Targets for turbidity and chlorine disinfection.	Short-term		Complete - CCP performance is covered in monthly client report	Complete	Operations
114		2023 Hydrological report	Develop a reticulation system performance report in SWIM Local based on chlorine residual, turbidity and pH monitoring of the reticulation system.	Short-term		Complete - monthly client report and internal reporting in google drive	Complete	Operations
115		2023 Hydrological report	Ensure that THMs are managed by following the Emergency Action Plan for high THMs, and follow the BAA-WI-L004 Trihalomethanes management plan	Medium term		New procedure will be developed based on current plant configuration.	In progress	Operations

116		2023 Hydrological report	Ensure that THM results can be correlated with operational and verification testing by using the same water sample. If there is an issue with different test results, have the operational test kit checked by a laboratory to determine if the test disparity is method or equipment related (Recommend dropping in-house testing for THMs and rely on external NATA accredited testing.)	Medium term		Declined - THM analysis not done internally	Complete	Operations
117		2023 Hydrological report	Continue with the investigation into using SWIMLocal as the water quality test information repository. (Veolia has stated they are considering using ID. This is a more powerful database and easier to use)	Short-term		Declined - NPAWSS uses Datalake and Tableau. Will also go onto LIMS (Lutra).	Complete	Operations
118		2023 Hydrological report	It is suggested that the recording of verification (and process monitoring data) information to worksheets be automated by using electronic tablets.	Short-term		Declined - existing process is sufficient	Complete	Operations
119		2023 Hydrological report	Keep verification records in a spreadsheet or SWIMLocal as this will help pick up on issues and with annual reporting	Short-term		Complete - recorded in Datalake and monthly reports, etc.	Complete	Operations
120		2023 Hydrological report	Develop simple but complete picture-based Work Instructions for key elements of the Bamaga water supply system . These should include, but not necessarily be limited to the following. CIP solution make up and CIP cleans Cleaning and calibration of online instruments Calibration of portable instruments Reticulation system sampling and testing Trouble shooting the CMF Setting and checking the chlorine dose Chlorine drum changeover Interpreting TMP trends and adjusting backwash and CIP intervals	Short-term		Complete Instructions are developed based on the needs of the learner. In-person training also being arranged.	Complete	Operations

			Interpretation of PDT tests. Short instructional videos could also be produced and able to be downloaded at the site where the Work Instruction is displayed.					
121		2023 Hydrological report	There needs to be a condition inspection program and a formalised maintenance program including reservoir cleaning and generator maintenance	Short-term		Complete Formalised maintenance program in place - condition inspection occurs annually; No generator	Complete	Operations
122		2023 Hydrological report	A procedure needs to be in place to ensure that all drinking water materials purchased are certified to Australian Standards or are WaterMark approved.	Medium term		Complete; DWQMP includes these requirements	Complete	Operations
123		2023 Hydrological report	Identify critical components of the water supply system and ensure an inventory of critical spares is maintained on site.	Short-term		Complete - critical spares list	Complete	Operations
124		2023 Hydrological report	Provide training for management staff in new roles in the water department for incident management, and specifically DWQMP awareness directly relating to the system.	Medium term		Complete	Complete	Operations
125		2024 DRDMW Information Requirement Notice	Review the maximum free chlorine critical limit to protect the 5mg/L health limit for total chlorine. Current maximum setpoint is 3.5 mg/L; HH limit is SP+1.5 mg/L = maximum HH of 5.0 mg/L. The system currently runs at a free chlorine setpoint of 2.9 mg/L, which has an associated HH alarm of 3.4 mg/L. While this setpoint currently provides sufficient residual chlorine at the distribution system extremities, lowering the maximum setpoint should be subject to review and, if implemented, the Management of Change procedure.	Short-term		New item	Planned	Operations

			Reservoirs downstream of the treatment plant do not have chlorine boosting facilities and do not have a power source to support such facilities. Lowering the free chlorine setpoint range would require: * Assessment of the implications of lowering the maximum allowed free chlorine setpoint without installation and operation of network chlorine boosting facilities; or, * Alternatively, consideration of capital works for chlorine boosting facilities (if required) and associated cost, operational, worker safety, supply chain, and chemical storage requirements. Either option would require: * Prioritisation of a suitable level of chlorine in the distribution system for protection against pathogen ingress * Implementation of the Management of Change procedure.					

5 Amendments to the DWQMP

During the reporting period, the scheme operated under the approved DWQMP version 11 (dated 10 June 2022). Prior to the approval of version 11, the scheme operated under the approved DWQMP version 9 (dated 16 June 2019).

