HINCHINBROOK SHIRE COUNCIL

DRINKING WATER QUALITY MANAGEMENT PLAN

HINCHINBROOK SHIRE COUNCIL
SERVICE PROVIDER NO SP62

HINCHINBROOK SHIRE COUNCIL
DRINKING WATER QUALITY MANAGEMENT PLAN
ADDENDUM NOTICE – REVISION B

As per the Information Requirement Notice dated 6th September 2012, the following is a list of Amendments to Hinchinbrook Shire Council's Drinking Water Quality Management Plan in order for the Plan to obtain approval under the Water Supply (Safety and Reliability) Act 2008.

	Additional Information Required	Council's Response	Relevant Section Of DWQMP
a	***Include details of the infrastructure for providing the service:***		
a	Describe raw water intake infrastructure at Herbert River used for Ingham Pump Station WTP.	Reference to Appendix E made in Table 2-2, which now includes a detailed plan. Process description has also been updated as per Item 1 (a) below.	• Table 2-2 Listing of Treatment Process and Disinfection Process • Appendix E
a	Enhance process description in Table 2-2 of the plan by explaining: 1. Operations of: a. Underground gallery, bypass & its linkages to operational monitoring in Ingham Pump Station WTP.	Process description changed for gallery '*Raw water is sourced via an underground timber gallery, which utilises sand filtration. A section of the gallery can be bypassed if a larger flow rate is required. If turbidity of the water is high the bypass should not be used. A detailed plan and photos of the underground gallery during construction are provided in Appendix E.*' The gallery bypass has been added to Bypasses/Variations '*Raw water intake Underground Gallery – flap on well to allow greater flow into filtration system. By closing the bypass all water filters through the sand bed.*' Link to Operational Monitoring - Bypass added to Table 6-1 as a critical control point in the Scheme 1 process.	• Table 2-2 Scheme 1 Treatment Process & Bypasses/ Variations • Appendix E • Table 6-1 Operational Monitoring – Scheme 1, 2 and 3
		Added to Bypass section - '*Emergency line in WTP. Allows treated water to be pumped directly to the water tower from the clear water tank, diverting the high lift reservoir.*'	• Table 2-2 Bypasses/ Variations
	b. Emergency line in Forrest Beach WTP.	The following is added to the process descriptions for all WTPs (except for Ingham Pump Station WTP) '*There is no filter backwash in the sand filters, they are either skimmed or sand is replaced.'*	• Table 2-2 Treatment Process
	c. Filter backwash, if any, for sand filters application to all WTPs (except for Ingham Pump Station WTP)	Added to process description, '*Water passes through a concrete sedimentation channel to reduce velocity of water to allow heavy sediment and grit to settle to the bottom of the basin. Sprinklers are in place to reduce algae growth.'*	

	Additional Information Required	Council's Response	Relevant Section Of DWQMP
	d. Sedimentation channels of Ingham Depot & Forrest Beach WTPs. 2. Recirculation of treated water to the front of aerator at Ingham Depot and Halifax WTPs.	Added to process description '*Recirculation is required as it is a large volume storage tank and may not be turned over regularly. Recirculated to maintain chlorine residual.'*	• Table 2-2 Treatment Process • Table 2-2 Treatment Process
a	Clarify whether runoff from the Forrest Beach scheme's reservoir is directed off roof or not (table 2.3 indicates it is but this appears to be contradicted by an improvement action line 6 in their *Risk Management Improvement Plan* (Table 5.4)	Updated Table: Ingham Tower updated to: - Vermin proofing = YES - Run-off directed off roof = YES Forrest Beach Reservoir updated to: - Vermin-proof = NO - Runoff directed off roof = YES	• Table 2-3 Distribution and Reticulation System and Reservoirs
a	Ensure consistency 1. In the number of clear and final water tanks between Macknade WTP schematic (Appendix B & C), 'process' section of table 2-2 and 'reservoirs' section of table 2-3 in the plan.	Table 2-2 updated to reflect correct number of clear and final water tanks. Schematic W-SK-0006 was correct. Some minor changes to SK-W-0003. Reservoirs added to Table 2-3.	• Table 2-3 Distribution and Reticulation System and Reservoirs • Table 2-2 Listing of Treatment Process and Disinfection Process.
	2. In 'bypass/variation' section of table 2-2 by citing the underground gallery bypass of Ingham Pump Station and emergency line of Forrest Beach WTPs; and	Table 2-2 has been changed to reflect the bypasses and variations of the underground gallery at Ingham Pump Station and Emergency Line at Forrest Beach WTP.	• Table 2-2 Listing of Treatment Process and Disinfection Process.
	3. In Ingham Pump Station WTP Schematic (Appendix B & C) by showing the underground gallery bypass mention in the 'process' section of table 2-2.	The location of the underground gallery is shown on both the water supply and water treatment plant schematics, but it has been changed to show the intake as part of the underground gallery. A more detailed plan has been provided in Appendix E for clarification.	• Appendix E • Appendix B & C (Schematics)
a	Explain the operation of lime and soda ash dosing in Forrest Beach and Macknade WTPs process descriptions respectively e.g., how it is linked to operational monitoring and include dosing rates, if available;	Update process description in Table 2-2. Macknade WTP addition of Soda Ash: *'Soda ash is added to the aerator to stabilise pH levels in the raw water. Blocks of soda ash are added after a pH test. No defined amount is required, but is generally added on a weekly basis. In the future HSC will progress to a pump dosing system as the chemical control systems are updated.'* Forrest Beach WTP addition of Lime: *'Lime is added to the mechanical hopper and is distributed to the sedimentation channel to assist in the removal iron and pH correction. No defined amount is required, but it depends on flow rate and is checked on a daily basis.'*	• Table 2-2 Listing of Treatment Process and Disinfection Process.

	Additional Information Required	Council's Response	Relevant Section Of DWQMP
a	Provide approximate percentage of total lengths of pipe material in Table 2-3 of the plan if available.	This data is not currently available, but the reticulation mains are currently being mapped and will be considerably accurate. Mapping of Assets has been included in the RMIP .	Nil.
b	***Identify the hazards and hazardous events the drinking water service provider considers may affect the quality of water to which the service relates.***		
b	Consider the hazards and hazardous events associated with; 1. The raw water intake infrastructure at Herbert River;	The raw water intake is a part of the underground gallery. Collapse of infrastructure is not considered a risk. Biological hazards have been covered for River and Groundwater Systems already in the risk assessment.	Nil.
	2. Chemical dozing failures with respect to manual dosing of lime and soda ash;	Added to Risk Assessment Item No. 55 and 58.	• Table 4-6 Hazard Identification, Risk Assessment and Uncertainty
	3. Runoff not being directed off roof and non-vermin proof Ingham Tower;	Error in Table 2-3, Ingham Water Tower has been updated to no issue with run-off or vermin, Forrest Beach Reservoir has been updated to reflect RMIP. Forrest Beach Reservoir already in Risk Table.	• Table 2-3 Distribution and Reticulation System and Reservoirs
	4. Underground gallery for Ingham Pump Station WTP;	As per item 1 above – the raw water intake is part of the underground gallery. Refer to Appendix E for further clarification.	Nil.
	5. Clear and final water tanks in Macknade WTP e.g., runoff is/is not directed off roof and is/is not vermin-proof? and	As per update to Table 2-3 reservoirs at Macknade WTP are vermin proof with runoff directed off roof. Error was made in original table.	Nil.
	6. Process steps such as aeration, sedimentation channels applicable to Ingham Depot and Forrest Beach WTPs.	Item 44 in the Risk Assessment Table (Table 4-6) addresses the risk associated with open filtration systems causing the growth of cyanobacteria. This risk is in relation to Ingham Depot and Forrest Beach WTP as they both consist of the aeration and sedimentation process. This risk has also been identified in the RMIP and includes actions to be taken to reduce the residual risk.	• Table 4-6 Hazard Identification, Risk Assessment and Uncertainty
c	***Include an assessment of the risks posed by hazards and hazardous events.***		
c	Consider potential risk(s) posed by the above applicable hazards and hazardous events	Updates as per hazards and hazardous events identified in Section b above.	• Table 4-6 Hazard Identification, Risk Assessment and Uncertainty

	Additional Information Required	Council's Response	Relevant Section Of DWQMP
c	Based on Table 4-2, re-evaluate the assessed maximum risk levels for all biological hazards in Table 4-6, e.g., qualitive measure of consequence/impact for bacteria & viruses, protozoa & pathogens etc should be a major or catastrophic instead of minor;	The following Risks were re-evaluated: 1 – *Contamination from Septic tanks & sewer mains* – Maximum Risk Consequence upgraded from a Minor to Major resulting in an increase of Residual Risk Level. 2 – *Contamination from Sewerage Treatment Plant* – Maximum Risk Consequence upgraded from a Minor to Major resulting in an increase of Residual Risk Level. 41 – *Chemical Dosing Failures* – Maximum Risk Consequence upgraded from a Moderate to Catastrophic resulting in an increase of Residual Risk Level. 42 – *Inadequate Mixing* – Maximum Risk Consequence upgraded from a Moderate to Catastrophic resulting in an increase of Residual Risk Level. 63 – *Inadequate repair and maintenance, inadequate system flushing* - Maximum Risk Consequence upgraded from a Moderate to Major resulting in an increase of Residual Risk Level. 64 – *Commissioning new mains* - Maximum Risk Consequence upgraded from a Moderate to Major resulting in an increase of Residual Risk Level. 65 – *Stagnation* - Maximum Risk Consequence upgraded from a Moderate to Major resulting in an increase of Residual Risk Level. 66 – *Cleaning of mains (use of improper equipment, incorrect methods, lack of cleaning strategy)* - Maximum Risk Consequence upgraded from a Moderate to Major resulting in an increase of Residual Risk Level. 68 – *Animals access through overflow drains, etc* - Maximum Risk Consequence upgraded from a Minor to Major resulting in an increase of Residual Risk Level. 69 – *Rainwater ponding on reservoir roof* - Maximum Risk Consequence upgraded from a Moderate to Major resulting in an increase of Residual Risk Level.	• Table 4-6 Hazard Identification, Risk Assessment and Uncertainty
c	In table 4.6, group hazards that can be managed by similar treatment process(es) e.g., bacteria & viruses, nitrates/nitrites; and	The hazards have been grouped so that the type of hazard and the preventive measures have been put together. Please note that the item numbers had to be reshuffled.	• Table 4-6 Hazard Identification, Risk Assessment and Uncertainty • Table 5-1 Existing and Proposed Preventative Measures
c	Explain the comment – '*most places have more than one plant to supply'* for items 38 & 40 in the existing preventative measures/barriers column of Table 4-6 (and repeated in Table 5-1) of the plan.	The statement has been amended as follows: *'Most schemes have more than one water supply source. Scheme 1 has two WTP's which provides two water supplies to the Ingham district. Scheme 2 is connected to Scheme 1 and also has two WTP's. Forrest Beach is the only standalone WTP, but depending on funding there is a proposed connection to Scheme 1 and 2.'*	• Table 4-6 Hazard Identification, Risk Assessment and Uncertainty • Table 5-1 Existing and Proposed

	Additional Information Required	Council's Response	Relevant Section Of DWQMP
			Preventative Measures
d	**Demonstrate how the drinking water service provider intends to manage the risks posed by the hazards and hazardous events**		
d	Clarify description of 'exceedance' for level 1 incident/emergency in Table 5-2 of plan e.g., *exceedance* of operational limit;	Updated Description of Level to '*Exceedance of operational limit has occurred but managed through operational and maintenance procedures.'*	• Table 5-2 Incident/ Emergency Levels
d	Include external communication protocol in the Table 5-3 of the plan e.g., reporting to regulator, Queensland Health;	*'Report exceedance to regulator'* added to communication protocols to relative items.	• Table 5-3 Management of Incidents and Emergencies and Emergency Contact Details and Protocols
d	Amend table 5-4 'Risk Management Improvement Plan' in the plan to include additional improvement action(s) that may arise from the risk assessment;	Risk Management Improvement Plan remains unchanged as residual risks are below the identified risk level of a Medium (6). Items 1 and 2 in the risk assessment have increased above the Medium (6) level but a preventative measure to increase certainty has already been identified in the RMIP.	Nil.
d	Explain record retention requirements in section 5.5 Service Wide Support – Information Management of the plan e.g., for internal and external (including regulatory) reporting.	Section added under Section 5.5 Service Wide Support – Information Management.	• Section 5.5.1 Record Retention Requirements
e	**Include details of the operational and verification monitoring programs under the plan, including the parameters to be used for compliance with the plan to the extent the plan requires the provider to maintain water quality in accordance with the water quality criteria for drinking water.**		
e	Include all grab sample locations marked on schematics of Appendix C in Operational Monitoring Table 6-1 of the plan e.g., raw water intake at Herbert River, bore raw water for Forrest Beach WTP.	The grab samples were originally marked on the water treatment plant schematics in Appendix C, but these have been updated so they stand out.	Appendix C

HINCHINBROOK SHIRE COUNCIL
DRINKING WATER QUALITY MANAGEMENT PLAN
ADDENDUM NOTICE – REVISION C

As per the Information Requirement Notice dated 7 February 2013, the following is a list of Amendments to Hinchinbrook Shire Council's Drinking Water Quality Management Plan in order for the Plan to obtain approval under the Water Supply (Safety and Reliability) Act 2008.

	Additional Information Required	Council's Response	Relevant Section Of DWQMP
a	***Include an assessment of the risks posed by hazards and hazardous events.***		
a	Re-evaluate the consequence (column 5) for item numbers 8, 9, 10, 11, 12, 13, 43, 44, 45, 50, 51, 64 and consequence (column 9) for all biological hazards in table 4-6 such that the consequence is consistent with the definitions in table 4-2. For example, the major and catastrophic consequence description refers to acute health risks (e.g., pathogens) whereas other consequence description refers to either chronic health risks or aesthetic parameters; and	The consequence for the item numbers mentioned was re-evaluated to reflect the definitions in table 4-2. The acceptable level of residual risk has been increased to anything below or equal to a Medium (8). Table 5-1 has been adjusted to reflect the changes in the acceptable level of residual risk.	• Table 4-6 Hazard Identification, Risk Assessment and Uncertainty • Table 5-1 Existing and Proposed Preventative Measures. • Section 5 – Managing Risks
a	In table 4-6 Hazard Identification, Risk Assessment and Uncertainty, hazards (column 4) that are managed by the same existing preventive measures/barriers must be separated from hazards that are not managed by those existing preventive measures/barriers. For example, filtration is an effective barrier for protozoa whereas chlorination is an effective treatment for bacteria and viruses.	An additional column was added (Column 9) to table 4-6 which outlines the hazard applicable to the existing preventative measure.	• Table 4-6 Hazard Identification, Risk Assessment and Uncertainty
b	**Demonstrate how the drinking water service provider intends to manage the risks posed by the hazards and hazardous events**		
b	Amend table 5-4 Risk Management Improvement Plan in the plan to include: 1. Pump dosing system to update chemical control system at Macknade Water Treatment Plant; and 2. Addition improvement action(s) that may arise when updating the risk assessment.	The upgrade of the pump dosing system at Macknade WTP has been added to table 5-4 Risk Management Improvement Plan. No additional improvement actions arose from re-evaluating the risk assessment.	• Table 5-4 Risk Management Improvement Plan.

HINCHINBROOK SHIRE COUNCIL
DRINKING WATER QUALITY MANAGEMENT PLAN
ADDENDUM NOTICE – REVISION D

As per the Review conducted on the 25 March 2015, the following is a list of Amendments to Hinchinbrook Shire Council's Drinking Water Quality Management Plan:

Item No.	Amendment Description	Relevant Section of the DWQMP
1	Updated all Water Treatment Plant Schematics to include the addition of fluoride. Bore descriptions for Macknade WTP have been amended to include the change of Macknade Well 2 and 3 to Bore 2 and 3	Appendix C SK-W-0003 SK-W-0005 SK-W-0006 SK-W-0007
2	Forrest Beach 3.8 ML Reservoir is now vermin proof	Table 2-3
3	Key Stakeholders table updated to provide final approved copy of DWQMP upon request.	Table 2-4
4	Updated raw water source details for Macknade Water Treatment Plant. Macknade Well 2 and 3 are now Bore 2 and 3. Bore descriptions for upgraded bores at Halifax Water Treatment Plant remain the same.	Table 3-46 Figure 3.4 SK-W-0003 SK-W-0006
5	Added fluoridation to the treatment processes. Removed outline on Risk Assessment that identified future risks associated with the implementation of fluoride in the water supply. Fluoride has since been implemented.	Table 2-2 Table 4-6
6	Updated Organisational Structure to include changes to the Water and Sewerage Supervisor position. This is now separated into two positions; Operations Team Leader and Treatment Team Leader.	Figure 5.1
7	CEO details to updated in the Incidents and Emergency Contact Details and Protocols	Table 5-3
8	RMIP updated to reflect items completed by Council, in progress, overdue and new items identified. New column added.	Table 5-4
9	Fluoride daily samples (SCADA and benchtop) added to the operational monitoring table.	Table 6-1
10	Monthly NATA fluoride verification samples and weekly reticulation samples added to the verification monitoring table. Update frequency of Standard Water Analysis to monthly at the treatment plant outlet.	Table 6-2
11	Updated the Local Disaster Management Plan to its current revision. Appendix H has been removed as it is included in the updated Local Disaster Management Plan.	Appendix G

HINCHINBROOK SHIRE COUNCIL
DRINKING WATER QUALITY MANAGEMENT PLAN
ADDENDUM NOTICE – REVISION E

As per the Review conducted on the 23 March 2018, the following is a list of Amendments to Hinchinbrook Shire Council's Drinking Water Quality Management Plan:

Item No.	Amendment Description	Relevant Section of the DWQMP
1	Updated all Water Treatment Plant Schematics to include the Decommissioning of fluoride along with other upgrades.	Appendix C SK-W-0001 SK-W-0002 SK-W-0004 SK-W-0005 SK-W-0006 SK-W-0007
2	Updated current and projected population, connections and demand.	Table 1-1
3	Updated Source Details table to represent the new pipeline connecting schemes 1 and 3.	Table 2-1
4	Key Stakeholders table updated to represent the change of Sucrogen to Wilmar.	Table 2-4
5	Removed fluoridation from the treatment processes.	Table 2-2 Table 4-6
6	Distribution and Reticulation System and Reservoirs table updated to represent the current percentage of total lengths of pipes.	Table 2-3
7	Updated Water Quality Data to latest results.	Section 3.1.1 Section 3.1.2 Section 3.1.3
8	Hazard Identification and Risk Assessment Team table updated.	Table 3-47
9	Key Stakeholders table updated to represent the change of Treatment Plant Operator to Treatment Plant Team Leader	Table 4-5
10	Updated Risk Assessment to represent actions from the RMIP that have been completed.	Table 4-6
11	Updated Organisational Structure to include addition of apprentice plumber and changes to a number of positions.	Figure 5.1
12	RMIP updated to reflect items completed by Council, in progress, overdue and new items identified. RMIP updated to reflect outcomes from DWQMP Audit completed on 28th April 2017.	Table 5-4

13	Fluoride daily samples (SCADA and benchtop) removed from the operational monitoring table.	Table 6-1
14	Monthly NATA fluoride verification samples and weekly reticulation samples removed from the verification monitoring table.	Table 6-2
15	Verification Monitoring Locations table updated to represent the removal of fluoride.	Table 6-3
16	Updated the Local Disaster Management Plan to its current revision.	Appendix G
17	Included DWQMP Audit Report carried out by Viridis Consultants	Appendix H

HINCHINBROOK SHIRE COUNCIL
DRINKING WATER QUALITY MANAGEMENT PLAN
ADDENDUM NOTICE – REVISION F

As per the Review conducted on the 25 March 2020 and feedback review in February/March 2021, the following is a list of Amendments to Hinchinbrook Shire Council's Drinking Water Quality Management Plan:

Item No.	Amendment Description	Relevant Section of the DWQMP
1	Updated all Water Treatment Plant Schematics to include upgrades from the Hinchinbrook Water Security Project	Appendix B SK-W-0001 SK-W-0002 Version 5 SK-W-0003 Version 4 SK-W-0005
2	Treatment and Disinfection Process table updated to include changes made as part of the Hinchinbrook Water Security Project.	Table 2-2
3	Distribution and Reticulation System and Reservoirs table updated to include changes made as part of the Hinchinbrook Water Security Project.	Table 2-3
4	Raw Water Source Details updated to include upgrades made as part of the Hinchinbrook Water Security Project.	Table 3-46 Figure 3.3
5	Water Quality Complaints tables updated.	Table 3-12 Table 3-29 Table 3-40
6	Hazard Identification and Risk Assessment Team table updated.	Table 3-47
7	Key Stakeholders table updated to represent the change of Treatment Plant Operator to Treatment Plant Team Leader	Table 4-5
8	Updated Risk Assessment to represent actions from the RMIP that have been completed.	Table 4-6
9	Updated Organisational Structure to include changes to a number of positions.	Figure 5.1
10	CEO details updated.	Table 5-3
11	RMIP updated to reflect items completed by Council, in progress, overdue and new items identified.	Table 5-4
12	Updated the Local Disaster Management Plan to its current revision.	Appendix H
13	Numerous Section updated due to DWQMP Amendment Information Requirement Notice from DRDM&W Dated 23/12/2021.	Multiple – See outcomes from NWM Issues Register.