As at the end of the reporting period, 30 June 2024, a review of the DWQMP was in progress. The reviewed DWQMP will reflect Veolia as the operator of NPAWSS and will include other updates as per below to reflect the current status of the scheme. The regulator has since approved an amended version of the Drinking Water Quality Management Plan Revision 13, on 14th of October 2024.

- The next revision of the DWQMP includes trending of the most recent 5 years of data in addition to statistical analysis.
- Ensure that details for further actions, target dates and owner for all items in the risk assessment with significant residual risk are transferred into the RMIP (e.g. O1, Pathogens; chemical contaminants)
- At the next revision of the DWQMP update the verification monitoring program to specify if iron analysis is for total or soluble iron.

6 Compliance with drinking water quality criteria

6.1 *Escherichia coli* annual performance 1 July 2023 to 30 June 2024

Based on available data, the 12-month rolling annual performance against the 98% compliance requirement for *E. coli* is deemed met (Table 2).

Table 2 Performance against 12 month rolling annual value for *Escherichia coli*, 1 July 2023 to 30 June 2024

Month	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
No. of samples collected	35	28	35	28	28	21	28	35	28	35	28	28
No. of samples collected in which *E. coli* is detected (i.e. a failure)	0	0	0	0	0	0	0	0	0	0	0	0
No. of samples collected in previous 12 month period	28	30	28	28	34	21	21	28	28	28	35	28
No. of failures for previous 12 month period*	0	0	0	0	0	0	0	0	0	0	0	0
% of samples that comply	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Compliance with 98% annual value	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Notes

6.2 Bamaga WTP

Table 3 provides a summary of the treated water compliance data between 1 July 2023 to 30 June 2024.

Table 3 Summary of Bamaga WTP treated water quality, 1 July 2023 to 30 June 2024

Sample Point (QCP)	Parameter	No. samples required	No. samples collected	ADWG limit	No. non-compliant samples	Percentage of samples that comply	Comments
QCP 2	*E. coli*	51*	51	<1 CFU/100mL	0	100%	
QCP 2	Total trihalomethanes	52	52	<250 µg/L	0	100%	
Quarterly testing data							
QCP 2	Colour (True)	4	4	<15 Pt/Co units	0	100%	
QCP 2	Cadmium - total	4	7	<0.002 mg/L	0	100%	
QCP 2	Calcium	4	4	<200 mg/L	0	100%	
QCP 2	Chloride	4	4	<250 mg/L	0	100%	
QCP 2	Copper - total	4	7	<2 mg/L	0	100%	
QCP 2	Electrical conductivity	4	4	<2500 µS/cm^2	0	100%	
QCP 2	Fluoride	4	4	<1.5 mg/L	0	100%	
QCP 2	Aluminium - dissolved	4	4	<0.2 mg/L	0	100%	
QCP 2	Iron - total	4	8	<0.3 mg/L	0	100%	
QCP 2	Lead - total	4	7	<0.01 mg/L	0	100%	
QCP 2	Manganese	4	4	<0.5 mg/L	0	100%	
QCP 2	Magnesium - total	4	4	<200 mg/L	0	100%	
QCP 2	Nickel - total	4	7	<0.02 mg/L	0	100%	
QCP 2	pH	4	4	6.5 to 8.5	0	100%	
QCP 2	Potassium	4	4	NA	0	100%	
QCP 2	Sodium	4	4	<180 mg/L	0	100%	
QCP 2	Sulphate	4	4	<250 mg/L	0	100%	
QCP 2	Total alkalinity	4	4	NA	0	100%	
QCP 2	Total hardness	4	4	<200 mg $CaCO_3$/L	0	100%	
QCP 2	Turbidity	4	4	<5 NTU	0	100%	
QCP 2	Zinc - total	4	7	<3 mg/L	0	100%	

Notes

QCP2 Bamaga WTP outlet

* Samples sent to the External laboratory on the 23rd October were left at the airport for 3 days and therefore were not within holding times for the testing of Bacteria. Samples were not resampled due to late notification

Quarterly testing data - additional investigation monitoring

6.3 NPA distribution system

The drinking water compliance data for the communities serviced by the Bamaga WTP is summarised in Table 4.

Table 4 Summary of distribution system drinking water quality, 1 July 2023 to 30 June 2024

Sample Points (QCP)	Parameter	No. samples required	No. samples collected	ADWG Limit	No. non-compliant samples	Percentage of samples that comply	Comments
QCPs 3 to 8	*E. coli*	52* per QCP	306*	<1 CFU/100mL	0	100%	
QCPs 3 to 8	Total THMs	52 per QCP	313	<0.25 mg/L	0	100%	
Quarterly testing data							
QCPs 3 to 8	Colour (True)	4 per QCP	24	<15 Pt/Co units	0	100%	
QCPs 3 to 8	Cadmium - total	4** per QCP	42	<0.002 mg/L	0	100%	
QCPs 3 to 8	Calcium	4 per QCP	24	<200 mg/L	0	100%	
QCPs 3 to 8	Chloride	4 per QCP	24	<250 mg/L	0	100%	
QCPs 3 to 8	Copper - total	4** per QCP	42	<2 mg/L	0	100%	
QCPs 3 to 8	Electrical conductivity	4 per QCP	24	<2500 µS/cm^2	0	100%	
QCPs 3 to 8	Fluoride	4 per QCP	24	<1.5 mg/L	0	100%	
QCPs 3 to 8	Aluminium - dissolved	4 per QCP	24	<0.2 mg/L	0	100%	
QCPs 3 to 8	Iron - total	4** per QCP	48	<0.3 mg/L	0	100%	
QCPs 3 to 8	Lead - total	4** per QCP	42	<0.01 mg/L	0	100%	
QCPs 3 to 8	Manganese	4 per QCP	24	<0.5 mg/L	0	100%	
QCPs 3 to 8	Magnesium - total	4 per QCP	24	<200 mg/L	0	100%	
QCPs 3 to 8	Nickel - total	4** per QCP	42	<0.02 mg/L	0	100%	
QCPs 3 to 8	pH	4 per QCP	24	6.5 to 8.5	0	100%	
QCPs 3 to 8	Potassium	4 per QCP	24	NA	0	100%	
QCPs 3 to 8	Sodium	4 per QCP	24	<180 mg/L	0	100%	
QCPs 3 to 8	Sulphate	4 per QCP	24	<250 mg/L	0	100%	
QCPs 3 to 8	Total alkalinity	4 per QCP	24	NA	0	100%	
QCPs 3 to 8	Total hardness	4 per QCP	24	<200 mg $CaCO_3$/L	0	100%	
QCPs 3 to 8	Turbidity	4 per QCP	24	<5 NTU	0	100%	
QCPs 3 to 8	Zinc - total	4** per QCP	42	<3 mg/L	0	100%	

Notes

QCP3 Bamaga Primary School - sample point moved to NPARC office as of 5th February 2024

QCP3 NPARC Office

QCP4 Bamaga Hospital

QCP5 Injinoo Health Centre

QCP6 Umagico Council Office

QCP7 New Mapoon Day Care Centre

QCP8 Seisia Holiday Park

* Samples sent to the External laboratory on the 23rd October were left at the airport for 3 days and therefore were not within holding times for the testing of Bacteria. Samples were not resampled due to late notification.

** As of the 5th February 2024 Cadmium, Copper, Iron, Lead, Nickel and Zinc have been monitored Monthly.

7 Notifications to regulator

The operator managed water quality incidents under Queensland Health response protocols for the management of microbiological, and physical, and chemical quality of drinking water.

Water quality notifications were provided by NPARC, or the operator on behalf of NPARC, through relevant contacts at DRDMW. Table 5 presents the notifications made and corrective actions implemented.

Table 5 Summary of events, incidents, root causes, and actions taken

Incident date	Location	Parameter / Issue	Root cause	Corrective actions
23/10/23	NPAWSS	Weekly water samples collected and left at Horn Island Airport and missed the holding time for E.Coli.	Samples taken on the correct day and delivered to airport, in transit they were misplaced and discovered three days later at Horn Island. Samples holding time elapsed.	Discussions with Bamaga Airport manager to ensure prompt delivery. Samples are now transported via TNT Urgent with labeling for same day delivery.
23/10/23	NPAWSS	Event - High DW demand.	High demand for drinking water due to influx into the community for the Dan Ropeyarn Cup and misuse of sprinklers in the community. Causing reservoir levels to reduce significantly. Plant operating at maximum production capacity.	Restrictions of supply initiated on 23rd, 24th and 25th of October between 10:00pm and 6:00 am to ensure daytime supply of drinking water..
14/01/24	NPAWSS	WTP CMF A Faulted	The control card in PLC failed rendering the system inoperable. Plant production capability reduced to 3ML/D.	Restrictions notifications to the community commenced and sprinkler bans initiated. The control card was replaced and a spare card is now in stock onsite. Production was returned to normal capacity.
02/04/24	Seisa Holiday Park QCP8	Non- Compliance Water Quality Criteria	DWQMP has a limit of 100cfu/ml on HPC. Sample taken and tested for 25th of March returned a result of 420cfu/ml. The park was closed at the time and not operating. It is believed the age of water and insufficient flushtime attributed to the result.	Free CL2 was tested at the sampling time and recorded at 1.12mg/l and a total of 1.2mg/l. All other parameters were below alerts and reporting levels. Longer flush times before sampling have been instigated when the park is closed.