Document Control					
Rev	**Date**	**Revision Details**	**Author**	**Reviewer**	**Approver**
A	01/06/2012	For Approval	M Vecchio	P Martin	DERM
B	19/11/2012	Response to Information Requirement Notice (dated 06/09/2012)	M Vecchio	P Martin	DERM
C	07/03/2013	Response to Information Requirement Notice (dated 07/02/2013)	M Vecchio	P Martin	DEWS
D	07/05/2015	Amendments required as part of the Review completed on 24 March 2015.	M Vecchio	P Martin	DEWS
E	14/05/2018	Amendments required as part of the review completed on 23 March 2018	H Grazioli	P Martin	DEWS
F	21/09/2020 & 22/3/2021	Amendments required as part of the review completed on 25 March 2020 and 11-22 March 2021	H Grazioli	P Martin	DEWS

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1 REGISTERED SERVICE DETAILS

1.1 Application Form

Hinchinbrook Shire Council (HSC) is responsible for the management of the shire's potable water reticulation network and provision of safe and reliable drinking water to residents.

The Service Provider Number for HSC is: **SP62**

Refer Appendix A for the Drinking Water Quality Management Plan Approval Application Form.

1.2 Further Information Required

Table 1-1 identifies ownership, operational responsibilities and the context of the water supply schemes in terms of current and future population as well as demand.

Table 1-1 Listing of Drinking Water Supplies

Scheme Name	Operator	Communities Served	Current			Projected in 10 Years		
			Population Served	Connections	Demand ML/year	Population Served	Connections	Demand ML/year
SCHEME 1 Ingham Water Supply	Hinchinbrook Shire Council	Ingham Trebonne Toobanna Blackrock Foresthome Victoria Plantation Braemeadows	7218	3156	1300	7160	3131	1300
SCHEME 2 Lower Herbert Water Supply	Hinchinbrook Shire Council	Halifax Cordelia Macknade Bemerside Lucinda Taylors Beach	3530	1084	450	3502	1075	445
SCHEME 3 Forrest Beach Water Supply	Hinchinbrook Shire Council	Forrest Beach	1500	597	250	1488	592	250

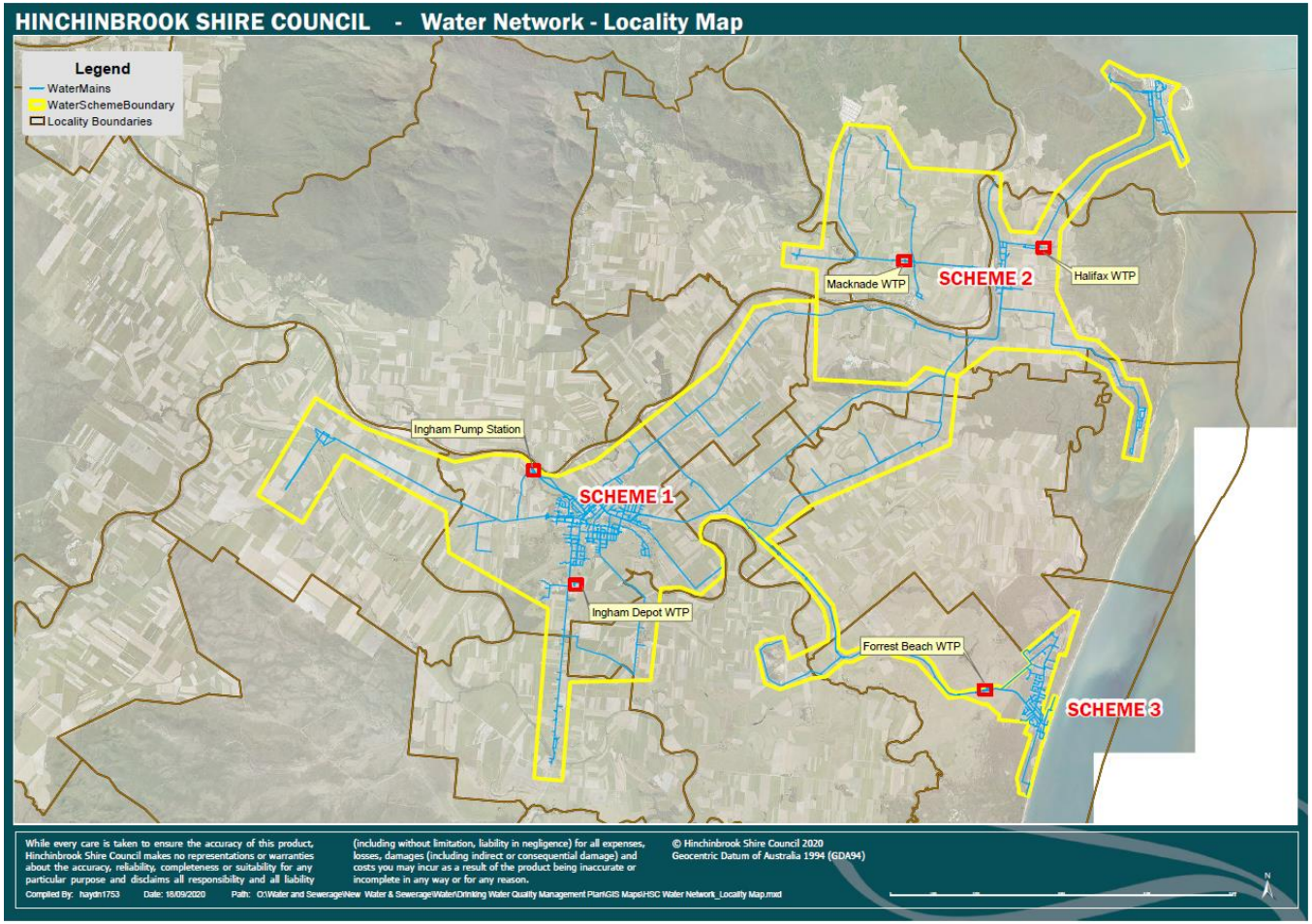


Figure 1.1 - Hinchinbrook Shire Council Water Network Locality Map

2 DETAILS OF INFRASTRUCTURE FOR PROVIDING THE SERVICE

2.1 Schematics

There are three schemes under the control of Hinchinbrook Shire Council:

- Ingham Water Supply
- Lower Herbert Water Supply
- Forrest Beach Water Supply

Schematics of each system as well as an overall schematic are provided in Appendix B. Key statistics which are relevant to each supply are summarised in Table 2-1. Schematics of each Water Treatment Plant outlined in Table 2-2, is provided in Appendix C.

Bore locations are further explained in Section 3.3, including locality maps.

2.2 Source Details

Table 2-1 provides a description of the water sources and sourcing infrastructure for each scheme.

Hinchinbrook Shire Council has an Order in Council to remove water from the Herbert River. This Order is included in Appendix G.

Table 2-1 Listing of Source Details for each Scheme

	SCHEME 1 Ingham Water Supply	SCHEME 2 Lower Herbert Water Supply	SCHEME 3 Forrest Beach Water Supply
Source	Herbert River	Groundwater (Bore) from Macknade Bores. Halifax infrastructure is not in use.	Groundwater (Bore)
Percent of Supply	Low – Used if bore supply rate drops and if river water quality meets turbidity requirement. Changes on a regular basis.	90% (Depending on season)	90%
Reliability	Variable (only used during dry season)	High	High
Water Quality Issues	High turbidity if extracting during high rainfall periods. In events of high rainfall, water is circulated from Ingham Depot to feed the reservoir.	Low pH in groundwater. Soda ash is added during the treatment process. (Macknade WTP). Halifax infrastructure is not in use due to raw water quality issues observed.	High iron levels and other aesthetic issues are present in the water source.
Source	Groundwater (7 Bores)	Scheme 1 (combination of both bore and river water)	Scheme 1 (combination of both bore and river water)
Percent of Supply	High – This is the Scheme's primary source. Ingham Depot WTP has the capacity to fully supply Scheme 1. Next priority is the bore bores at the Herbert River Pump Station Site, then the Herbert River.	10% (Depending on season)	10% (Depending on season)
Reliability	High	High	High
Water Quality Issues	Water quality is very good, no major issues.	High turbidity if extracting during high rainfall periods. In events of high rainfall, water is	High turbidity if extracting during high rainfall periods. In events of high rainfall, water is circulated

		circulated from Ingham Depot to feed the reservoir. PFAS found in Macknade Bores 3 & 4. Macknade Bore 1 abandoned. Potential additional Bore at Kemps Rd has no PFAS.	from Ingham Depot to feed the reservoir.
Are there any sources that do not undergo treatment prior to supply?	No		

2.3 Treatment Process and Disinfection Process

Table 2-2 provides a description of the water treatment infrastructure and processes, for each water source as well as the disinfection process for each drinking water source.

Table 2-2 Listing of Treatment Process and Disinfection Process

			SCHEME 1 Ingham Water Supply	SCHEME 2 Lower Herbert Water Supply	SCHEME 3 Forrest Beach Water Supply
TREATMENT PLANT A	TREATMENT PROCESS	**Name**	Ingham Pumping Station	Halifax Treatment Plant – **Not in use due to unsuitable raw water quality**	Forrest Beach Treatment Plant
		Location	Lot 1 RP733651 164 Pump Station Road, Ingham	Lot 1 RP727372 100 Lucinda Point Road, Halifax	Lot 7 RP800047 1421 Forrest Beach Road, Forrest Beach
		Process	• Raw water is sourced via an underground timber gallery, which utilises sand filtration. A section of the gallery can be bypassed if a larger flow rate is required. If turbidity of the water is > 1.0 NTU the bypass should not be used. A detailed plan and photos of the underground gallery during construction are provided in Appendix F. • The low lift pumps are operated based on the water level in the reservoir when the Herbert River water quality is acceptable. • New groundwater bore pumps on the river bank are being developed to fill the reservoir when it is not possible to take water from the river. • Chlorination of raw water into the reservoir (sodium hypochlorite). • The recirculation pump is timed. • The water supply pumps are operated based on the demand in the water reticulation network. • An altitude valve is actuated to allow treated water from the Depot WTP to backfill the reservoir. • A chlorine analyser is installed to monitor the residual chlorine of the treated water and regulate the hypochlorite dosing. • Inlet flow meter is installed upstream of the reservoir. • Outlet flow meter is installed downstream of the water supply pumps.	• Cascade Aerator • Three sand filters (only 2 in use). There is no filter backwash in the sand filters, they are either skimmed or sand is replaced. • Clear Water Tank • Chlorination in the clear water tank (sodium hypochlorite) • Recirculation pump to mix the water in the clear water tank. Automatically operated based on the level of the water reservoir. Recirculation is required as it is a large volume storage tank and may not be turned over regularly. Recirculated to maintain chlorine residual. • Water supply pumps to Halifax and Lucinda. Automatically operated based on the demand of the water reticulation network. • A chlorine analyser is installed in the recirculation loop to monitor the residual chlorine of the treated water and regulate the hypochlorite dosing. • Outlet flow meter is installed downstream of the water supply pumps.	• Cascade Aerator • Lime is added to the mechanical hopper and is distributed to the sedimentation channel to assist in the removal iron and pH correction. No defined amount is required, but it depends on flow rate and is checked on a daily basis. • Water passes through a concrete sedimentation channel to reduce velocity of water to allow heavy sediment and grit to settle to the bottom of the basin. Sprinklers are in place to reduce algae growth. • Two sand filters. There is no filter backwash in the sand filters, they are either skimmed or sand is replaced. • Chlorination (sodium hypochlorite) into the clear water well • Recirculation pump around the clear water well. Operating continuously. • Low lift pumps to transfer water to the 3800m^3 reservoir at the other end of the site. Operated based on the water level in the reservoir. • Water supply pumps to the Forrest Beach reticulation network. Operated based on demand in the water reticulation network.

			SCHEME 1 Ingham Water Supply	SCHEME 2 Lower Herbert Water Supply	SCHEME 3 Forrest Beach Water Supply
					• A chlorine analyser is installed in the recirculation loop to monitor the residual chlorine of the treated water and regulate the hypochlorite dosing. • Outlet flow meter is installed downstream of the water supply pumps.
		Design Capacity (20 hr operation)	12960 kL/day	1800 kL/day	3200 kL/day
		Daily Flow Range	Minimum = 0 m³/day (during wet season) Average = 208 m³/day Maximum = 705 m³/day	Minimum = 17 m³/day Average = 125 m³/day Maximum = 165 m³/day	Minimum = 477 m³/day Average = 725 m³/day Maximum = 1000 m³/day
		Chemicals Added	Sodium Hypochlorite	Sodium Hypochlorite	Sodium Hypochlorite Lime
		Standby Chemical Dosing Facilities (Y/N)	Y (manual)	Y (manual)	Y (manual)
		Water Sourced From and %	Low – Usage depends on water quality in river. Supply from each scheme depends on seasonal changes. At times Ingham Depot can be supplying 100% of the average day demand.	Was: Groundwater Bores = 90% (approx.) Water from Scheme 1 = 10% (approx.) Critical turbidity limit of 1.0 NTU for individual bores.	Groundwater Bores = 90% (approx.) Water from Scheme 1 = 10% (approx.) Critical turbidity limit of 1.0 NTU for individual bores.
		% of Average Day Demand Provided		Was: 25% (will increase to 30% when bores are upgraded)	100%
		% of Scheme Supply Distribution Area Supplied		Was: 25% (will increase to 30% when bores are upgraded)	100%
		Bypasses / Variations	• Altitude valve to allow filling reservoir from Ingham Depot WTP. • Raw water intake Underground Gallery – flap on well to allow greater flow into filtration system. By closing the bypass all water filters through the sand bed.	Nil	Emergency line in WTP. Allows treated water to be pumped directly to the water tower from the clear water tank, diverting the high lift reservoir.
	DISINFECTION PROCESS	**Location**	After flow meter prior to entering reservoir.	Into clear water tank.	Into clear water well.
		Type	Sodium Hypochlorite – usually a re-chlorination site due to non-use of Herbert River raw water source. Chlorinated water from the Ingham Depot WTP is re-chlorinated at the River Pump Station Reservoir site.	Sodium Hypochlorite	Sodium Hypochlorite
		Dose Rate	1.3 mg/L, increased to 1.6 mg/L in the wet season	1.3 mg/L, increased to 1.6 mg/L in the wet season	1.3 mg/L, increased to 1.6 mg/L in the wet season

			SCHEME 1 Ingham Water Supply	SCHEME 2 Lower Herbert Water Supply	SCHEME 3 Forrest Beach Water Supply
		Target Residual Levels	1.3 mg/L when exits plant 0.6 mg/L at furthest point	1.3 mg/L when exits plant 0.6 mg/L at furthest point	1.3 mg/L when exits plant 0.6 mg/L at furthest point
		Duty/Standby	Only duty pumps, no standby pumps	Only duty pumps, no standby pumps	Only duty pumps, no standby pumps
		Dosing Arrangements	Depolox 4 Chlorine Analyser Residual Analyser Will be renewed over next 2 years	Depolox 3 Chlorine Analyser Residual Analyser Will be renewed over next 2 years	Depolox 4 Chlorine Analyser Residual Analyser
		Alarms	SCADA System: Failure Low residual High residual	SCADA System: Failure Low residual High residual	SCADA System: Failure Low residual High residual
TREATMENT PLANT B	**TREATMENT PROCESS**	**Name**	Depot Treatment Plant	Macknade Water Treatment Plant	
		Location	Lot 95 CP843302 Council Depot Martin Street, Ingham	Lot 1 RP730836 4-14 Marbelli Street, Macknade	
		Process	• Cascade Aerator • Sand Filters (4 in total, only 2 in use) There is no filter backwash in the sand filters, they are either skimmed or sand is replaced (see operational procedures for more information). • Chlorination (sodium hypochlorite). • 2 Covered Clearwater Reservoir 3800m^3 & m^3 • Recirculation Pump is timed to return flow upstream of the aeration cascade. Recirculation is required as it is a large volume storage tank and may not be turned over regularly. Recirculated to maintain chlorine residual. • Final water is pumped to water reticulation. • A chlorine analyser is installed in the recirculation loop to monitor the residual chlorine of the treated water and regulate the hypochlorite dosing. • Outlet flow meter is installed downstream of the water supply pumps.	• Cascade Aerator • Soda ash is added to the aerator to stabilise pH levels in the raw water. Blocks of soda ash are added after a pH test. No defined amount is required, but is generally added on a weekly basis. In the future HSC will progress to a pump dosing system as the chemical control systems are updated. • Two sand filters. There is no filter backwash in the sand filters, they are either skimmed or sand is replaced. • Chlorination (sodium hypochlorite) • Clear water tank • Recirculation pump to mix in the clear water tank. Operated continuously. • Final water tanks (4 in total, hydraulically linked) • Separate water supply pumps to Halifax and Macknade/ Bemerside. Water supply pumps are operated based on demand in the water reticulation network. • A chlorine analyser is installed in the recirculation loop to monitor the residual chlorine of the treated water and regulate the hypochlorite dosing. • Two outlet flow meters are installed downstream of the water supply pumps to monitor the potable demand to Halifax and Macknade/Bemerside.	
		Design Capacity (20 hr operation)	5000 kL/day	3250 kL/day	

			SCHEME 1 Ingham Water Supply	SCHEME 2 Lower Herbert Water Supply	SCHEME 3 Forrest Beach Water Supply
		Daily Flow Range	Minimum = 3100 m³/day Average = 3411 m³/day Maximum = 3915 m³/day	Minimum = 751 m³/day Average = 901 m³/day Maximum = 1020 m³/day	
		Chemicals Added	Sodium Hypochlorite	Sodium Hypochlorite Soda Ash	
		Standby Chemical Dosing Facilities (Y/N)	Y (manual)	Y (manual)	
		Water Sourced From and %	Groundwater Bores = 100%, Critical turbidity limit of 3.0 NTU for individual bores. Can select river water as an alternative. Future duplication of Bore 7 at Como Rd will ensure that the Herbert River will rarely be relied upon.	Groundwater Bores = 100% Critical turbidity limit of 2.0 NTU for individual bores.	
		% of Average Day Demand Provided	High - Depends on water quality in river. Supply from each scheme depends on seasonal changes. At times Ingham Depot can be supplying 100% of the average day demand.	75%	
		% of Scheme Supply Distribution Area Supplied	High - Depends on water quality in river. Supply from each scheme depends on seasonal changes. At times Ingham Depot can be supplying 100% of the water supply.	75%	
		Bypasses / Variations	Nil	Nil	
	DISINFECTION PROCESS	**Location**	Dosed post sand filters prior to entering reservoir.	Dosed into sump post sand filters and prior to entering clear water tanks.	
		Type	Sodium Hypochlorite	Sodium Hypochlorite	
		Dose Rate	1.3 mg/L, increased to 1.6 mg/L in the wet season	1.3 mg/L, increased to 1.6 mg/L in the wet season	
		Target Residual Levels	1.3 mg/L when exits plant 0.6 mg/L at furthest point	1.3 mg/L when exits plant 0.6 mg/L at furthest point	
		Duty/Standby	Only duty pumps, no standby pumps	Only duty pumps, no standby pumps	
		Dosing Arrangements	Residual Analyser Depolox 4 Chlorine Analyser	Residual Analyser Depolox 4 Chlorine Analyser	
		Alarms	SCADA System: Failure Low residual High residual	SCADA System: Failure Low residual High residual	

2.4 Infrastructure Details

Table 2-3 provides a description of the distribution and reticulation system and reservoirs for each scheme.

Table 2-3 Distribution and Reticulation System and Reservoirs

		SCHEME 1 Ingham Water Supply	SCHEME 2 Lower Herbert Water Supply	SCHEME 3 Forrest Beach Water Supply
DISTRIBUTION AND RETICULATION SYSTEM	Pipe Material	• Cast Iron • Asbestos Cement • PVC	• Asbestos Cement • PVC	• Asbestos Cement • PVC
	Age Range	1939 to present	1975 to present	1975 to present
	Approx. % of Total Lengths	At this stage, we currently do not separate the water assets into individual schemes. We are currently going through the process of mapping our assets, which will assist in separating the assets into Scheme 1, 2 and 3. 100mm = 38% 200mm = 0.7% 250mm = 10.4% 375mm = 0.3% 150mm = 31.9%. 225mm = 8 300mm = 2.4%		
	Areas where potential long detention periods could be expected	• Cemetery Road • Challands Street • Industrial Avenue • Foresthome Road • Kehls Road • Two Mile Road • Three Mile Road	• Patterson Parade • Fulton Drive • Bullock Paddock Road • Neames Inlet Road	• Beatts Road • Allamanda Avenue • Cassady Beach Road • Bill Johnson Drive • Forrest Drive
	Areas where low water pressure could be expected during peak or other demand periods	• Cemetery Road • Foresthome Road • Brolga Street • Kehls Road	• Patterson Parade • Bullock Paddock Road • Neames Inlet Road	• Forrest Drive • Bill Johnson Drive • Cassady Beach Road
RESERVOIRS	**GROUND RESERVOIR**			
	Name	Ingham Reservoir	Halifax Depot WPS Reservoir	Forrest Beach WTP Reservoir
	Capacity (ML)	17.6	2	3.8
	Roofed (Y/N)	Y	Y	Y
	Vermin-proof (Y/N)	Y	Y	Y
	Runoff directed off roof (Y/N)	Y	Y	Y
	GROUND RESERVOIR			
	Name	Ingham Depot WTP Reservoir 1. Can be isolated from Reservoir 2.	Halifax WTP Clear Water Tank	Clear Water Well
	Capacity (ML)	3.8	0.180	0.165
	Roofed (Y/N)	Y	Y	Y
	Vermin-proof (Y/N)	Y	Y	Y
	Runoff directed off roof (Y/N)	Y	Y	Y
	GROUND RESERVOIR			
	Name	Ingham Depot WTP Reservoir 2. Can be isolated Can be isolated from Reservoir 1.	Macknade WTP Clear Water Tank	
	Capacity (ML)	2.5	0.0675	
	Roofed (Y/N)	Y	Y	
	Vermin-proof (Y/N)	Y	Y	
	Runoff directed off roof (Y/N)	Y	Y	

RESERVOIRS	GROUND RESERVOIR			
	Name		Macknade WTP Final Water Tank x 4	
	Capacity (ML)		No. 1 = 0.099 No. 2 = 0.065 No. 3 = 0.099 No. 4 = 0.135	
	Roofed (Y/N)		Y	
	Vermin-proof (Y/N)		Y	
	Runoff directed off roof (Y/N)		Y	
	ELEVATED RESERVOIR			
	Name	Ingham Tower	Halifax Tower	Forrest Beach Tower
	Capacity	0.445	0.175	0.175
	Roofed (Y/N)	Y	Y	Y
	Vermin-proof (Y/N)	Y	Y	Y
	Runoff directed off roof (Y/N)	Y	Y	Y
	ELEVATED RESERVOIR			
	Name	Tokalon Tower	Lucinda Reservoir	
	Capacity	0.080	3.5	
	Roofed (Y/N)	Y	Y	
	Vermin-proof (Y/N)	Y	Y	
	Runoff directed off roof (Y/N)	Y	Y	
WATER QUALITY RESPONSIBILITY CHANGES	Upstream Location	Tablelands Regional Council and Hinchinbrook Shire Council		
	Downstream Location	Nil.		

2.5 Key Stakeholders

Table 2.4 discusses which stakeholders are involved in the management of drinking water quality, and how they have been engaged in the process of preparing this Plan. Stakeholders are an entity that could possibly increase/decrease water quality risks including catchment groups (land-holders, industries, etc), catchment land use planners/controllers, treatment chemical suppliers, providers of engineering services, etc.

Table 2-4 Stakeholders

Organisation	Contact Name and Details	Relevance to management of drinking water quality	How the stakeholder is engaged in the DWQMP
Department of Environment and Resource Management		Regulator	Approver
Hinchinbrook Shire Council	Peter Martin 25 Lannercost Street Ingham QLD 4850	Supplier	Creator
Terrain	Michael Nash Tyto Precinct Macrossan Avenue Ingham QLD 4850 (07) 4776 0186 michaeln@terrain.org.au	Natural Resource Management body for the Wet Tropics.	Provide final approved copy of DWQMP upon request.
Tablelands Regional Council	45 Mabel Street Atherton QLD 4883 (07) 4091 4300	Responsible for water quality changes upstream.	Provide final approved copy of DWQMP upon request.
Canegrowers	11-13 Lannercost Street Ingham QLD 4850 (07) 4776 5350	Representative body for Australian sugarcane growers.	Provide final approved copy of DWQMP upon request.
Wilmar	Administration (07) 4776 4211	Key industry leader with the Hinchinbrook Shire	Provide final approved copy of DWQMP upon request.
Queensland Health	Queensland Health Building 147-163 Charlotte Street Brisbane QLD 4000 (07) 3234 0111	Completes analysis of water quality.	Provide final approved copy of DWQMP upon request.
Office of the Water Supply Regulator	Level 3 Mineral House 41 George Street Brisbane QLD 4000	Regulator	Approver
Ionics Australia Pty Ltd GE Power & Water Chemicals (Trading as Elite Chemicals)	customerservice.anz@ge.com 1873 Lytton Road Lytton QLD 4178 (07) 3893 7500	Supplier of Disinfection	Discussed the potential issues due to shortage of chemical.

3 IDENTIFY HAZARDS AND HAZARDOUS EVENTS

3.1 Information Gathering – Water Quality and Catchment Characteristics

Historical water quality data can assist in understanding source water characteristics and system performance. This can aid the identification of hazards and aspects of the drinking water supply system which requires improvement. Trend analysis and control charts to monitor water quality are used for recognising potential problems or hazards and the accumulation of any gradual changes or cumulative effects.

Water quality testing data for physical and chemical analysis ranges from 1999 to 2021. Some raw water sources have minimal data available as these sources are not always in use and act as a backup water supply only. Bacteria testing for Escherichia Coli are available from 1981 to present for various sampling points for each scheme.

The raw water summaries below are generally for the previous 5 years but historical information has been included for completeness. These results are to be read in conjunction with Appendix D which is divided into:

- Water Sample Data – Summary by Scheme (Previous 5 Year Period);
- Water Sample Data – Detailed for each Test Site (Historical to 2021 – Separate attachment);
- Water Sample Data – Summary for each Test Site (Historical to 2018).
- Water Sample Data – PFAS Testing Results.
- Water Sample Data – THM Testing Results.
- Water Sample Data – Pesticides Testing Results (no exceedances found).

Council plans to record water quality data in SWIMLocal.

3.1.1 Scheme 1 – Ingham Water Supply

Pesticide Residue Analysis

Pesticide residue analysis occurs every 12 months for both untreated and treated samples. Herbicides including, Atrazine, Desethyl Atrazine and Hexazinone, have been recorded to have greater values than <0.1 µg/L, but have not exceeded the ADWG.

Aluminium - ADWG 0.2 mg/L

Samples taken from the Herbert River shows spikes in the level of aluminium with the maximum sample of 0.45 mg/L. No exceedances, trends, major variations or abnormal results have been recorded for the treated or reticulation water.

Boron – ADWG 0.6 mg/L

Boron levels in raw water, treated water and reticulated water for scheme 1 are low and well below the guideline. No exceedances, trends, major variations or abnormal results have been recorded.

Chloride – ADWG 250 mg/L

Chloride levels are generally low for all raw water sources (river water and bore water) and the sampling data (available from 1998) shows that the chloride levels have not exceeded the ADWG in any source for Scheme 1. The chloride levels in treated water are low and well below the ADWG. The maximum recorded value for chloride in the treated water was 63 mg/L in 2005 at the Ingham River Pump Station and 69 mg/L in 2005 at the Ingham Depot Treatment Plant. Reticulated water also has low levels of chloride in the system, as shown in , with a maximum of 19 in the past 5 years and 31 mg/L historically. There is a fairly consistent range of results for chloride across the scheme with all samples being recorded under 70 mg/L. No exceedances, trends, major variations or abnormal results have been recorded.

Colour – ADWG 15 HTU

The Herbert River exceeds the guideline for colour during heavy rainfall periods, but to avoid any exceedances sourcing water from the river is avoided during high flow. There were high levels of colour in the raw water from

the Herbert with a maximum recorded value of 47 HU. The samples taken for colour in treated water and reticulated water respectively in Scheme 1 to be under the ADWG. A trend that can be identified in the sampling is the increase of colour in the Herbert River during high rainfalls. Due to only a small number of samples for the bores in Scheme 1 it is hard to identify if flooding affects the colour in bore water. It is evident in Como Road Bore 5 that increase in water colour occurred when the river recorded had a high peak in water colour.

Copper – ADWG 0.8 mg/L
There are low readings of copper in all raw water sources, but some spikes have occurred in Bore 5 and at the Combined Bore, but all remain under the guideline. Treated and reticulated water also have low values for copper, which remain well under the guideline.

Fluoride – 1.5 mg/L
The raw water sources for Scheme 1 have low presence of fluoride, but an abnormal result was recorded for the Herbert River in 2006. It is thought that this is operator error when entering the sampling data into a spreadsheet. The result showed a reading of 9.1 mg/L of fluoride in the raw water sample which is much higher than the average of 0.4 mg/L in the 28 samples that are available for the river. Fluoride levels in treated water are well below the ADWG. Reticulated water also shows low levels of fluoride in the system,

Hardness as $CaCO_3$ – 500 mg/L
Scheme 1 recorded low readings for Hardness as $CaCO_3$ in the raw water with values below 50 mg/L. Both treated water and reticulated water also record low values of hardness. No trends, spikes or abnormal results have been recorded.

Iron – 0.3 mg/L
Iron levels in the Herbert River are significantly higher than iron recorded from the groundwater bores. The historical iron levels in the raw water from the Herbert are generally below the guideline with the maximum level recorded being 0.32 mg/L. However, the past 5 years showed low levels.

Manganese – 0.5 mg/L
Levels of manganese in raw water for scheme 1 are low and well below the ADWG. There is one historical instance of an abnormal result of 0.9 mg/L from the Herbert River. It is assumed to be an error when entering the results into the spreadsheet. Manganese levels for treated and reticulated water are also very low and do not show any trends or major variations.

Nitrate as NO_3 – 50 mg/L
Results for nitrate as NO_3 from the Herbert are low and remain under 15 mg/L. Testing from the bore sites show that nitrate levels are higher than samples taken from the river, but still remain well under the ADWG. The nitrate levels in treated and reticulation water are much the same as raw water, but still remain well under the guideline with no exceedances.

pH – ADWG 6.5 – 8.5
The pH levels in the Herbert are between 6.5 and 8.5, which meets ADWG. The pH of the groundwater is low and generally falls below a pH of 6.5. The treated water however falls just below the ADWG for some recordings. The reticulated water meets guidelines with no exceedances or abnormalities.

Sodium – ADWG 180 mg/L
There were low levels of sodium in the Herbert with slightly higher levels of sodium in the groundwater. The maximum historical sample taken from the Ingham River Pump Station is 53 mg/L with a minimum of 11 mg/L. The Ingham Depot Treatment Plant recorded a historical maximum of 62 mg/L and a minimum of 1.7 mg/L. shows sodium levels in reticulation to be well below the ADWG.

Sulfate – 250 mg/L
Sulfate measured in raw water samples for scheme 1 are low and insignificant. A historical maximum of 17mg/L was recorded from the combined bores, which is well below the ADWG of 250 mg/L. The maximum reading for

sulphate recorded for treated water was 5.8 mg/L and 7.1 mg/L for reticulated water, which are well below the guideline.

Total Dissolved Solids – 500 mg/L
Samples taken for total dissolved solids show that the Herbert has slightly lower readings then samples taken from the bores. Treated and reticulated water shows similar results.

Turbidity – 1 NTU Notional
Turbidity in the Herbert is quite high and increases during the wet season and has been designated as a backup supply. As the Herbert source is not often used, the turbidity was a maximum of 18 NTU in the past 5 years. Turbidity in the groundwater is usually <1.0 NTU and therefore is used as the primary supply. Prior to 1996 the Herbert River was the only source water for Scheme 1 until the bore fields south of Ingham were constructed. A result of 8 NTU was recorded at Hunter Street on 14th July 2003. Operational controls are planned to ensure raw water sources are selected based on turbidity QCP and CCP limits.

Zinc – ADWG 3 mg/L
Most testing data for zinc shows low levels, but there are some peaks that have occurred in Como Road Bore 5 and the Combined Bores at Ingham Depot. Treated and reticulated water show low levels of zinc with no exceedances.

E. Coli
In Table 3-11 the bacterial testing data for E. Coli is tabulated into sample locations for each scheme. It shows that no E. Coli has been detected in the water samples since 1995, with 3 instances occurring in March 1995. A summary of the findings is below: The bacterial testing for E. Coli in the reticulated system for scheme 1 shows that the water supply has meet ADWG 99.54% between 1982 to 2011 with 2188 samples being taken. It is also evident that no breaches of the guideline have occurred since 1995.

Trihalomethanes – ADWG 0.25 mg/L
Trihalomethanes have currently only be tested for at the Ingham Depot water treatment plant. The testing has shown that the levels of Trihalomethanes are low. No trends, spikes or abnormal results have been recorded.

3.1.2 Scheme 2 – Lower Herbert Water Supply

Pesticide Residue Analysis
Pesticide residue analysis occurs every 12 months for both untreated and treated samples. Herbicides including, Atrazine, Desethyl Atrazine and Hexazinone, have been recorded to have greater values than <0.1 µg/L, but have not exceeded the ADWG.

Aluminium - ADWG 0.2 mg/L
Sampling for aluminium in raw water sources shows small quantities in all bores, except for two abnormal historical results that occurred in a Macknade Combined Bore sample and a Halifax Combined Bore sample. On 21st June 2000 a sample was taken for aluminium from both the Macknade Combined Bore and the Halifax Combined Bore and the reading for aluminium was 0.8 mg/L and 0.17 mg/L respectively. These results were a large variation against the other samples taken over the period. These bores have been rehabilitated within the past 5 years and the latest readings show low levels. Aluminium levels in the treated and reticulated water remain constant and do not show any trends, exceedances or spikes.

Boron – ADWG 0.6 mg/L
Boron levels in raw water, treated water and reticulated water for scheme 2 are low and well below the guideline.

Chloride – ADWG 250 mg/L
Some high levels of chloride in the raw water have been recorded at Halifax that exceeds the ADWG. Halifax Bore 3 had the highest record of 590 mg/L in 2015. However, the maximum over the past 5 years was 47 indicating that the decommissioning of the Halifax system has improved raw water quality. Chloride levels for treated and reticulation water are well below the guideline.

Colour – ADWG 15 HTU
Samples for the raw water for scheme 2 were found to be less than the ADWG guideline.

Copper – ADWG 0.8 mg/L
Copper levels for raw, treated and reticulated water are insignificant. No peaks, trends or exceedances have been identified.

Fluoride – 1.5 mg/L
Fluoride in raw water is very low, despite an historical abnormal result for fluoride in the combined bores. It is assumed that this is an operator error when entering the data into the spreadsheet. Treated water results did not exceeded 0.61 mg/L and reticulated water did not exceed 0.59 mg/L.

Hardness as $CaCO_3$ – 500 mg/L
Scheme 2 has high raw levels of hardness ranging up to 292 mg/L. Treated and reticulated water measures low levels of hardness less the 131 mg/L historically but 46 mg/L since the bores were rehabilitated. No trends, exceedances or abnormal results have been recorded.

Iron – 0.3 mg/L
In 2000 the iron levels in the combined bore at Macknade (Scheme 2) were quite high, but levels were well below the guideline for the previous 5 years. Iron levels in treated and reticulated water are low and well below the guideline.

Manganese – 0.5 mg/L
Manganese levels in raw water for scheme 2 generally fall below 0.1 mg/L but there are three historical instances when results spiked, but values are still low and remain below the guideline of 0.5 mg/L. Manganese levels for treated water are low and negligible. An abnormal historical result occurred in the reticulated samples, having a value of 4.7 mg/L. This is assumed to be an operator error when entering into the spreadsheet. All other values are well below the guideline.

Nitrate as NO_3 – 50 mg/L
The nitrate as NO_3 in the raw water samples showed a general increase in nitrate from 2003 to 2008 across all bores. Levels of nitrate in the treated and reticulation water were consistently below threshold.

pH – ADWG 6.5 – 8.5
pH levels in raw water vary across the different sources but generally range from a pH of 6 to 7.5. The Macknade Combined bore had a historical high reading of 9.2, but normally obtain values between 7 and 6. pH in treated water shows no trends or spikes and is between the ADWG maximum and minimum guideline. Reticulated water showed 5 historical instances of high levels that exceeds the guideline:

- pH 9.61 – 17th January 2005, sample taken from reservoir.
- pH 9.09 – 14th April 2005, sample taken from end of Patterson Parade.
- pH 9.41 – 29th February 2008, sample taken from end of Patterson Parade.
- pH 9.25 – 29th September 2008, sample taken from end of Patterson Parade.
- pH 9.71 – 17th June 2009, unknown sample location.

There have been no exceedances however within the past 5 years.

Sodium – ADWG 180 mg/L
Historical sodium levels in raw water were slightly higher in the Halifax bores than the Macknade Bores. There were some peaks identified in Halifax Bore 3 (maximum 321 mg/L) and Halifax Bore 5 (maximum 150 mg/L). however, the maximum value was 40 mg/L in the past 5 years and is due to using Macknade bores. Sodium levels in treated and reticulated water are below the guideline and show no trends or abnormal results.

Sulfate – 250 mg/L

Sulfate in all water samples for scheme 2 are low and remain below 20 mg/L over the past 5 years.

Total Dissolved Solids – 500 mg/L
Raw water data for the level of total dissolved solids is scattered. In general, the Halifax bores have a higher reading of total dissolved solids in the raw water. The maximum level of 1190 mg/L was recorded at Halifax Bore 3 in 2015. A maximum level of 189 mg/L was recorded since 2015 indicating that the removal of the Halifax system has been beneficial. Similar results were found in the treated and reticulated water.

Turbidity – 1 NTU Notional
For the past 5 years, turbidity levels in raw water are quite scattered, but the majority of the sampling shows that the turbidity in raw water falls below 5 NTU. The maximum result was 13 NTU. The maximum treated water turbidity was 4 NTU, and 2 NTU in the reticulation system. An operational procedure is planned to select raw water sources to improve overall water quality.

Zinc – ADWG 3 mg/L
All water samples show negligible levels of zinc.

Trihalomethanes – ADWG 0.25 mg/L
No testing for trihalomethanes has been carried out for scheme 2.

3.1.3 Scheme 3 – Forrest Beach Water Supply

Pesticide Residue Analysis
Pesticide residue analysis occurs every 12 months for both untreated and treated samples. Herbicides including, Atrazine, Desethyl Atrazine and Hexazinone, have been recorded to have greater values than <0.1 µg/L, but have not exceeded the ADWG.

Aluminium - ADWG 0.2 mg/L
Sampling data for aluminium generally shows low levels below 0.1 mg/L, but some spikes occur. Treated and reticulated water shows negligible levels of less than 0.05 mg/L. No exceedances of the guideline occurred for treated or reticulated water.

Boron – ADWG 0.6 mg/L
Boron levels across the bores are quite scattered but all values remain below 0.04 mg/L. Levels in treated and reticulated water are negligible.

Chloride – ADWG 250 mg/L
Chloride levels in all water at Forrest Beach are below 30 mg/L.

Colour – ADWG 15 HTU
Colour levels in raw water at Forrest Beach are scattered, as shown in , but there are some samples that are quite high. An historical abnormal result of 249 HU occurred in September 2006, but it is hard to determine if this is operator error or a rare occurrence. Colour in treated water has been sampled to be below the guideline, but levels are quite high with many samples being over 10 HU. Reticulated water showed a similar result with one ample being 17 HU. Selection of raw water sources may have a positive effect on this issue. Soda Ash is used in Scheme 2 and may be replicated here, however to minimise expense, switching raw water sources in currently considered the most appropriate solution.

Copper – ADWG 0.8 mg/L
Copper levels for raw, treated and reticulated water are insignificant. No peaks, trends or exceedances have been identified.

Fluoride – 1.5 mg/L
Fluoride levels for raw, treated and reticulated water are low and well below the recommend guideline.

Hardness as $CaCO_3$ – 500 mg/L
Scheme 3 has low readings of hardness, remaining below 125 mg/L. No exceedances, major variations or abnormal results have been recorded.

Iron – 0.3 mg/L
Iron levels in raw water are quite scattered with the historical maximum sample of 0.39 mg/L. Iron levels in the treated and reticulated water have often exceeded the guideline. The maximum reticulation sample taken for iron had a reading of 0.77 mg/L. There have been five historical instances that have exceeded the ADWG:

- 0.65 mg/L - 20th June 2001 sample taken from water tower (Turbidity levels were also exceeded in this sample).
- 0.9 mg/L - 24 January 2002 sample taken from water tower.
- 0.9 mg/L – 16 July 2002 sample taken from Beatts Road.
- 0.31 mg/L - 8th January 2003 sample taken from water tower.
- 0.39 mg/L – 17 June 2009 sample taken from Pangola Street (pH exceeded guideline in same sample).

We note a number of obvious data entry errors in the results and will be resolved in a future data update. It is expected that raw water source selection will largely resolve this issue.

Manganese – 0.5 mg/L
Manganese levels vary across the bores. There was one historical abnormal result for Bore 1 that had a reading of 1.2 mg/L which was well above the average of 0.47 mg/L at the time of the last review. The current results revealed lower levels, however one result was 3.3 mg/L and is likely an error. Treated and reticulated water samples for manganese is well below the guideline and do not display any trends within the data.

Nitrate as NO_3 – 50 mg/L
Nitrate levels for raw water are under 10 mg/L with higher levels shown in Bore 1, 2 and 3. shows the raw water sampling data for Nitrate as NO_3. Treated and reticulated water also have low levels of nitrate.

pH – ADWG 6.5 – 8.5
The pH in the raw water is quite low, although some historical peaks have occurred in Bore 7 with a maximum sample of 8.89. shows the pH levels in the raw water sources for scheme 1. Treated water ranges between the ADWG lower and upper limits. Two instances where the reticulated water exceeds the guideline for pH were:

- pH 9.4 – 17th June 2009, sample taken from Pangola Street. (Iron exceeded guideline in same sample)
- pH 8.55 – 7th January 2010, sample taken from Allamanda Avenue.

Sodium – ADWG 180 mg/L
Low levels of sodium were recorded across raw, treated and reticulated water. All values remain well below the guideline.

Sulfate – 250 mg/L
The sodium values remain well below the guideline.

Total Dissolved Solids – 500 mg/L
Total Dissolved Solids were found to be well below the guideline.

Turbidity – 1 NTU Notional
The raw water has high levels of turbidity. Bore 6 has the highest level of turbidity with a maximum value of 215 NTU. Treated water shows scattered levels of turbidity that all fall below the guideline. There was one occurrence where the turbidity level was 5 NTU. Reticulated water had five instances where the sample for turbidity exceeded the guideline aesthetic limit:

- 4.3 NTU – 23 June 2001, sample taken from water tower (Iron levels were also exceeded in this sample).
- 16.5 NTU – 23 January 2002, sample taken from water tower.
- 17.5 NTU – 24 January 2002, sample taken from water tower.
- 15 NTU – 6 March 2002, sample taken from water tower.
- 16 NTU – 10 September 2008, sample taken from water tower.