8 Customer complaints related to water quality

There were no complaints relating to any water quality during the reported period.

9 Findings and recommendations of the DWQMP auditor

The following audits were conducted during the reported period:

- Nil

The actions or proposed actions to address any noncompliances, recommendations, and opportunities for improvement identified in these audits are set out in Table 1.

Appendix A - NPA scheme water quality verification monitoring program as at 30 June 2024

Parameter	Sample Frequency	Units of Measure	Limit (ADWG 2011)
Raw water (QCP 1)			
E. coli	Weekly	CFU/100mL	
Total coliforms	Weekly	CFU/100mL	
Heterotrophic plate count	Weekly	CFU/mL	
Sodium	Quarterly	mg/L	≤180
Potassium	Quarterly	mg/L	
Calcium	Quarterly	mg/L	
Magnesium	Quarterly	mg/L	
Total hardness	Quarterly	mg $CaCO_3$/L	60<TH≤200
Iron	Quarterly	mg/L	≤0.3
Manganese	Quarterly	mg/L	≤0.1
Aluminium (dissolved)	Quarterly	mg/L	<0.2
Conductivity	Quarterly	µS/cm	
pH	Quarterly		6.5-8.5
Total alkalinity	Quarterly	mg $CaCO_3$/L	
Colour (true)*	Quarterly	Pt/Co units	≤15
Turbidity	Quarterly	NTU	≤5
Sulphate	Quarterly	mg/L	≤250
Chloride	Quarterly	mg/L	≤250
Fluoride	Quarterly	mg/L	≤1.5
Treated water - Bamaga WTP outlet (QCP 2)			
E. coli	Weekly	CFU/100mL	<1
Total coliforms	Weekly	CFU/100mL	<1
Heterotrophic plate count	Weekly	CFU/100mL	
Sodium	Quarterly	mg/L	≤180
Potassium	Quarterly	mg/L	
Calcium	Quarterly	mg/L	
Magnesium	Quarterly	mg/L	<200
Total hardness	Quarterly	mg $CaCO_3$/L	60<TH≤200
Iron	Quarterly	mg/L	≤0.3
Manganese	Quarterly	mg/L	≤0.5
Aluminium (dissolved)	Quarterly	mg/L	<0.2
Conductivity	Quarterly	µS/cm	<2500
pH	Quarterly		6.5-8.5

Total alkalinity	Quarterly	mg $CaCO_3$/L	
Colour (true) *	Quarterly	Pt/Co units	≤15
Turbidity	Quarterly	NTU	≤5
Sulphate	Quarterly	mg/L	≤250
Chloride	Quarterly	mg/L	≤250
Fluoride	Quarterly	mg/L	≤1.5
Total THMs	Weekly	µg/L	<250
Treated water – NPA distribution system quality control points (QCPs 3 to 8)			
E. coli	Weekly	CFU/100mL	<1
Total coliforms	Weekly	CFU/100mL	<1
Heterotrophic plate count	Weekly	CFU/100mL	
Sodium	Quarterly	mg/L	≤180
Potassium	Quarterly	mg/L	
Calcium	Quarterly	mg/L	
Magnesium	Quarterly	mg/L	<200
Total hardness	Quarterly	mg $CaCO_3$/L	≤200
Iron	Quarterly	mg/L	≤0.3
Manganese	Quarterly	mg/L	≤0.5
Aluminium (dissolved)	Quarterly	mg/L	<0.2
Conductivity	Quarterly	µS/cm	<2500
pH	Quarterly		6.5-8.5
Total alkalinity	Quarterly	mg $CaCO_3$/L	
Colour (true)*	Quarterly	Pt/Co units	≤15
Turbidity	Quarterly	NTU	≤5
Sulphate	Quarterly	mg/L	≤250
Chloride	Quarterly	mg/L	≤250
Fluoride	Quarterly	mg/L	≤1.5
Total THMs	Weekly	µg/L	<250

Notes

* The monitoring program changed from apparent to true colour after the fourth quarter external monitoring was performed.