There were numerous results in the reticulated water where the turbidity was above 1 NTU. Source selection is planned to treat this issue however further work is planned to investigate chlorine disinfection increases to address this issue and is an RMIP action.

Zinc – ADWG 3 mg/L
All water samples show negligible levels of zinc.

Trihalomethanes – ADWG 0.25 mg/L
No testing for trihalomethanes has been carried out for scheme 3.

3.2 Snapshot Monitoring

Snapshot monitoring took place as part of the development of this Drinking Water Quality Management Plan. The results of the Snapshot monitoring are below.

	Detected below ADWG (Likely hazard)
	Detected (ADWG aesthetic guideline)
	Less than detection limit
	Above ADWG (aesthetic guideline)

Table 3-1 Snapshot Monitoring Results for Toxic Cyanobacteria

Analysed	18-Aug-11	13-Feb-2012
Received	15-Aug-11	13-Feb-2012
QHSS Reference	11KP920	12KP179
Client Reference	HIN772	HIN804
Method Code	13032	13032
Request	Cyanobacterial Count	Cyanobacterial Count
Organisms	Cells/mL	Cells/mL
TOTAL CELLS PER ML	nil	Nil
Potentially Toxic Cyanobacteria Found in Sample	**No Potentially Toxic Cyanobacteria Found**	**No Potentially Toxic Cyanobacteria Found**

Table 3-2 Snapshot Monitoring Results Summary of Radiation

Description	Collection Date	LAT	LONG	Analysis Date	Total Alpha Activity (Bg/L)	Total Beta Activity (Bg/L)	K40-Corrected Beta Activity (Bg/L)
Forrest Beach - Bore Untreated	11/08/2011	-18.70086	146.27883	29/08/2011	<0.07	0.19±0.02	<0.2
Como Rd - Bore Untreated	11/08/2011	-18.69336	146.15058	29/08/2011	<0.07	<0.2	<0.2
Macknade - Bore Untreated	11/08/2011	-18.57642	146.25558	29/08/2011	<0.09	<0.2	<0.2

Table 3-3 Snapshot Monitoring – Anions and Metals

		ROUND 1								ROUND 2		ROUND 3						
		11/08/11	11/08/11	11/08/11	11/08/11	11/08/11	11/08/11	11/08/11	11/08/11	08/11/11	08/11/11	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12	10/02/12
		Herbert River S18°38'15.7" E146°8'31.9"	Forrest Beach S18°42'2.1 " E146°16' 50.2"	Ingham Depot S18°40'10.9" E146°9'17.7"	Macknade P/Pumps S18°34'36" E146°15'21.5"	Macknade S18°34'35.1" E146°15'20.1"	Como Rd S18°41'36.1" E146°9'2.7"	Forrest Beach S18°42'3.1" E146°16 '43.8"	Herbert River S18°38'6.9" E146°8 '36.6"	Herbert River S18°38'15.7" E146°8'31.9"	Herbert River S18°30'6.9" E146°8'36.6"	Herbert River S18°30'6.9" E146°8'36.6"	Forrest Beach S18°42'2.1 " E146°16' 50.2"	Ingham Depot S18°41'11" E146°16'50.2"	Macknade S18°34'36" E146°08'21.5"	Herbert River S18°38'15.7" E146°8'36.6"	Forrest Beach S18°42'2.1 " E146°16' 50.2"	Ingham Depot S18°40'10.9" E146°09'17.7"
		Treated	Treated	Treated	Treated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Untreated	Treated	Treated	Treated
ANIONS	Chlorate by IC	0.09	0.15	0.36	0.09					0.17						1.21	0.64	0.19
	Bromate by IC	< 0.01	< 0.01	< 0.01	0.09											< 0.01	< 0.01	<0.01
METALS	Aluminium					0.009	0.003	0.064	0.043		0.073	0.61	0.1	0.004	0.029			
	Antimony					< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	0.0006	< 0.0001	< 0.0001	< 0.0001			
	Arsenic					< 0.0003	< 0.0003	0.0005	< 0.0003		< 0.0003	0.0008	0.0003	0.0001	0.0002			
	Barium					0.061	0.05	0.042	0.024		0.022	0.026	0.036	0.05	0.054			
	Beryllium					< 0.0001	< 0.0001	0.0008	< 0.0001		< 0.0001	0.0001	0.0006	< 0.0001	0.0001			
	Boron					0.019	0.015	0.042	0.017		0.023	0.016	0.031	0.014	0.017			
	Cadmium					< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			
	Chromium					< 0.0001	< 0.0001	0.0003	< 0.0001		0.0002	0.0005	0.0003	0.0002	0.0002			
	Cobalt					0.0003	< 0.0001	0.0029	< 0.0001		< 0.0001	0.0005	0.0022	< 0.0001	0.0003			
	Copper					< 0.001	0.042	0.004	< 0.001		< 0.001	0.002	< 0.001	0.018	0.001			
	Iron					0.2	0.009	2.9	0.15		0.16	0.86	1.7	< 0.005	0.21			
	Lead					< 0.0001	0.0021	0.0003	< 0.0001		< 0.0001	0.038	0.0003	0.0018	0.0001			
	Manganese					0.013	0.0005	0.047	0.013		0.015	0.049	0.038	0.0006	0.012			
	Molybdenum					< 0.0001	< 0.0001	< 0.0001	0.0002		0.0002	0.0002	0.0001	< 0.0001	< 0.0001			
	Nickel					0.0006	0.0006	0.0018	0.0002		0.0002	0.0006	0.0014	0.0006	0.0006			
	Selenium					< 0.0010	< 0.0010	< 0.0010	< 0.0010		< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010			
	Silver					< 0.001	< 0.001	< 0.001	< 0.001		< 0.001	< 0.001	< 0.001	< 0.001	< 0.001			
	Stronium					0.15	0.13	0.089	0.051		0.047	0.027	0.072	0.12	0.12			
	Thallium					< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001			
	Titanium					< 0.001	< 0.001	0.001	0.001		0.002	0.012	0.002	< 0.001	< 0.001			
	Uranium					< 0.0001	< 0.0001	< 0.0001	< 0.0001		< 0.0001	0.0002	0.0001	< 0.0001	< 0.0001			
	Vanadium					0.0009	0.0011	0.005	0.0011		0.0007	0.0019	0.0024	0.0005	0.0005			
	Zinc					0.003	0.011	0.015	< 0.001		< 0.001	0.006	0.009	0.011	0.003			

Table 3-4 Snapshot Monitoring – SWA and Pesticides

		11/08/11 Herbert River S18°38'6.9" E146°8 '36.6" Untreated	08/11/11 Herbert River S18°30'6.9" E146°8'36.6" Untreated	10/02/2012 Herbert River S18°30'6.9" E146°8'36.6" Untreated
STANDARD WATER ANALYSIS	Conductivity	118	106	68
	pH	7.56	7.65	7.19
	Temperature	22	22	23
	Total Hardness	27	24	12
	Temporary Hardness	27	24	12
	Alkalinity	36	36	23
	Residual Alkalinity	0.2	0.2	0.2
	Silica	23	20	24
	Total Dissolved Ions	80	77	51
	Total Dissolved Solids	80	76	61
	True Colour	2	6	44
	Turbidity	2	2	25
	pH (Saturation)*	9.2	9.2	9.6
	Saturation Index	-1.6	-1.6	-2.4
	Mole Ratio	2.3	2.3	2.8
	Sodium Absorption Ratio	1	1	1
	Figure of Merit	1.1	1	0.7
	Sodium	11	11	8
	Potassium	1.6	1.6	1.4
	Calcium	5	4.3	2.5
	Magnesium	3.5	3.4	1.5
	Hydrogen	0	0	0
	Bicarbonate	44	43	27
	Carbonate	0.1	0.1	0
	Hydroxide	0	0	0
	Chloride	13	12	8
	Fluoride	0.08	0.06	0.09
	Nitrate	0.7	<0.5	1.1
	Sulphate	1.2	1.3	1.2
	Iron	0.02	0.03	0.37
	Manganese	<0.01	<0.01	<0.01
	Zinc	<0.01	0.04	0.03
	Aluminium	<0.05	<0.05	0.85
	Boron	0.02	0.02	0.02
	Copper	<0.03	<0.03	0.05
PESTICIDES	Aldrin (OC)	< 0.1		< 0.1
	Allethrin (SP)	< 0.1		
	Ametryn (HLCMS)	< 0.01		< 0.01
	Atrazine (HLCMS)	< 0.01		< 0.01
	Azinphos ethyl (OP)	< 0.1		< 0.1
	Azinphos methyl (OP)	< 0.1		< 0.1
	Benalaxyl (OTHER)	< 0.1		< 0.1
	Bifenthrin (SP)	< 0.1		< 0.1
	Bioresmethrin (SP)	< 0.1		< 0.1
	Bitertinol (OTHER)	< 0.1		< 0.1
	Bromacil (LCMS)	< 0.01		< 0.01
	Bromophos ethyl (OP)	< 0.1		< 0.1
	Cadusafos (OP)	< 0.1		< 0.1

	11/08/11 Herbert River S18°38'6.9" E146°8 '36.6"	08/11/11 Herbert River S18°30'6.9" E146°8'36.6"	10/02/2012 Herbert River S18°30'6.9" E146°8'36.6"
	Untreated	Untreated	Untreated
Carbaryl (OTHER)	< 0.1		< 0.1
Carbophenothion (OP)	< 0.1		< 0.1
Chlordane cis (OC)	< 0.1		< 0.1
Chlordane trans (OC)	< 0.1		< 0.1
Chlordene (OC)	< 0.1		< 0.1
Chlordene epoxide (OC)	< 0.1		< 0.1
Chlorfenvinphos (OP)	< 0.1		< 0.1
Chlorpyrifos (OP)	< 0.1		< 0.1
Chlorpyrifos methyl (OP)	< 0.1		< 0.1
Chlorpyrifos oxon (OP)	< 0.1		< 0.1
Coumaphos (OP)	< 0.1		< 0.1
Cyfluthrin (SP)	< 0.1		< 0.7
Cypermethrin (SP)	< 0.1		< 0.5
Deltamethrin (SP)	< 0.1		< 1
Desethyl Atrazine (HLCMS)	< 0.01		< 0.01
Desisopropyl Atrazine (HLCMS)	< 0.01		< 0.02
Diazinon (OP)	< 0.1		< 0.1
Dichloran (OTHER)	< 0.1		
Dichlorfluanid (OTHER)	< 0.1		
Dichlorvos (OP)	< 0.1		< 0.1
Diclofop methyl (HGCMS)	< 0.1		< 0.1
Dicofol (OC)	< 0.1		< 1.5
Dieldrin (OC)	< 0.05		< 0.10
Dimethoate (OP)	< 0.1		< 0.1
Diuron (HLCMS)	< 0.01		< 0.01
Endosulfan alpha (OC)	< 0.05		< 0.2
Endosulfan beta (OC)	< 0.05		< 0.2
Endosulfan Ether (OC)	< 0.1		< 0.1
Endosulfan Lactone (OC)	< 0.1		< 0.5
Endosulfan Sulphate (OC)	< 0.05		< 0.2
Endrin (OC)	< 0.1		< 0.1
Endrin Aldehyde (OC)	< 0.1		< 0.1
Ethion (OP)	< 0.1		< 0.1
Ethoprophos (OP)	< 0.1		< 0.1
Etrimphos (OP)	< 0.1		< 0.1
Famphur (OP)	< 0.1		< 0.1
Fenamiphos (OP)	< 0.1		< 0.1
Fenchlorphos (OP)	< 0.1		< 0.1
Fenitrothion (OP)	< 0.1		< 0.1
Fenthion ethyl (OP)	< 0.1		< 0.1
Fenthion methyl (OP)	< 0.1		< 0.1
Fenvalerate (SP)	< 0.1		< 0.5
Fipronil (OTHER)	< 0.1		< 0.1
Fluometuron (HLCMS)	< 0.01		< 0.02
Fluvalinate (SP)	< 0.1		< 0.5
Furalaxyl (OTHER)	< 0.1		< 0.1
Haloxyfop methyl (HGCMS)	< 0.1		< 0.1
Haloxyfop-2-etotyl (HGCMS)	< 0.1		< 0.1
HCB (OC)	< 0.1		< 0.2

	11/08/11 Herbert River S18°38'6.9" E146°8 '36.6" Untreated	08/11/11 Herbert River S18°30'6.9" E146°8'36.6" Untreated	10/02/2012 Herbert River S18°30'6.9" E146°8'36.6" Untreated
HCH alpha (OC)	< 0.1		< 0.1
HCH beta (OC)	< 0.1		< 0.1
HCH delta (OC)	< 0.1		< 0.1
Heptachlor (OC)	< 0.1		< 0.1
Heptachlor Epoxide (OC)	< 0.1		< 0.1
Hexazinone (HLCMS)	< 0.01		< 0.01
Isophenphos (OP)	< 0.1		< 0.1
lambda-Cyhalothrin (SP)	< 0.1		< 0.2
Lindane (OC)	< 0.1		< 0.1
Malathion (OP)	< 0.1		< 0.1
Metalaxyl (OTHER)	< 0.1		< 0.1
Methidathion (OP)	< 0.1		< 0.1
Methoxychlor (OC)	< 0.1		< 0.1
Metolachlor (LCMS)	< 0.01		< 0.01
Metribuzin (HGCMS)	< 0.1		< 0.1
Mevinphos (OP)	< 0.1		< 0.1
Nonachlor trans (OC)	< 0.1		< 0.1
op-DDD (OC)	< 0.1		< 0.1
op-DDE (OC)	< 0.1		< 0.1
op-DDT (OC)	< 0.1		< 0.1
Oxadiazinon (OTHER)	< 0.1		< 0.1
Oxychlordane (OC)	< 0.1		< 0.1
Oxyfluorfen (HGCMS)	< 0.1		< 0.1
Parathion ethyl (OP)	< 0.1		< 0.2
Parathion methyl (OP)	< 0.1		< 0.1
Pendimethalin (HGCMS)	< 0.1		< 0.1
Permethrin (SP)	< 0.1		< 0.2
Phenothrin (SP)	< 0.1		< 0.1
Phorate (OP)	< 0.1		< 0.1
Phosmet (OP)	< 0.1		< 0.2
Piperonyl Butoxide (OTHER)	< 0.1		< 0.1
Pirimicarb (OTHER)	< 0.1		< 0.2
Pirimiphos methyl (OP)	< 0.1		< 0.1
pp-DDD (OC)	< 0.1		< 0.1
pp-DDE (OC)	< 0.1		< 0.1
pp-DDT (OC)	< 0.1		< 0.1
Procymidone (OTHER)	< 0.1		< 0.1
Profenofos (OP)	< 0.1		< 0.1
Prometryn (HLCMS)	< 0.01		< 0.01
Propanil (HGCMS)	< 0.1		< 0.1
Propazine (HGCMS)	< 0.1		< 0.1
Propiconazole (OTHER)	< 0.1		< 0.1
Propoxur (OTHER)	< 1		< 0.1
Propoxur (OTHER)	< 1		
Prothiofos (OP)	< 0.1		< 0.1
Pyrazophos (OP)	< 0.1		< 0.1
Simazine (HLCMS)	< 0.01		< 0.01
Tebuconazole (OTHER)	< 0.1		< 0.1
Tebuthiuron (HLCMS)	< 0.01		< 0.01

	11/08/11 Herbert River S18°38'6.9" E146°8 '36.6"	08/11/11 Herbert River S18°30'6.9" E146°8'36.6"	10/02/2012 Herbert River S18°30'6.9" E146°8'36.6"
	Untreated	Untreated	Untreated
Terbufos (OP)	< 0.1		< 0.1
Terbuthylazine (HGCMS)	< 0.1		< 0.1
Terbutryn (LCMS)	< 0.01		< 0.01
Tetrachlorvinphos (OP)	< 0.1		< 0.1
Tetradifon (OTHER)	< 0.1		< 0.1
Tetramethrin (SP)	< 0.1		< 0.2
Total DDT (OC)	< 0.3		< 0.4
Total Endosulfan (OC)	< 0.15		< 0.6
Transfluthrin (SP)	< 0.1		< 0.1
Tri-allate (HGCMS)	< 0.1		< 0.1
Trifluralin (HGCMS)	< 0.1		< 0.1
Vinclozolin (OTHER)	< 0.1		< 0.2

3.3 Catchment Characteristics

Figure 3.1 outlines the Herbert Catchment Boundaries and the tributaries that contribute to the Herbert River. As shown, the Herbert Catchment extends to the Tablelands Region, which can cause major flooding in the Lower Herbert if the Upper Catchment receives significant rainfall.

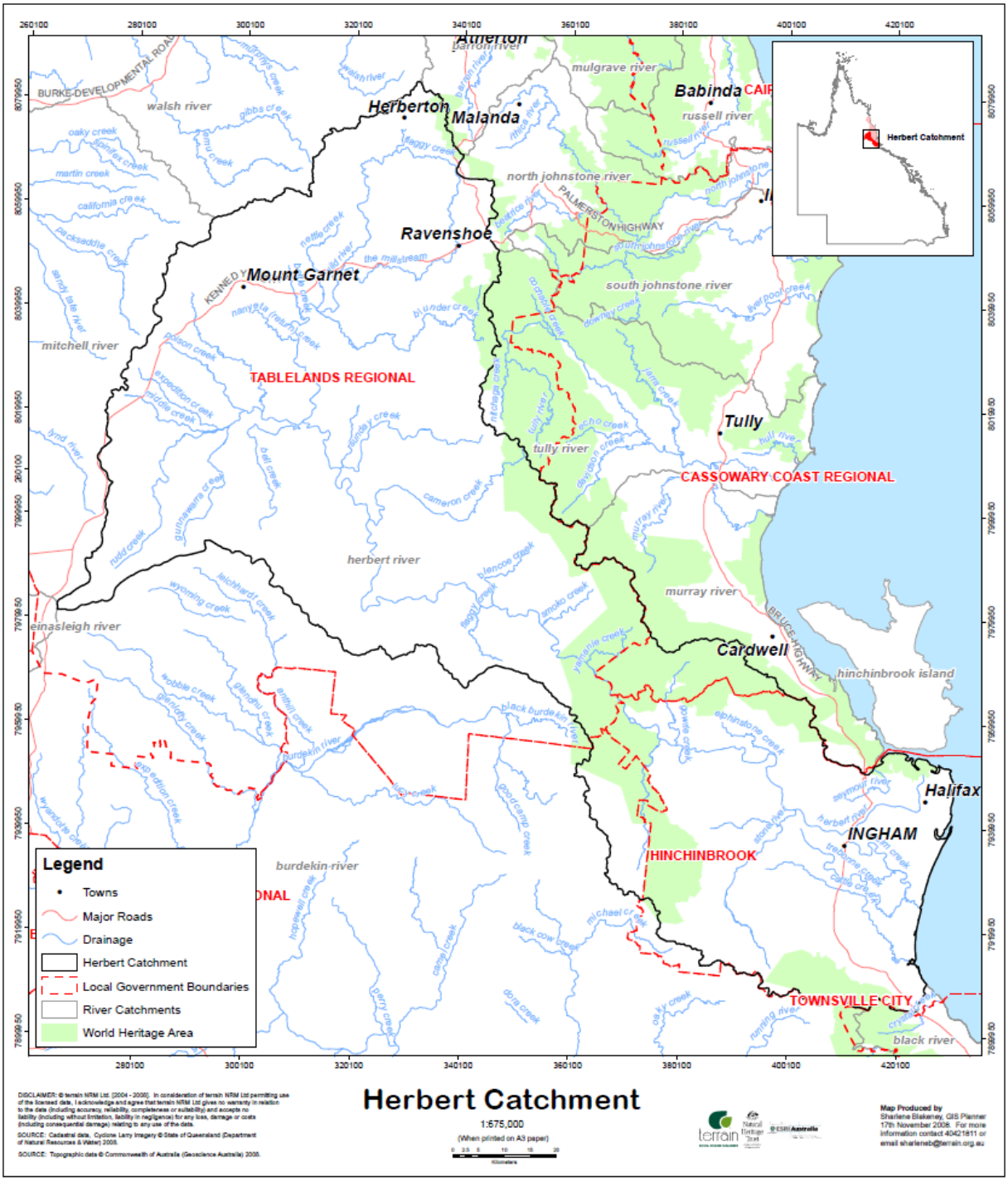


Figure 3.1 – Herbert River Catchment Map (Terrain Natural Resource Management)

The catchment for the Herbert is primarily used for agricultural purposes with its main production in the Lower Herbert Region being sugar cane. The Hinchinbrook Shire area has two sugar mills, Victoria and Macknade Mill, that process the sugar cane and transports the product to the Lucinda Bulk Sugar Terminal. As shown in Figure 3.2, the land use map shows that the majority of the land is used for agricultural purposes and a large portion is reserved as National Parks.

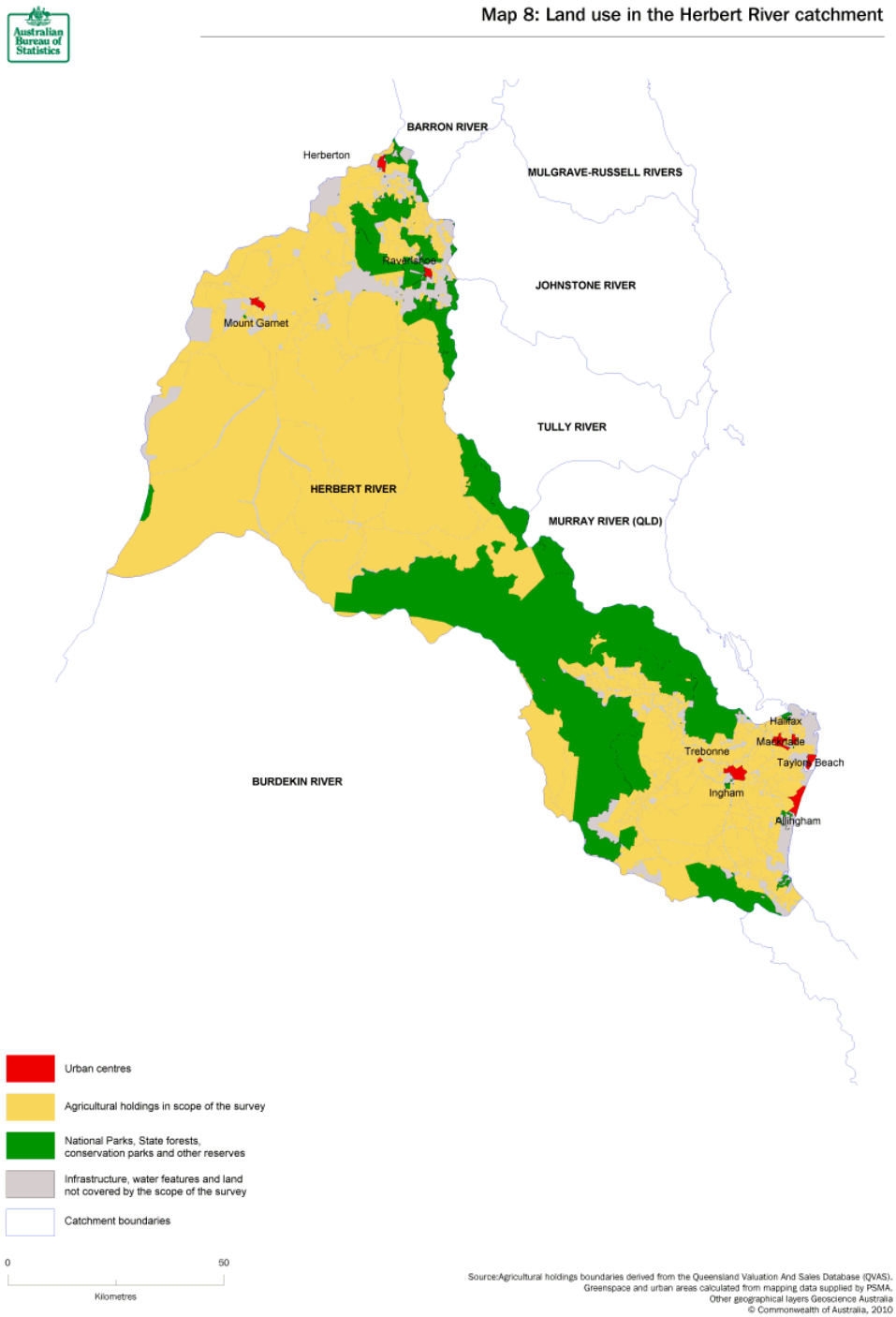


Figure 3.2– *Herbert River Catchment Land Use Map (Supplied by Australia Bureau of Statistics)*

Table 3-5 Herbert Catchment Characteristics

Catchment Characteristic	Description	Applicability to Groundwater Supplies
Catchment Area	Total Area = 9843 km^2 Area Under Grazing = 7330 km^2 Area under Sugar = 691 km^2 Area under Horticulture = 35 km^2	Potential runoff off from crops can cause contamination of soil (e.g., Pesticides, fertilisers)
Topography	The Upper Herbert ranges from level alluvial plains along the river margins to rugged, deeply incised ranges. It is bounded to the north and west by the Great Dividing Range. The Herbert River has its headwaters in a high rainfall area of the Dividing Range near Herberton and flows through a gorge to the coastal plain near Ingham. The river continues to its mouth near Lucinda where the catchment area is approximately 9000 km^2.	
Main Geological Features	Geology of the lower catchment comprises Quaternary alluvium and beach sands, Cainozoic basalts, Carboniferous granites, Carboniferous acid volcanics and undifferentiated Palaeozoic quartzite.	
Soil Type	Alluvial soils vary according to their associated landform and position in the landscape. Soils of lower areas suffer drainage problems due to topography and poor internal structure.	
Monthly Rainfall (Average, Maximum and Minimum)	*Month* / *Max* / *Min* / *Average* *Jan* 1712.0 30.0 389.7 *Feb* 1400.6 0.0 484.5 *Mar* 1278.4 29.0 377.3 *Apr* 528.0 33.4 204.8 *May* 270.0 5.4 108.6 *Jun* 200.6 3.0 44.8 *Jul* 130.5 0.0 34.4 *Aug* 168.8 0.3 39.1 *Sep* 231.2 0.0 42.2 *Oct* 233.1 0.0 52.2 *Nov* 782.6 3.0 126.7 *Dec* 792.6 38.0 203.9	In periods of high rainfall water sourced from the Herbert River at Ingham Pumping Station is stopped and the water supply for Scheme 1 is reliant on groundwater bores, both at the Pumping Station and Ingham Depot.
Incidence of flooding and bushfire	The Herbert River responds quickly to heavy rainfall and river rises can be rapid and velocities very high. The area around Ingham is very flat and the town itself is located on the floodplain of the river. Several natural watercourses distribute floodwaters through the town during major flooding with virtually the whole town being at risk from flooding. Floodwater up to depths of 3 metres above ground level occurs in low parts of the town, requiring the evacuation of residents from low lying areas. Incidence of large wide spread bushfires in the Herbert Catchment is very low and if a bushfire does occur, it is generally isolated and not widespread.	Flooding affects groundwater supplies, but affects are minimal.
Predominant vegetation types	- Natural vegetation of the Herbert Floodplain has been dramatically reduced since European Settlement. - Approx. 12% of the floodplain is occupied by mangrove. - 2% is occupied by saline (treeless areas associated with mangroves). - 4% by Melaleuca dominated swamp and riparian forests	
Urban settlements and population	Tablelands Regional Council = 40,906 (census population in 2006) Hinchinbrook Shire Council = 12,513	

Catchment Characteristic	Description	Applicability to Groundwater Supplies
Agricultural, industrial, mining and recreational activities	The Upper Herbert area is primarily used for the grazing of beef cattle, although some dairying occurs east of Ravenshoe. Maize, sorghum, peanuts and potatoes are the dominant cropping enterprises in the Upper Herbert area. The Lower Herbert is mainly dominated by sugar cane as well as some use for forestry and cattle purposes. Various forms of mining, particularly tin mining, have been extensive in the Upper Catchment. The numbers of relic mine workings and diggings have been reported to be in the hundreds; however, very few of these are actually marked on land use or topographic maps.	Detection of E. Coli from runoff of grazing properties. Potential runoff off from crops can cause contamination of soil (e.g., Pesticides, fertilisers)
Planned future activities which may impact water quality	- North Queensland Bio Energy Mill purposed for the Hinchinbrook Shire.	The purposed location is near the Ingham Depot Bores which are one of the main water supplies to the Ingham Scheme.
Potential sources of microbial and chemical contamination in the catchment	- Fertiliser runoff into the catchment from sugar cane production. - Tablelands Regional Council sewerage overflows from Ravenshoe Sewerage Treatment Plant. Ravenshoe is the only sewerage plant in the upper catchment; all other areas have septic systems.	

Table 3-6 Bore Details

		Location	Bore Depth	Aquifer Description, Depth & Thickness	Confined/ Unconfined	Fast or slow response to events on surface	Bore Construction Details
Scheme 1	Tokalon Well 1	Bruce Highway	10		Unconfined		
	Tokalon Well 2	Bruce Highway	10		Unconfined		
	Tokalon Well 3	Bruce Highway	10		Unconfined		Refer Bore Log in Appendix E.
	Como Road Bore 4	Bruce Highway	10		Unconfined		Refer Bore Log in Appendix E.
	Como Road Bore 5	Bruce Highway	25		Unconfined		Refer Bore Log in Appendix E.
	Como Road Bore 7	Bruce Highway	25		Unconfined		Refer Bore Log in Appendix E.
Scheme 2	Macknade Well 1	Lot 2 SP188122	10		Unconfined		
	Macknade Bore 2	Lot 1 RP727377	10		Unconfined		
	Macknade Bore 3	Road Reserve	10		Unconfined		
	Macknade Bore 4	Lot 1 RP730836	10		Unconfined		
	Macknade Bore 5	Lot 2 SP188122	10		Unconfined		Refer Bore Log in Appendix E.
	Halifax Well 1	Lot 430 CWL2870	10	Shallow Aquifer	Unconfined		• Showing signs of deterioration and productivity loss. • Issues with underground power supply, which limits the operation.

		Location	Bore Depth	Aquifer Description, Depth & Thickness	Confined/ Unconfined	Fast or slow response to events on surface	Bore Construction Details
	Halifax Well 2	Lot 431 CWL2870	12.0m		Unconfined	Pervious material mostly loam, clay, sand and mud. No studies to indicate response to surface events.	• Showing signs of deterioration and productivity loss. • Issues with underground power supply, which limits the operation. Refer Bore Log in Appendix E.
	Halifax Bore 3	Lot 1 RP727372			Unconfined		
	Halifax Well 4	Road Reserve			Unconfined		• Showing signs of deterioration and productivity loss. • Issues with underground power supply, which limits the operation. Refer Bore Log in Appendix E.
	Halifax Bore 5	Lot 1 RP727372	11.0m		Unconfined	Pervious material mostly sand, gravel, mud and clay. No studies to indicate response to surface events.	Refer Bore Log in Appendix E.
Scheme 3	**Well 1**	Lot 1 RP729179		Depth – 16.0m Thickness – 2.60m	Unconfined		
	Well 2	Lot 7 RP800047			Unconfined		
	Well 3	Lot 1 RP738935			Unconfined		
	Bore 4	Lot 7 RP800047			Unconfined		
	Bore 6	Lot 7 RP800047			Unconfined		Isolated due to poor water quality. Refer Bore Log in Appendix E.
	Bore 7	Lot 7 RP800047	16.0m		Unconfined	Pervious material mostly clay, sand and mud. No studies to indicate response to surface events.	Refer Bore Log in Appendix E.

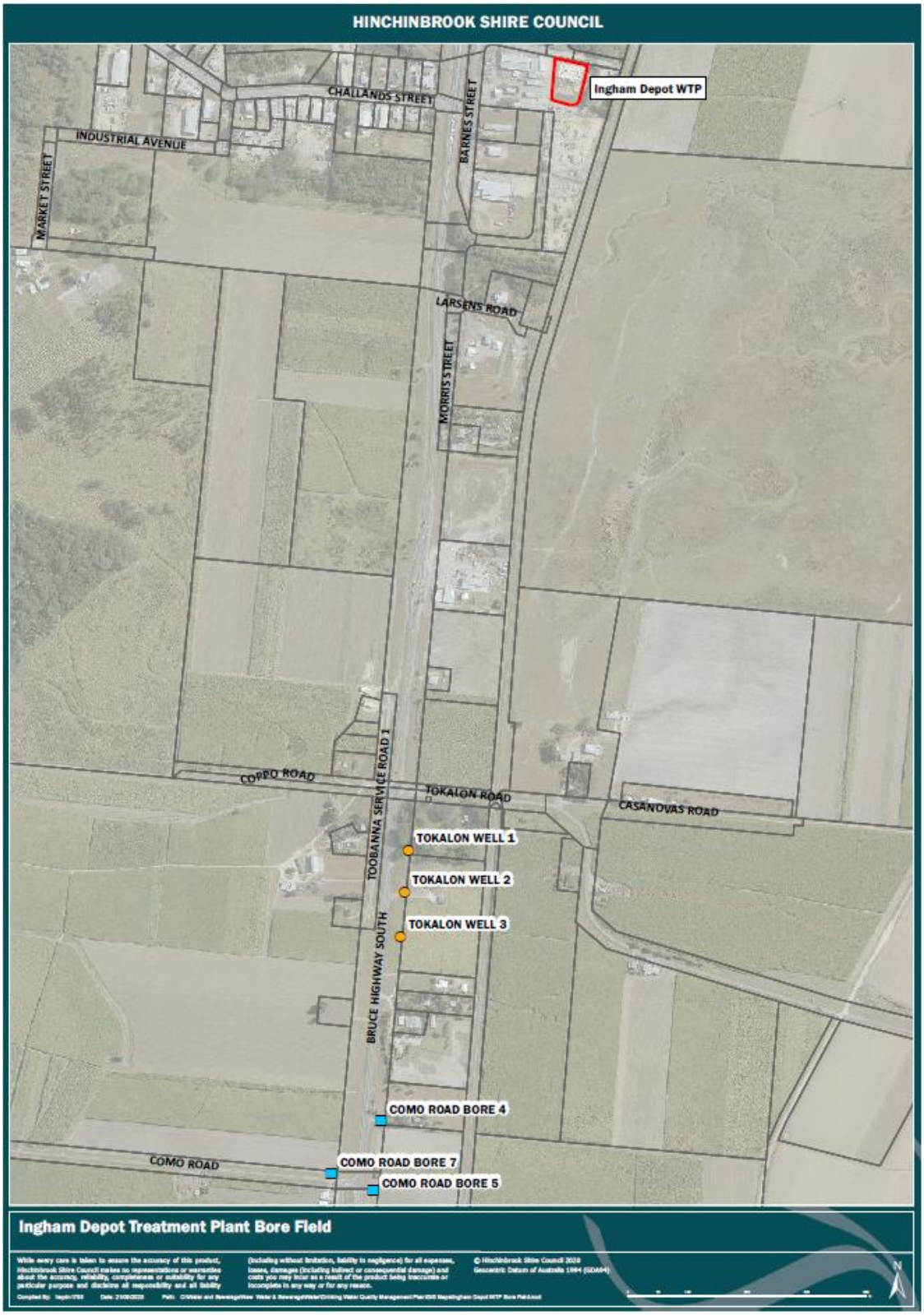


Figure 3.3 – Scheme 1 Bore/Well Identification Map

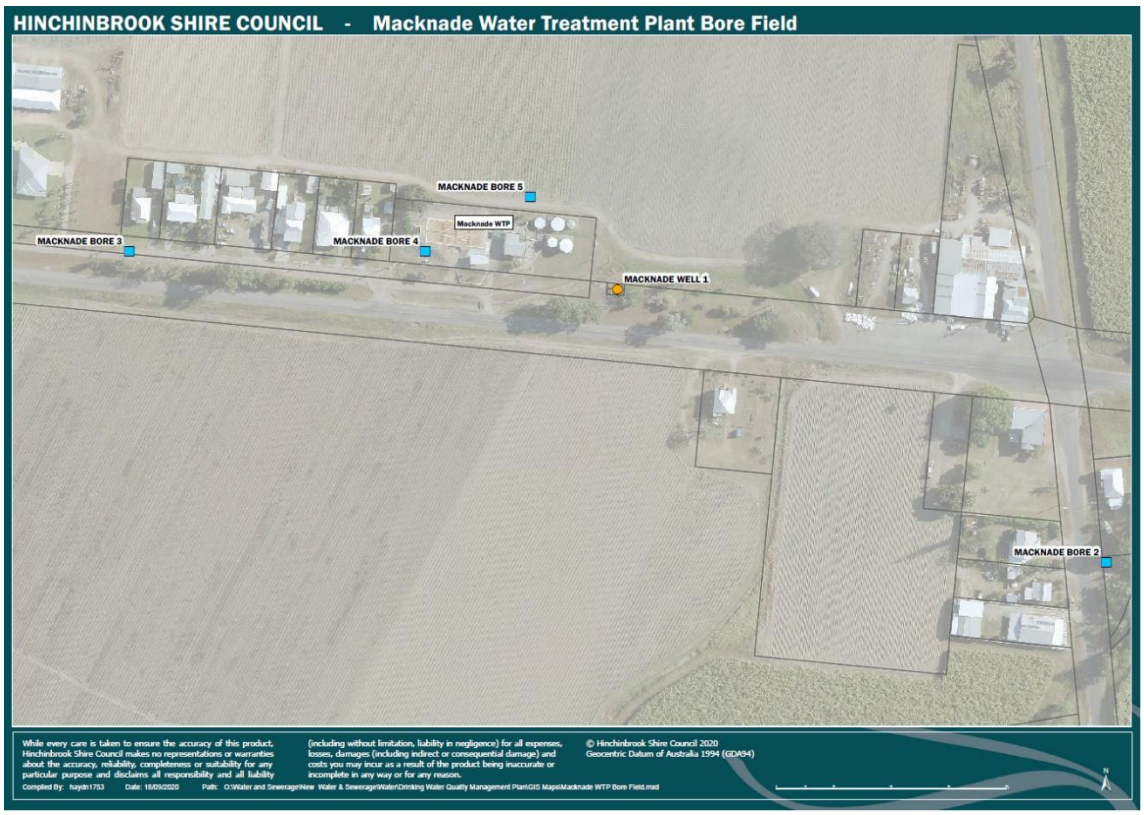


Figure 3.4 – Scheme 2 Macknade Water Treatment Plant Bore/Well Identification Map

Figure 3.5 – Scheme 2 Halifax Water Treatment Plant Bore/Well Identification Map

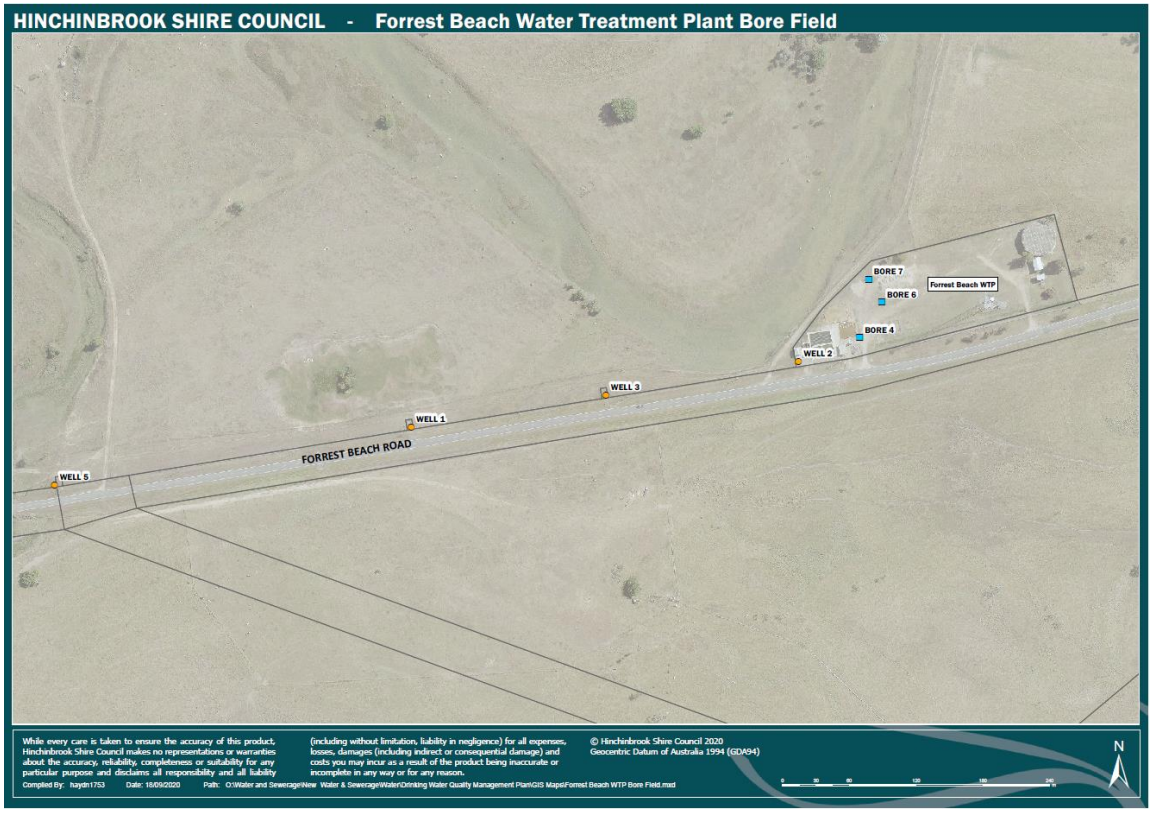


Figure 3.6 – Scheme 3 Forrest Beach Bore/Well Identification Map

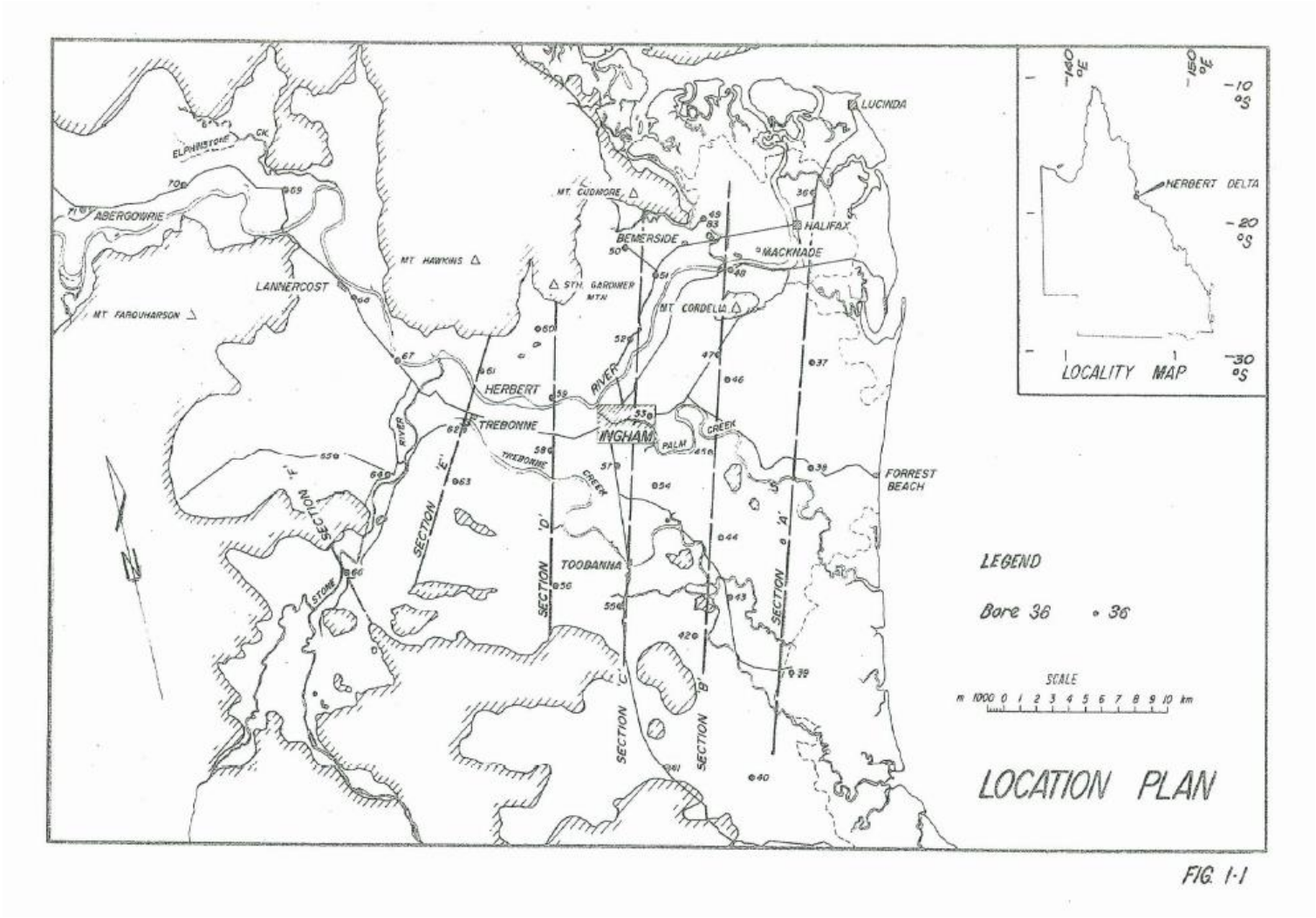
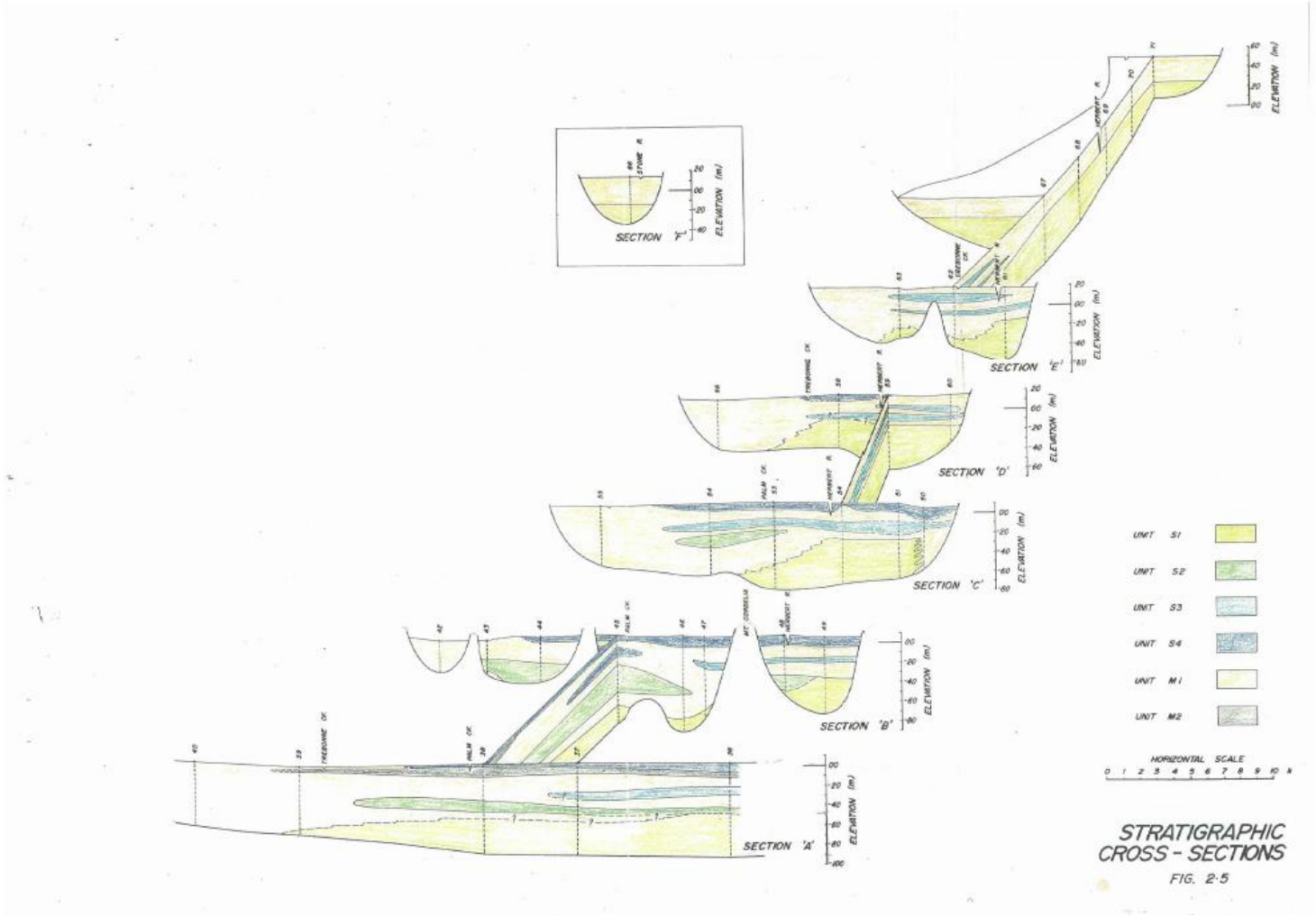


Figure 3.7 – Reproduced from Queensland Water Resources Commission Report 1978: Groundwater Investigation Herbert River Area by Randall Cox

Figure 3.8 – Reproduced from Queensland Water Resources Commission Report 1978: Groundwater Investigation Herbert River Area by Randall Cox



3.4 Hazard Identification

Hazards and the hazardous events leading to their presence have been identified in Table 4-6. The hazards that have been identified to occur are based on the characteristics of the catchment, source and scheme along with historical information on the water quality (raw, treated and supplied). Hazard Identification includes hazards that are extreme and infrequent events that could have a magnifying effect (e.g., heavy rain, temperature extremes, and drought).

NOTE: hazard identification and risk assessment have been combined into a single table because of the close linkages between these two steps in the process.

3.5 Hazard Identification and Risk Assessment Team

Table 3-7 below details the personnel responsible for the hazard identification and risk assessment process, their roles and responsibilities and how knowledge of the actual day to day operations of the schemes has been included in the process.

Table 3-7 Hazard Identification and Risk Assessment Team

Participant (Position)	Qualifications/ Expertise	Role in Assessment	Knowledge of Drinking Water Service	Experience in Hazard Identification/ Risk Assessment
Peter Martin (Utility Services Manager)	40 years' experience with HSC Water Department	Contributor	Very High	• HACCP for Fluoride • Varies projects risk assessments
Monica Accornero (Infrastructure Assets Manager)	Masters of Engineering Practice (Civil)	Creator	High	• HACCP for Fluoride • Varies projects risk assessments
Jenna Devietti (Infrastructure Assets Manager)	Bachelor of Environmental Engineering with Honours	Reviewer	High	• HACCP for Fluoride • Varies projects risk assessments
Haydn Grazioli (Project and Technical Support Officer)	Currently Studying Bachelor of Civil Engineering	Contributor	Medium	• Varies projects risk assessments
Neil Fredericks (WTP Operator)	Certificate III in Water Treatment Operations	Contributor	High	• HACCP for Fluoride • Component of certification
Paul Bourne	Certificate III in Waste Water Treatment Operations	Contributor	High	• Component of certification
David Lee	Certificate IV in Water & Waste Water Operations	Contributor	High	• HACCP for Fluoride • Component of certification

4 ASSESSMENT OF RISKS

4.1 Methodology

Table 4-1 Qualitative Measures of Likelihood

Level	Likelihood	Descriptor
A	Rare	Occurs less than or equal to once every 5 years
B	Unlikely	Occurs more often than once every 5 years and up to once per year
C	Possible	Occurs more often than once per year and up to once a month (12/yr)
D	Likely	Occurs more often than once per month (12/yr) and up to once per week (52/yr)
E	Almost Certain	Occurs more often than once per week (52/yr)

Table 4-2 Qualitative Measures of Consequence or Impact

Level	Descriptor	Example Description
1	Insignificant	Isolated exceedance of aesthetic parameter with little or no disruption to normal operation
2	Minor	Potential local aesthetic, isolated exceedance of chronic health parameter
3	Moderate	Potential widespread aesthetic impact or repeated breach of chronic health parameter
4	Major	Potential acute health impact, no declared outbreak expected
5	Catastrophic	Potential acute health impact, declared outbreak expected

Table 4-3 Qualitative Risk Analysis Matrix – Level of Risk

Likelihood	Consequences				
	1. Insignificant	2. Minor	3. Moderate	4. Major	5. Catastrophic
A (almost certain)	Medium (6)	High (10)	High (15)	Extreme (20)	Extreme (25)
B (likely)	Medium (5)	Medium (8)	High	High (16)	Extreme (20)
C (possible)	Low (3)	Medium (6)	Medium (9)	High (12)	High (15)
D (unlikely)	Low (2)	Low (4)	Medium (6)	Medium (8)	High (10)
E (rare)	Low (1)	Low (2)	Low (3)	Medium (5)	Medium (6)

Table 4-4 Level of Uncertainty

Level of Uncertainty	Definition
Certain	There is 5 years of continuous monitoring data, which has been trended and assessed, with at least daily monitoring; or The processes involved are thoroughly understood.
Confident	There is 5 years of continuous monitoring data, which has been collated and assessed, with at least weekly monitoring or for the duration of seasonal events; or There is a good understanding of the processes involved.
Reliable	There is at least a year of continuous monitoring data available, which has been assessed; or There is reasonable understanding of the processes involved.
Estimate	There is limited monitoring data available; or There is limited understanding of the processes involved.
Uncertain	There is limited or no monitoring data available; or The processes are not well understood.

4.2 Assessment of Risk

For all hazards, maximum risk must be assessed, which helps put into perspective the implications to the health of the population if the hazard is not removed or controlled. Where there is insufficient data or information to complete a reliable assessment, it has been highlighted as an uncertainty and discussed in the Risk Management Improvement Program. The assessment of risk is outline in Table 4-6.

For catchments and groundwater systems all schemes have been included in the one risk assessment as they all remain within the same catchments and hazards that are identified have the possibility to occur across all three schemes. Schemes 1, 2 and 3 have been assessed separately for both Treatment Systems and Service Reservoirs and Distribution Systems.

4.3 Existing Preventative Measures/Barriers and Residual Risk

All existing preventative measures and barriers for the identified hazards are outline in Table 4-6. Existing preventative measures include all actions, barriers or measures currently in place to reduce the maximum risk. They include all treatment steps, active measures that protect raw water quality prior to treatment and measures to protect treated water quality.

The residual risk is determined once existing preventive measures have been applied. Residual risk is the level of risk a particular hazard is assessed as posing to the safety of the drinking water once the existing preventative measures have been applied. Residual risk used the same methodology as the initial maximum risk assessment; however, changes in the likely hood should result in a lower resultant risk level.

4.4 Uncertainties

The quality of information underpinning the risk assessment can vary from very good to 'not so good'. Hence, whilst the risk assessment process described in this template is a 'qualitative' process, the confidence in the information that is used to determine each risk level is variable.

Any uncertainties in the risk assessment have been detail in Table 4-6.

4.5 Key Stakeholders

Table 4-5 identifies Key Stakeholders which are involved in the management of drinking water quality and how they have been engaged in the process of preparing the Drinking Water Quality Management Plan.

Table 4-5 Stakeholders – Risk Assessment

Stakeholder	Contact Name and Details	Rational for engagement and how engagement occurred
Utility Services Manager	Peter Martin (07) 4776 4673	Responsible for the operation of Scheme 1, 2 and 3. Assisted in the Risk Assessment process.
Treatment Plant Operator	Neil Fredericks (07) 4776 4673	Responsible for treating water from Source. Assisted in the Risk Assessment process.
Treatment Plant Team Leader	David Lee (07) 4776 4673	Responsible for treating water from Source. Assisted in the Risk Assessment process.
Department of Environmental and Resource Management	Anne Gardiner (07) 3224 7887	Approver. Provides assistance in the plan review process.
Terrain	Michael Nash (07) 4776 0186	Terrain is currently undergoing studies on Drinking Water Quality in relation to the effects of herbicides and pesticides used by farmers. This study will provide valuable information to council and can be used to increase the level of certainty in the risk assessment.
Office of the Water Supply Regulator	Level 3 Mineral House 41 George Street Brisbane QLD 4000	Regulator of the Water Industry

Queensland Health Water Quality Unit	Queensland Health Building 147-163 Charlotte Street Brisbane QLD 4000 (07) 3234 0111	The Water Quality Unit is the lead agency for legislation, policy, guidelines and standards development in relation to water quality.

Table 4-6 Hazard Identification, Risk Assessment and Uncertainty

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
Catchment and Groundwater Systems - Hazardous Events for catchment and groundwater systems are applicable to all schemes														
1	River and Groundwater Systems	Contamination from Septic tanks & Sewer Mains (breakages, etc)	Source for pathogens and nitrates/nitrites. A number of townships are not sewered. These not considered to be well maintained as there is no monitoring program and are likely to be old systems.	Protozoa Viruses Bacteria Pathogens Nitrates/ nitrites	Major	Possible	High (12)	~ Aeration→ Sedimentation → Filtration ~ Chlorination ~ New dwellings in non sewered areas to meet requirements of AS 1547. ~ Health Department within council handles any complaints in regards to unsatisfactory septic systems. ~ During periods of high turbidity in the river, it is not used as a water source	Protozoa Viruses & Bacteria Applicable to all hazards Applicable to all hazards Applicable to all hazards	Major	Unlikely	Medium (8)	Uncertain	~ Undertake testing monthly for the presence of E. Coli in raw water and monitor the data to identify any peaks associated with high rainfall, etc. Herbert River source to be used only when needed. Another action item covers the introduction of another bore for the Ingham system.
2	River	Contamination from Sewerage Treatment Plant	Source for pathogens and nutrients. There is one WWTP upstream (Ravenshoe Sewerage Treatment Plant). The Hinchinbrook Shire has two treatment plants both located downstream of the intake of river water.	Protozoa Viruses Bacteria Pathogens Nutrients	Major	Possible	High (12)	~ Sedimentation → Filtration ~ Chlorination ~ During periods of high turbidity in the river, it is not used as a water source ~ Intake through galleries with the possibility of using the sand bed as a filtration system. ~ Storage cleaned on a yearly basis.	Protozoa Viruses & Bacteria Applicable to all hazards, measure to reduce likelihood of each Protozoa, Viruses Protozoa, Viruses, Bacteria	Major	Unlikely	Medium (8)	Uncertain	~ Undertake testing for the presence of E. Coli in raw water and monitor the data to identify any peaks associated with high rainfall, etc.
3	Groundwater	Groundwater under direct influence of surface water	All unconfined aquifers.	Pesticides & Herbicides (Atrazine, Desthyl Atrazine, Diuron, Hexazinone) Nitrates/Nitrites	Minor	Possible	Medium (6)	~ Water Quality Monitoring ~ All aquifers are unconfined so it is expected that surface water would have some affect on groundwater but monitoring shows that these effects are minimal.	Pesticides & Herbicides for all existing preventative measures	Minor	Possible	Medium (6)	Certain	
4	River and Groundwater Systems	Runoff from agricultural land (primarily sugar cane production) during rainfall events	Pesticides/Herbicides, fertiliser and nutrients from cane production. Previous testing has only been in groundwater.	Pesticides & Herbicides (Atrazine, Desthyl Atrazine, Diuron, Hexazinone)	Minor	Unlikely	Low (4)	~ Pesticide/Herbicide analysis every 6 months to monitor levels in source water. No issues have been recorded.	Pesticides & Herbicides	Minor	Unlikely	Low (4)	Reliable	~ Conduct testing in river & bores for pesticides and herbicides after wet season prior to pumping from the river and again during the dry season (mid year). ~Terrain currently completing a study on the effects of pesticides to the catchments water supply. Results expected in a 2 year timeframe.
5	River and Groundwater Systems	Spraying of aquatic weeds		Pesticides	Minor	Unlikely	Low (4)	~ Controlled spraying by Environmental Health Officers	Pesticides	Minor	Unlikely	Low (4)	Confident	
6	River and Groundwater Systems	Contamination from crop dusting		Pesticides & Herbicides	Minor	Unlikely	Low (4)	~ Pesticide/Herbicide analysis every 6 months to monitor levels in source water. No issues have been recorded.	Pesticides & Herbicides	Minor	Unlikely	Low (4)	Reliable	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
7	River and Groundwater Systems	Runoff from rural stormwater (open earth drains from grazing land, sugar cane, etc) during rainfall events	Increase colour and turbidity in raw water. Aesthetic only.	Physical	Insignificant	Possible	Low (3)	~ During periods of high turbidity in the river, it is not used as a water source	Physical	Insignificant	Rare	Low (1)	Certain	
8	River and Groundwater Systems	Flooding	Contamination of surface water and possible contamination of groundwater	Bacteria, Chemical and Physical	Major	Possible	High (12)	~ No existing preventative measures.		Major	Possible	High (12)	Certain	~ Improve borehead construction under the borehead replacement program
9	River and Groundwater Systems	Inadequate well or bore head protection	Contamination of groundwater from surface runoff. No control over private bores.	Bacteria Chemical	Major	Possible	High (12)	~ Chemical testing to monitor any changes in groundwater that could result from infiltration of flood water through inadequate well or bore head.	Chemical	Major	Possible	High (12)	Confident	~ Improve borehead construction under the borehead replacement program
10	River	Runoff from rural stormwater (open earth drains from grazing land, sugar cane, etc) during rainfall events	May contain pathogens	Bacteria	Major	Possible	High (12)	~ During periods of high turbidity in the river, it is not used as a water source	Bacteria	Major	Rare	Medium (5)	Certain	
11	Groundwater	Discharge from urban stormwater during rainfall events	May contain lead and zinc from roads, petrol/oil products, sewerage overflow and increase colour and turbidity of water.	Bacteria Chemical Turbidity Microbial	Major	Unlikely	Medium (8)	~ Sediment Traps for stormwater systems	Chemical Turbidity	Major	Rare	Medium (5)	Estimate	~ Terrain currently completing a study on the effects of pesticides to the catchments water supply. Results expected in a 2 year timeframe. ~ Improve borehead construction under the borehead replacement program
12	River and Groundwater Systems	Bushfires	Turbidity from particulate fallout and from erosion. Microbiological contamination from dead animals and chemical contamination from fire retardants.	Microbial, Chemical and Physical	Major	Unlikely	Medium (8)	~ Coordinated Fire Management Plan (Rural Fire Brigade) ~ Fire restrictions during high fire risk season ~ Areas of high fire risk determined in Planning Scheme	All existing preventative measures work towards lowering likelihood of all hazards.	Major	Rare	Medium (5)	Estimate	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
13	River and Groundwater Systems	Wildlife (feral, native, stray and unfenced farm animals)	Microbial contamination from waste and dead animals, turbidity from erosion due to overgrazing and animal tracks. Feral pigs are an issue within the catchment	Microbial Bacteria Turbidity Taste and Odour Compounds	Major	Rare	Medium (5)	~ Aeration→ Sedimentation → Filtration ~ Chlorination ~ Feral animal prevention program	Taste and Odour Compounds, Turbidity Microbial, Bacteria All hazards	Major	Rare	Medium (5)	Reliable	~ Review effectiveness of feral animal prevention programs (in conjunction with Health Department)
14	River and Groundwater Systems	Accidental or intentional contamination of surface or groundwater	~ No control over private bores & wells. ~ Fertilisers, mill muds, etc. potential substances	Harmful substances (not identified)	Catastrophic	Rare	Medium (6)	~ Chemical Monitoring helps to identify any abnormalities within the water sources. If contamination is to occur then monitoring should allow us to identify the issue.	Harmful substances	Catastrophic	Rare	Medium (6)	Uncertain	~ Develop action plan
15	River and Groundwater Systems	Major Spills and accidental spillage of harmful contaminant	Example - Fuel carrier accident spilling load into nearby drainage system	Unidentified Chemical	Catastrophic	Rare	Medium (6)	~ If to occur, appropriate action taken. ~ Monitoring after incident	Unidentified Chemical	Catastrophic	Rare	Medium (6)	Uncertain	~ Develop action plan
16	River and Groundwater Systems	Industrial chemical waste discharge contaminating groundwater &/or surface water	Proposed Bio Energy Mill. Existing Sugar Mills	Chemical Contamination	Moderate	Possible	Medium (9)	~ Chemical Monitoring (Standard Water Analysis) ~ Processes in place through ERA.	Chemical Contamination Chemical Contamination	Moderate	Possible	Medium (9)	Estimate	~ No control over private enterprise. ~ Continue to monitor chemical levels in raw water supplies.
17	Groundwater	Geology in relation to groundwater	Turbidity from dissolved minerals and chemical contamination from leaching and minerals. Chemical monitoring shows low levels in most naturally occurring chemicals.	Turbidity Chemical	Major	Rare	Medium (5)	~ Chemical Monitoring (Standard Water Analysis) to gain understanding of natural presence of metals/chemicals in source water and monitor to identify any significant changes.	Turbidity and Chemical	Major	Rare	Medium (5)	Certain	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
18	River and Groundwater Systems	Aluminium	Snapshot monitoring has identified Aluminium as being detected within the aesthetic guideline.	Aesthetic	Minor	Possible	Medium (6)	~ Monitoring for presence of aluminium in source water. ~ Treatment processes to eliminate presence in drinking water.	Aesthetic for all existing preventative measures	Minor	Possible	Medium (6)	Reliable	
19	River and Groundwater Systems	Barium	Snapshot monitoring has identified Barium as a likely hazard	Metal	Major	Rare	Medium (5)	~ Monitoring for presence of barium in source water. ~ Treatment processes to eliminate presence in drinking water.	Metal for all existing preventative measures	Major	Rare	Medium (5)	Reliable	
20	River and Groundwater Systems	Boron	Snapshot monitoring has identified Boron as a likely hazard	Metal	Minor	Rare	Low (2)	~ Monitoring for presence of boron in source water. ~ Treatment processes to eliminate presence in drinking water.	Metal for all existing preventative measures	Minor	Rare	Low (2)	Reliable	
21	River and Groundwater Systems	Manganese	Snapshot monitoring has identified Manganese as a likely hazard	Metal	Moderate	Unlikely	Medium (6)	~ Monitoring for presence of manganese in source water. ~ Treatment processes to eliminate presence in drinking water.	Metal for all existing preventative measures	Moderate	Rare	Low (3)	Confident	
22	River and Groundwater Systems	Nickel	Snapshot monitoring has identified Nickel as a likely hazard	Metal	Moderate	Rare	Low (3)	~ Monitoring for presence of nickel in source water. ~ Treatment processes to eliminate presence in drinking water.	Metal for all existing preventative measures	Moderate	Rare	Low (3)	Reliable	
23	Groundwater	Zinc	Snapshot monitoring has identified Zinc as being detected within the aesthetic guideline.	Metal	Insignificant	Rare	Low (1)	~ Monitoring to identify trends and presence in groundwater. ~ Treatment processes	Metal for all existing preventative measures	Insignificant	Rare	Low (1)	Reliable	
Catchment and Groundwater Systems - Applicable to SCHEME 1 only														
24	River & Groundwater Systems	Runoff from forestry production	May contain pesticides and increase colour and turbidity in raw water.	Pesticides/ Herbicides and Physical	Minor	Unlikely	Low (4)	~ Pesticide/Herbicide analysis every 6 months	Pesticides/Herbicides	Minor	Unlikely	Low (4)	Reliable	~ Conduct testing in river & bores for pesticides and herbicides after wet season prior to pumping from the river and again during the dry season (mid year). ~Terrain currently completing a study on the effects of pesticides to the catchments water supply. Results expected in a 2 year timeframe.
25	Groundwater	Copper	Snapshot monitoring has identified Copper as a likely hazard	Metal	Minor	Rare	Low (2)	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of copper in our system. ~ Existing treatment process minimises hazard.	Metal for all existing preventative measures	Minor	Rare	Low (2)	Reliable	
26	River & Groundwater Systems	Iron	Snapshot monitoring has identified Iron as being detected within the aesthetic guideline.	Metal	Moderate	Unlikely	Medium (6)	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of iron in our system. ~ Existing treatment process minimises hazard.	Metal for all existing preventative measures	Moderate	Rare	Low (3)	Certain	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
27	Groundwater	Lead	Snapshot monitoring has identified Lead as a likely hazard	Metal	Moderate	Rare	Low (3)	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of lead in our system. ~ Existing treatment process minimises hazard.	Metal for all existing preventative measures	Moderate	Rare	Low (3)	Reliable	
28	River	Molybdenum	Snapshot monitoring has identified Molybdenum as a likely hazard	Metal	Minor	Rare	Low (2)	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of molybdenum in our system. ~ Existing treatment process minimises hazard.	Metal for all existing preventative measures	Minor	Rare	Low (2)	Reliable	
Catchment and Groundwater Systems - Applicable to SCHEME 2 only														
29	Groundwater	Saline intrusion of coastal aquifers	Happens if the bore is over pumped.	Loss of Supply	Catastrophic	Rare	Medium (6)	~ Monitoring of sodium and chloride levels in raw water. ~ Reduce pumping rate.	Loss of supply	Catastrophic	Rare	Medium (6)	Certain	
30	Groundwater	Iron	Snapshot monitoring has identified Iron as being detected within the aesthetic guideline.	Metal	Moderate	Unlikely	Medium (6)	~ Monitoring ~ Treatment processes	Metal for all existing preventative measures	Moderate	Rare	Low (3)	Certain	
31	Groundwater	PFAS	Snapshot monitoring has identified PFAS as a likely hazard in Bores 3 & 4	Chemical	Moderate	Almost Certain	High (15)	Selection of raw water sources	Loss of supply	Moderate	Possible	Medium (5)	Reliable	Investigate securing Kemps Rd Bore as this have no PFAS issues and has a high yield. Decommission Bores 3 & 4 if Kemps Rd is feasible, alternatively investigate other options for these bores.
Catchment and Groundwater Systems - Applicable to SCHEME 3 only														
32	Groundwater	Saline intrusion of coastal aquifers	Happens if the bore is over pumped.	Loss of Supply	Catastrophic	Rare	Medium (6)	~ Monitoring of sodium and chloride levels in raw water. ~ Reduce pumping rate. ~ Backup supply between WTP and connection to Ingham Supply	Loss of supply	Catastrophic	Rare	Medium (6)	Confident	
33	Groundwater	High iron levels in groundwater	The Forrest Beach water supply has experienced high iron levels in the groundwater. The Iron level was detected about the ADWG in the snapshot monitoring.	Iron	Moderate	Almost Certain	High (15)	~ Treatment processes including coagulation (addition of lime) ~ Monitoring ~ Backup supply between WTP and connection to Ingham Supply	Iron for all existing preventative measures	Moderate	Rare	Low (3)	Certain	~ Looking at new filtration systems
34	Groundwater	Arsenic	Snapshot monitoring has identified Arsenic as a likely hazard	Metal	Major	Rare	Medium (5)	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of arsenic in our system. ~ Existing treatment process minimises hazard.	Metal for all existing preventative measures	Major	Rare	Medium (5)	Reliable	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
35	Groundwater	Beryllium	Snapshot monitoring has identified Beryllium as a likely hazard	Metal	Major	Rare	Medium (5)	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of beryllium in our system. ~ Existing treatment process minimises hazard.	Metal for all existing preventative measures	Major	Rare	Medium (5)	Reliable	
36	Groundwater	Chromium	Snapshot monitoring has identified Chromium as a likely hazard	Metal	Moderate	Rare	Low (3)	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of chromium in our system. ~ Existing treatment process minimises hazard.	Metal for all existing preventative measures	Moderate	Rare	Low (3)	Reliable	
37	Groundwater	Copper	Snapshot monitoring has identified Copper as a likely hazard	Metal	Minor	Rare	Low (2)	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of copper in our system. ~ Existing treatment process minimises hazard.	Metal for all existing preventative measures	Minor	Rare	Low (2)	Reliable	
38	Groundwater	Lead	Snapshot monitoring has identified Lead as a likely hazard	Metal	Major	Rare	Medium (5)	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of lead in our system. ~ Existing treatment process minimises hazard.	Metal for all existing preventative measures	Major	Rare	Medium (5)	Reliable	
TREATMENT SYSTEMS - APPLICABLE TO ALL SCHEMES														
39	WTP	Cyclone greater then than Category 2	Damage to control room, pumping equipment, etc.	Plant Shutdown	Major	Rare	Medium (5)	~ Most schemes have more then one water supply source. Scheme 1 has two WTP's which provides two water supplies to the Ingham district. Scheme 2 is connected to Scheme 1 and also has two WTP's. Scheme 3 is connected to Scheme 1 and 2 and also has one WTP. ~ Built in redundancy ~ Emergency Planning requires people to have 3 days of provisions.	Plant Shutdown for all existing preventative measures	Major	Rare	Medium (5)	Confident	~ Review Emergency Planning
40	WTP	Loss of power greater then 7 days	No treatment process if there is no power.	Plant Shutdown	Major	Rare	Medium (5)	Back up generators	Plant Shutdown for all existing preventative measures	Minor	Rare	Low (2)	Certain	~ Turn 40 kVa to a mobile trailerable generator.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
41	WTP	Flooding	Inundation of equipment Unable to attend water treatment plant	Plant Shutdown (pending on magnitude of flooding)	Catastrophic	Rare	Medium (6)	~ All water treatment plants are constructed above any known flood event. ~ Most WTP can be attended by competent persons who live in the vicinity of the area, otherwise access by helicopter is required ~ Most supplies have more then one water supply source. Scheme 1 has two WTP's which provides two water supplies to the Ingham district. Scheme 2 is connected to Scheme 1 and also has two WTP's. Scheme 3 is connected to Scheme 1 and 2 and also has one WTP. ~ Built in redundancy ~ Emergency Planning requires people to have 3 days of provisions.	Plant Shutdown for all existing preventative measures	Moderate	Rare	Low (3)	Certain	~ Cyclone/Flooding season preparations
42	WTP	Chemical Dosing Failures		Bacterial Chemical	Catastrophic	Unlikely	High (10)	~ Telemetry system monitoring (alarms are set well before any critical levels) ~ Scada ~ Every plant is inspected everyday ~ Built in redundancy	Chemical Chemical Chemical and Bacterial Chemical and Bacterial	Catastrophic	Rare	Medium (6)	Certain	
43	WTP	Inadequate mixing	Inadequate mixing can result in an over or under dose of disinfectant resulting in bacterial and chemical infection.	Bacterial Chemical	Catastrophic	Unlikely	High (10)	~ Recirculation systems ~ Continuous online monitoring ~ Daily inspections	Bacteria Chemical Bacteria and Chemical	Catastrophic	Rare	Medium (6)	Certain	
44	WTP	Inadequate filter operation		Bacterial Loss of Performance	Major	Unlikely	Medium (8)	~ Replacement of sand media when required. ~ Daily inspections	Bacterial for all existing preventative measures	Major	Rare	Medium (5)	Certain	
45	WTP	Open filtration system causing growth of cyanobacteria		Cyanobacteria	Catastrophic	Possible	High (15)	Nil.		Catastrophic	Possible	High (15)	Estimate	~ Testing during hot months of the year ~ Improvements to the aeration and filtration system
46	WTP	Ineffective disinfection	Faulty supply chemical Faulty monitoring equipment Faulty dosing equipment High turbidity	Bacteria	Major	Unlikely	Medium (8)	~ Daily checking of equipment ~ Online monitoring	Bacteria for all existing preventative measures	Major	Rare	Medium (5)	Certain	

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
47	WTP	Supply failure	One supplier in North Queensland	Bacteria	Major	Unlikely	Medium (8)	~ Ensure adequate stock	Bacteria for all existing preventative measures	Major	Rare	Medium (5)	Certain	
48	WTP	Inadequate backup		Bacteria	Major	Unlikely	Medium (8)	~ Ensure emergency preparedness before cyclone/flood season	Bacteria for all existing preventative measures	Major	Rare	Medium (5)	Certain	
49	WTP	Failure of alarms and monitoring equipment		Overdose/ Ineffective dose	Moderate	Possible	Medium (9)	~ Daily checking of equipment and manual confirmation of testing equipment ~ Calibration of instruments	Overdose/Ineffective dose for all existing preventative measures	Moderate	Rare	Low (3)	Certain	
50	WTP	Sabotage		Unknown	Catastrophic	Rare	Medium (6)	~ Security fencing ~ Daily checking	Unknown hazard caused from sabotage for all existing preventative measures	Catastrophic	Rare	Medium (6)	Certain	
51	WTP	Formation of disinfection by-products		Trihalomethanes and Chlorates	Moderate	Possible	Medium (9)	~ Occasional testing	Trihalomethanes	Moderate	Rare	Low (3)	Estimate	~ Enforce testing on a 6 monthly basis at the Ingham Pump Station.
52	WTP	Significant flow variations through water treatment system	Could cause under or overdose	Chemical	Moderate	Possible	Medium (9)	~ Online monitoring	Chemical	Moderate	Rare	Low (3)	Certain	
TREATMENT SYSTEMS - Scheme 2 Lower Herbert Water Supply														
53	WTP	Storm Surge	Damage to equipment Storm surge would have to be of a significant magnitude in order to affect the WTP.	Plant Shutdown	Catastrophic	Rare	Medium (6)	~ Backup supply between both WTP and connection to Ingham Water Supply	Plant Shutdown	Minor	Rare	Low (2)	Confident	
54	WTP	Chemical Dosing Failure - Soda Ash	Manual dosing of soda ash into the aerator at Macknade Water Treatment Plant	Chemical (Soda Ash)	Minor	Possible	Medium (6)	~ A pH test is always conducted prior to dosing with soda ash.	Chemical	Minor	Unlikely	Low (4)	Reliable	~ Progressing to a pump dosing system as HSC update the chemical control system.
55	WTP	Formation of disinfection by-products		Trihalomethanes and Chlorates	Moderate	Possible	Medium (9)	~ Occasional testing	Trihalomethanes	Moderate	Rare	Low (3)	Estimate	~ Enforce testing on a 6 monthly basis at the Ingham Pump Station. Consider changing the Halifax Depot to a chlorine gas facility to reduce the risk of THMs and Chlorates.
TREATMENT SYSTEMS - Scheme 3 Forrest Beach Water Supply														

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
56	WTP	Groundwater unsuitable for treatment	Scheme 3 is a standalone supply and relies completely on groundwater. High Iron levels is an issue in the area.	Chemical Bacteria	Major	Rare	Medium (5)	~ Monitoring to ensure suitability of groundwater ~ Backup supply between WTP and connection to Ingham Supply	Chemical and Bacteria	Major	Rare	Medium (5)	Confident	~ Current application to government for funding in order to connect into Scheme 1 and 2.
57	WTP	Storm Surge	Damage to equipment Storm surge would have to be of a significant magnitude in order to affect the WTP.	Plant Shutdown	Catastrophic	Rare	Medium (6)	~ Backup supply between WTP and connection to Ingham Supply	Plant Shutdown	Catastrophic	Rare	Medium (6)	Confident	~ Current application to government for funding in order to connect into Scheme 1 and 2.
58	WTP	Chemical Dosing Failure - Lime	Manual dosing of lime into the sedimentation channel at Forrest Beach Water Treatment Plant	Chemical (Lime)	Minor	Possible	Medium (6)	~ Daily monitoring	Chemical	Minor	Rare	Low (2)	Reliable	
SERVICE RESERVOIRS AND DISTRIBUTION SYSTEMS - APPLICABLE TO ALL SCHEMES														
59	Reservoir	Biofilms, sloughing and resuspension, regrowth		Cyanotoxin	Major	Possible	High (12)	~ Clean tanks yearly and sealing	Cyanotoxin	Major	Rare	Medium (5)	Confident	
60	Reservoir	Intentional contamination of reservoir (sabotage)		Unknown	Catastrophic	Rare	Medium (6)	~ Security fencing ~ Daily checking	Unknown hazard caused from sabotage	Catastrophic	Rare	Medium (6)	Certain	
61	Reticulation	Faulty backflow prevention devices installed		Harmful Substance (not identified)	Major	Rare	Medium (5)	~ All devices have to be tested every year. ~ Local authorities have a register.	Unknown hazard caused from backflow	Minor	Rare	Low (2)	Reliable	Very rare for loss of pressure in the main to create the vacuum.
62	Reticulation	Corrosion of reservoirs and pipe system		Loss of Supply	Major	Unlikely	Medium (8)	~ Inspection programs, building maintenance program, daily site visits	Loss of supply	Major	Rare	Medium (5)	Certain	
63	Reticulation	Cyclone & Flooding	Fallen trees could uproot water mains and create severe breaks which cannot be attended to during the storm.	Bacteria	Catastrophic	Possible	High (15)	~ When a significant cyclone is forecasted for the district the water supply is turned off until possible breaks can be assessed. ~ Boil alert when turning on reticulation	Bacteria for all existing preventative measures	Catastrophic	Rare	Medium (6)	Certain	
64	Reticulation	Aged pipes, infrastructure (pipes break or leak)	Contamination from repairs Build up of biofilms	Bacteria	Major	Unlikely	Medium (8)	~ Flushing of hydrants	Bacteria	Major	Rare	Medium (5)	Confident	

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	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
65	Reticulation	Inadequate repair and maintenance, inadequate system flushing		Bacteria	Major	Possible	High (12)	~ Flushing critical points in the system	Bacteria	Major	Unlikely	Medium (8)	Certain	
66	Reticulation	Commissioning new mains		Bacteria	Major	Possible	High (12)	~ Flush hydrants ~ Sterilise	Bacteria for all existing preventative measures	Major	Unlikely	Medium (8)	Confident	
67	Reticulation	Stagnation	Chlorine runs out and regrowth occurs	Bacteria	Major	Possible	High (12)	~ Flushing of hydrants	Bacteria	Major	Unlikely	Medium (8)	Confident	
68	Reticulation	Cleaning of mains (use of improper equipment, incorrect methods, lack of cleaning strategy)		Bacteria	Major	Possible	High (12)	~ Scouring and flushing ~ Supervision during cleaning process	Bacteria for all existing preventative measures	Major	Unlikely	Medium (8)	Confident	
SERVICE RESERVOIRS AND DISTRIBUTION SYSTEMS - Scheme 2 Lower Herbert Water Supply														
69	Reticulation	High pH levels in areas that are acceptable to long detention times.	3 samples from the end of Patterson Parade were identified to have high pH levels (highest sample pH 9.41)	pH	Insignificant	Possible	Low (3)	~ Flushing of the water main from hydrant monthly ~ Quarterly monitoring.	pH for all existing preventative measures	Insignificant	Unlikely	Low (2)	Certain	
70	Reservoir	Animals access through overflow drains, etc.	Halifax WTP Clear water tank	Bacteria	Major	Unlikely	Medium (8)			Major	Unlikely	Medium (8)	Confident	
SERVICE RESERVOIRS AND DISTRIBUTION SYSTEMS - Scheme 3 Forrest Beach Water Supply														
71	Reservoir	Rainwater ponding on reservoir roof	Rainwater entering low level reservoir	Bacteria	Major	Possible	High (12)			Major	Possible	High (12)	Certain	~ Complete
WHOLE OF SYSTEM RISKS - APPLICABLE TO ALL SCHEMES														

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
72	Whole of System	Lack of asset management	Cybersecurity	Governance	Catastrophic	Possible	High (12)	The New IT manager is progressing technology and has commenced the development of a governance framework with responsibilities /policies /procedures for information technology security. These include: - Information Systems (IS) Policy, - Computer Systems and Equipment Use Standard, - Information Systems Management Guidelines Servers are replaced every 4 years to reduce data loss but also to upgrade hardware which will also resolve any issue with newer software compatibility.	Governance	Moderate	Rare	Low (3)	Confident	**MC-01-Vulnerability assessment** Undertake a cybersecurity audit including a penetration test: - identify critical sites and those with cyber access, devices and access points specific to the Supervisory Control and Data Acquisition (SCADA) for water quality management. These will include 1) pump sites. 2) related operational technology systems - servers, firewalls, network switches, access points, Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). 3) Implement actions to maintain effective cyber security controls of SCADA and Industrial Control Systems (ICS). 4) Implement actions and integration consisting of standards and processes to manage both information technology (IT) and operational technology (OT). 5) Implement a single point access to enter the telemetry network. 6) Implement a secure entry protocol/procedure to the IT/OT network.
73	Whole of System	Inability to detect critical Assets	Cybersecurity	Governance	Catastrophic	Possible	High (12)	As above in Item 70	Governance	Moderate	Rare	Low (3)	Confident	**MC-02 -Governance structure** - Framework to be in place with responsibilities - Procedures for information technology and operation technology security to be created. **MC-03- Security safeguards** - Create a list of permitted applications to be installed / run within Council's Standard Operating Environment (SOE)
74	Whole of System	Disruption of Cyber information (IT)	Cybersecurity	Intentional Interference	Catastrophic	Possible	High (12)	SCADA is a Private network. Systems are built into the IT network and they look at the whole network. They guard the Water network.	Intentional Interference	Moderate	Rare	Low (3)	Confident	**MC - 04 Detection process** - Require SOE security monitoring system that reports anomalies. e.g. high CPU use, user accounts, high network traffic. **MC-05 Response & Recovery** - Organise routine backups / archiving for ICS equipment, servers and applications.
75	Whole of System	Disruption of Systems (IT)	Cybersecurity	Intentional Interference	Catastrophic	Possible	High (12)	As above in Item 70	Intentional Interference	Moderate	Rare	Low (3)	Confident	As above
76	Whole of System	Disruption of Cyber information (OT)	Cybersecurity	Intentional Interference	Catastrophic	Possible	High (12)	As above in Item 70	Intentional Interference	Moderate	Rare	Low (3)	Confident	As above
77	Whole of System	Disruption of Systems (OT)	Cybersecurity - Access to sites	Intentional Interference - Unauthorised access to sites	Catastrophic	Possible	High (12)	Passwords in place but not changed regularly.	Intentional Interference	Moderate	Rare	Low (3)	Confident	Ensure all sites are secure if there are no personnel onsite. Update camera systems and number of cameras to deter intruders. Install security card access to all sites.
78	Whole of System	Unauthorised access	Cybersecurity	Physical security Breach	Catastrophic	Possible	High (12)	Security Key system, induction and procurement procedures, contractor controls.	Physical security Breach	Moderate	Rare	Low (3)	Confident	Ensure all drives, chlorinators, controllers, etc are secure if there are no personnel onsite. Passcode protect all drives, chlorinators, controllers, etc to operators, managers, supervisors and fitters

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
79	Whole of System	Disruption of Cyber information (IT)	Cybersecurity	Unintentional Interference	Catastrophic	Possible	High (12)	SCADA is a Private network. The radio network is the permissions point of control. Passwords in place but not changed regularly. There are permissions set up for each individual person.	Unintentional Interference	Moderate	Rare	Low (3)	Confident	**MA - 01 Build out private SCADA network** - requires testing and cutover for all water facilities, sites & equipment to ensure the existing network is fully private. **MA - 02 Build single point of access and authentication method** - Undertake after MA-01. A single point access should be built as a mechanism to enter the telemetry network. **MA - 03 Implement rules to prevent across network access** - After MA-01 & MA-02, SCADA IT section to create and document a procedure for secure entry to the IT/OT network. **MA - 04 Consider disallowing open internet access** - To be actioned with MA-01 & MA-02. Address vulnerability scenarios but also allows for system updates (e.g. allowing Windows Update).
80	Whole of System	Disruption of Systems (IT)	Cybersecurity	Unintentional Interference	Catastrophic	Possible	High (12)	As above in Item 70	Unintentional Interference	Moderate	Rare	Low (3)	Confident	As above
81	Whole of System	Systems Configuration and data files	Cybersecurity - virus scanning	Abuse of Cyber Information	Catastrophic	Possible	High (12)	Most sites are not connected to the internet. Fire wall is in place. SCADA has a backup server and accessible, and talk to each other. If one falls over, the other takes over.	Abuse of Cyber Information	Moderate	Rare	Low (3)	Confident	**MA-05 Install and enable active virus scanning** - OT SCADA machines will not have anti-virus installed as it can interfere with SCADA installed software. Cybersecurity of OT SCADA machines is controlled by restricting internet access and eliminating the use of external USB drives and fire wall settings.
82	Whole of System	Systems Configuration and data files	Cybersecurity - Patches to Systems	Abuse of Cyber Information	Catastrophic	Possible	High (12)	Most sites are not connected to the internet. Fire wall is in place. SCADA has a backup server and accessible, and talk to each other. If one falls over, the other takes over.	Abuse of Cyber Information	Moderate	Rare	Low (3)	Confident	**MA-06 Activate and set windows firewall rules** - Do after MA-01 is completed **MA-07 Implement maintenance and updates schedule** - Maintenance will be ongoing in terms of updating SCADA software. All upgrades or changes to a PLC or SCADA shall have their configuration files backed up and saved on each workstation on-site and off-site. **MA-08 Consider certificate or key based authentication for remote access** - Do after MA-01 is completed **MA-09 Consider Two factor authentication** - Do after MA-01 is completed
83	Whole of System	System configuration and Data files	Cybersecurity	Theft of information	Catastrophic	Possible	High (12)	As above in Item 70	Theft of information	Moderate	Rare	Low (3)	Confident	As above
84	Whole of System	Access to Confidential Information	Cybersecurity	Fraud	Catastrophic	Possible	High (12)	As above in Item 70	Fraud	Moderate	Rare	Low (3)	Confident	As above
85	Whole of System	Unauthorised Access of privacy	Cybersecurity	Regulatory Breaches	Catastrophic	Possible	High (12)	As above in Item 70	Regulatory Breaches	Moderate	Rare	Low (3)	Confident	As above

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Scheme Component / Sub-component	Hazardous Event	Notes	Hazard	Maximum Risk			Existing Preventative Measures / Barriers.	Hazard Applicable to Existing Preventative Measure	Residual risk			Uncertainty	Comments/ Proposed Further Risk Reduction Actions
					Consequence	Likelihood	Risk level			Consequence	Likelihood	Risk level		
86	Whole of System	Lack of access control and identity management	Cybersecurity - Backups and licences	Control	Catastrophic	Possible	High (12)	SCADA has a backup server and accessible, and talk to each other. If one falls over, the other takes over. Action will be to check if all areas are backed up.	Control	Moderate	Rare	Low (3)	Confident	**MA-10 Implement backup schedule** - To be done as part of regular maintenance of IT/OT systems. Backups of configurations files to be made and stored onsite with a copy stored off-site in the secure corporate Drive, and with the SCADA provider. **MA-11 Ensure validity of software licences used across machines** - Ongoing as all SCADA OT software is licenced and authentication is used across SCADA OT machines.
87	Whole of System	Lack of protective technology and maintenance	Cybersecurity	Technical advancement	Insignificant	Rare	Low (1)	Routine manual operation of sites is the primary activity and is a low risk.	Technical advancement	Insignificant	Rare	Low (1)	Certain	Consider AusCERT Membership
88	Whole of System	Inability to detect a cyber security event	Cybersecurity	Detection	Catastrophic	Possible	High (12)	As above in Item 70	Detection	Moderate	Rare	Low (3)	Confident	Increased awareness from operators surrounding physical security access on ICS sites, provided by means of training sessions. Add this to the procedures -
89	Whole of System	Loss of system control	Cybersecurity	System failure	Catastrophic	Possible	High (12)	Perform routine manual operation at site. Documentation exists for operating procedures. Staff trained and deemed competent to run manual operation of sites.	System failure	Moderate	Rare	Low (3)	Confident	

5 MANAGING RISKS

5.1 Risk Management Measures

Section 5.1.1 outlines the existing preventive actions or measures that are in place for each water supply scheme. These actions and measures are managed by the Hinchinbrook Shire Council and are aimed to achieve acceptable residual risks in the short and longer-term.

Section 5.1.2 outlines proposed additional preventative measures and actions that are necessary to reduce any unacceptable residual risks that have been identified in the risk assessment in Section 4 of this DWQMP.

5.1.1 Existing Preventative Measures

NOTE:

- An acceptable level of residual risk is anything below or Equal to a Medium (8)

All hazardous events that have an unacceptable residual risk then the proposed measures must be included in the Risk Management Improvement Plan

Table 5-1 provides additional information regarding each of the existing preventive measures. Particular focus has been given to those preventive measures that are relied upon to manage extreme or high risks. This includes preventive measures undertaken by other organisations e.g., farmers, business owners, etc.

5.1.2 Proposed Preventative Measures

NOTE:

- An acceptable level of residual risk is anything below or Equal to a Medium (8)
- All hazardous events that have an unacceptable residual risk then the proposed measures must be included in the Risk Management Improvement Plan.

Table 5-1 provides information on the proposed additional preventative measures necessary to reduce any unacceptable residual risks identified in the risk assessment to an acceptable level.

NOTE:

- An acceptable level of residual risk is anything below or Equal to a Medium (6)
- All hazardous events that have an unacceptable residual risk then the proposed measures must be included in the Risk Management Improvement Plan.

Table 5-1 – Existing and Proposed Preventative Measures

	1	2	3	4	5	6	7	8	9
	Scheme Component / Sub-component	**Hazardous Event**	**Hazard**	**Existing Preventive Measures / Barriers.**	**Which risk factor/s does the existing preventative measure/s impact on (i.e., likelihood &/or consequence)**	**How effective is/are the existing preventative measure/s & on what basis has this been determined?**	**Is the level of residual risk acceptable**	**Proposed measures to reach an acceptable level or residual risk**	**Responsible Work Unit/Organisation (& arrangements with external organisation if applicable)**
	Catchment and Groundwater Systems - Hazardous Events for catchment and groundwater systems are applicable to all schemes								
1	River and Groundwater Systems	Contamination from Septic tanks & Sewer Mains (breakages, etc)	Protozoa Viruses Bacteria Pathogens Nitrates/ nitrites	~ Aeration→ Sedimentation → Filtration ~ Chlorination ~ New dwellings in non sewered areas to meet requirements of AS 1547. ~ Health Department within council handles any complaints in regards to unsatisfactory septic systems. ~ During periods of high turbidity in the river, it is not used as a water source	Likelihood & Consequence	Effective, but some more data could be obtained to increase the uncertainty.	Yes	~ Undertake testing monthly for the presence of E. Coli in raw water and monitor the data to identify any peaks associated with high rainfall, etc.	Water Department - Consult with WTP Operator to organise sampling and testing.
2	River	Contamination from Sewerage Treatment Plant	Protozoa Viruses Bacteria Pathogens Nutrients	~ Sedimentation → Filtration ~ Chlorination ~ During periods of high turbidity in the river, it is not used as a water source ~ Intake through galleries with the possibility of using the sand bed as a filtration system. ~ Storage cleaned on a yearly basis.	Likelihood & Consequence	Effective, but some more data could be obtained to decrease the uncertainty.	Yes	~ Undertake testing for the presence of E. Coli in raw water and monitor the data to identify any peaks associated with high rainfall, etc.	As per item 1
3	Groundwater	Groundwater under direct influence of surface water	Pesticides & Herbicides (Atrazine, Desthyl Atrazine, Diuron, Hexazinone) Nitrates/Nitrites	~ Water Quality Monitoring ~ All aquifers are unconfined so it is expected that surface water would have some effect on groundwater but monitoring shows that these effects are minimal.	Nil	Effective, as monitoring shows that the groundwater is still a suitable source during flooding which would be the peak time that groundwater would be under direct influence of surface water.	Yes		
4	River and Groundwater Systems	Runoff from agricultural land (primarily sugar cane production) during rainfall events	Pesticides & Herbicides (Atrazine, Desthyl Atrazine, Diuron, Hexazinone)	~ Pesticide/Herbicide analysis every 6 months to monitor levels in source water. No issues have been recorded.	Nil	Effective, existing monitoring data shows that the pesticide levels are minimal with little or no detection, but some herbicides have been identified. Further testing for presence in raw water data would increase knowledge.	Yes	~ Conduct testing in river & bores for pesticides and herbicides after wet season prior to pumping from the river and again during the dry season (mid-year). ~Terrain currently completing a study on the effects of pesticides to the catchments water supply. Results expected in a 2-year timeframe.	Water Department - Consult with WTP Operator to organise sampling and testing. Terrain - Communicate with to keep up to date with their progress.
5	River and Groundwater Systems	Spraying of aquatic weeds	Pesticides	~ Controlled spraying by Environmental Health Officers	Nil	Effective, spraying is controlled and is monitored to avoid fish kills, etc.	Yes		
6	River and Groundwater Systems	Contamination from crop dusting	Pesticides & Herbicides	~ Pesticide/Herbicide analysis every 6 months to monitor levels in source water. No issues have been recorded.	Nil		Yes		

	1	2	3	4	5	6	7	8	9
	Scheme Component / Sub-component	**Hazardous Event**	**Hazard**	**Existing Preventive Measures / Barriers.**	**Which risk factor/s does the existing preventative measure/s impact on (i.e., likelihood &/or consequence)**	**How effective is/are the existing preventative measure/s & on what basis has this been determined?**	**Is the level of residual risk acceptable**	**Proposed measures to reach an acceptable level or residual risk**	**Responsible Work Unit/Organisation (& arrangements with external organisation if applicable)**
7	River and Groundwater Systems	Runoff from rural stormwater (open earth drains from grazing land, sugar cane, etc) during rainfall events	Physical	~ During periods of high turbidity in the river, it is not used as a water source	Likelihood	Effective, groundwater shows good filtration during rainfall events and turbidity levels are significantly lower than river water.	Yes		
8	River and Groundwater Systems	Flooding	Bacteria, Chemical and Physical	~ No existing preventative measures.	Consequence	Effective, good knowledge of local flooding which allows operators to be prepared. Resorting to groundwater has proved to be effective and increasing chlorine residual allows the consequences of a possible contamination to be reduced. It is recognised that improvements could be made to the boreheads.	No	~ Improve borehead construction under the borehead replacement program	Water Department (as per item 6)
9	River and Groundwater Systems	Inadequate well or bore head protection	Bacteria Chemical	~ Chemical testing to monitor any changes in groundwater that could result from infiltration of flood water through inadequate well or bore head.	Nil	No existing preventative measure, action to be taken.	No	~ Improve borehead construction under the borehead replacement program	Water Department
10	River	Runoff from rural stormwater (open earth drains from grazing land, sugar cane, etc) during rainfall events	Bacteria	~ During periods of high turbidity in the river, it is not used as a water source	Likelihood & Consequence	Effective, groundwater shows good filtration during rainfall events.	Yes		
11	Groundwater	Discharge from urban stormwater during rainfall events	Bacteria Chemical Turbidity Microbial	~ Sediment Traps for stormwater systems	Nil	Ok, some stormwater systems have sediment traps in place which minimise the risk of harmful substances (e.g., Oil, grease) exiting the outlet.	Yes	~ Terrain currently completing a study on the effects of pesticides to the catchments water supply. Results expected in a 2-year timeframe. ~ Improve borehead construction under the borehead replacement program	As per item 2 and 4
12	River and Groundwater Systems	Bushfires	Microbial, Chemical and Physical	~ Coordinated Fire Management Plan (Rural Fire Brigade) ~ Fire restrictions during high fire risk season ~ Areas of high fire risk determined in Planning Scheme	Likelihood	Effective, bushfire risk in our catchment is minimal.	Yes		
13	River and Groundwater Systems	Wildlife (feral, native, stray and unfenced farm animals)	Microbial Bacteria Turbidity Taste and Odour Compounds	~ Aeration→ Sedimentation → Filtration ~ Chlorination ~ Feral animal prevention program	Nil	Ok, a review of the feral animal prevention program could be undertaken to better understand the programs aims and its effectiveness.	Yes	~ Review effectiveness of feral animal prevention programs (in conjunction with Health Department)	Health Department in conjunction with the Water Department
14	River and Groundwater Systems	Accidental or intentional contamination of surface or groundwater	Harmful substances (not identified)	~ Chemical Monitoring helps to identify any abnormalities within the water sources. If contamination is to occur then monitoring should allow us to identify the issue.	Nil	No existing preventive measures, proposed Action Plan to help minimise the consequence of the risk.	Yes	~ Develop action plan	Water Department
15	River and Groundwater Systems	Major Spills and accidental spillage of harmful contaminant	Unidentified Chemical	~ If to occur, appropriate action taken. ~ Monitoring after incident	Nil	No existing preventive measures, proposed Action Plan to help minimise the consequence of the risk.	Yes	~ Develop action plan	Water Department (as per item 8)

	1	2	3	4	5	6	7	8	9
	Scheme Component / Sub-component	**Hazardous Event**	**Hazard**	**Existing Preventive Measures / Barriers.**	**Which risk factor/s does the existing preventative measure/s impact on (i.e., likelihood &/or consequence)**	**How effective is/are the existing preventative measure/s & on what basis has this been determined?**	**Is the level of residual risk acceptable**	**Proposed measures to reach an acceptable level or residual risk**	**Responsible Work Unit/Organisation (& arrangements with external organisation if applicable)**
16	River and Groundwater Systems	Industrial chemical waste discharge contaminating groundwater &/or surface water	Chemical Contamination	~ Chemical Monitoring (Standard Water Analysis) ~ Processes in place through ERA.	Nil	No, there needs to be some communication between Council and large industrial companies within the catchment.	No	~ No control over private enterprise. ~ Continue to monitor chemical levels in raw water supplies.	Water Department will need to do some investigations on the possible chemical discharge from industrial companies.
17	Groundwater	Geology in relation to groundwater	TurbidityChemical	~ Chemical Monitoring (Standard Water Analysis) to gain understanding of natural presence of metals/chemicals in source water and monitor to identify any significant changes.	Nil	The existing preventative measures are effective in determining the possible risks associated with the geology in relation to groundwater and what possible substances could be present, but the consequence still requires further action to be taken.	Yes		
18	River and Groundwater Systems	Aluminium	Aesthetic	~ Monitoring for presence of aluminium in source water. ~ Treatment processes to eliminate presence in drinking water.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
19	River and Groundwater Systems	Barium	Metal	~ Monitoring for presence of barium in source water. ~ Treatment processes to eliminate presence in drinking water.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
20	River and Groundwater Systems	Boron	Metal	~ Monitoring for presence of boron in source water. ~ Treatment processes to eliminate presence in drinking water.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
21	River and Groundwater Systems	Manganese	Metal	~ Monitoring for presence of manganese in source water. ~ Treatment processes to eliminate presence in drinking water.	Likelihood	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
22	River and Groundwater Systems	Nickel	Metal	~ Monitoring for presence of nickel in source water. ~ Treatment processes to eliminate presence in drinking water.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
23	Groundwater	Zinc	Metal	~ Monitoring to identify trends and presence in groundwater. ~ Treatment processes	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
Catchment and Groundwater Systems - Applicable to SCHEME 1 only									
24	River & Groundwater Systems	Runoff from forestry production	Pesticides/ Herbicides and Physical	~ Pesticide/Herbicide analysis every 6 months	Nil	Effective, existing monitoring data shows that the pesticide levels are minimal with little or no detection, but some herbicides have been identified. Further testing for presence in raw water data would increase knowledge.	Yes	~ Conduct testing in river & bores for pesticides and herbicides after wet season prior to pumping from the river and again during the dry season (mid-year). ~Terrain currently completing a study on the effects of pesticides to the catchments water supply. Results expected in a 2-year timeframe.	As per item 2

	1	2	3	4	5	6	7	8	9
	Scheme Component / Sub-component	Hazardous Event	Hazard	Existing Preventive Measures / Barriers.	Which risk factor/s does the existing preventative measure/s impact on (i.e., likelihood &/or consequence)	How effective is/are the existing preventative measure/s & on what basis has this been determined?	Is the level of residual risk acceptable	Proposed measures to reach an acceptable level or residual risk	Responsible Work Unit/Organisation (& arrangements with external organisation if applicable)
25	Groundwater	Copper	Metal	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of copper in our system. ~ Existing treatment process minimises hazard.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
26	River & Groundwater Systems	Iron	Metal	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of iron in our system. ~ Existing treatment process minimises hazard.	Likelihood		Yes		
27	Groundwater	Lead	Metal	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of lead in our system. ~ Existing treatment process minimises hazard.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
28	River	Molybdenum	Metal	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of molybdenum in our system. ~ Existing treatment process minimises hazard.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
Catchment and Groundwater Systems - Applicable to SCHEME 2 only									
29	Groundwater	Saline intrusion of coastal aquifers	Loss of Supply	~ Monitoring of sodium and chloride levels in raw water. ~ Reduce pumping rate.	Nil	Effective, by monitoring we are able to maintain a fair understanding on the nature of the aquifer.	Yes		
30	Groundwater	Iron	Metal	~ Monitoring ~ Treatment processes	Likelihood		Yes		
Catchment and Groundwater Systems - Applicable to SCHEME 3 only									
31	Groundwater	Saline intrusion of coastal aquifers	Loss of Supply	~ Monitoring of sodium and chloride levels in raw water. ~ Reduce pumping rate.	Nil		Yes	~ Current proposal for funding in place to connect the Forrest Beach Water Supply to Scheme 1 & 2 which will allow a backup water supply if groundwater quality is not suitable for consumption.	Water Department
32	Groundwater	High iron levels in groundwater	Iron	~ Treatment processes including coagulation (addition of lime) ~ Monitoring	Likelihood	Ok, treatment process has decreased the likelihood but further action still needs to be taken.	No	~ Current proposal for funding in place to connect the Forrest Beach Water Supply to Scheme 1 & 2 which will allow a backup water supply if groundwater quality is not suitable for consumption. ~ Looking at new filtration systems	Water Department
33	Groundwater	Arsenic	Metal	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of arsenic in our system. ~ Existing treatment process minimises hazard.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
34	Groundwater	Beryllium	Metal	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of beryllium in our system. ~ Existing treatment process minimises hazard.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		

	1	2	3	4	5	6	7	8	9
	Scheme Component / Sub-component	Hazardous Event	Hazard	Existing Preventive Measures / Barriers.	Which risk factor/s does the existing preventative measure/s impact on (i.e., likelihood &/or consequence)	How effective is/are the existing preventative measure/s & on what basis has this been determined?	Is the level of residual risk acceptable	Proposed measures to reach an acceptable level or residual risk	Responsible Work Unit/Organisation (& arrangements with external organisation if applicable)
35	Groundwater	Chromium	Metal	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of chromium in our system. ~ Existing treatment process minimises hazard.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
36	Groundwater	Copper	Metal	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of copper in our system. ~ Existing treatment process minimises hazard.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
37	Groundwater	Lead	Metal	~ Undertook monitoring as part of the Snapshot program to help gain an understanding of lead in our system. ~ Existing treatment process minimises hazard.	Nil	Effective, monitoring shows that the likelihood of occurring is minimal.	Yes		
TREATMENT SYSTEMS - APPLICABLE TO ALL SCHEMES									
38	WTP	Cyclone greater then than Category 2	Plant Shutdown	~ Most schemes have more than one water supply source. Scheme 1 has two WTP's which provides two water supplies to the Ingham district. Scheme 2 is connected to Scheme 1 and also has two WTP's. Forrest Beach is the only standalone WTP, but depending on funding there is a proposed connection to Scheme 1 and 2.~ Built in redundancy~ Emergency Planning requires people to have 3 days of provisions.	Nil	Ok, cannot control the likelihood, but further measures could be taken to reduce the consequence during an event.	Yes	~ Review Emergency Planning~ Connection to Forrest Beach	Water Department
39	WTP	Loss of power greater than 7 days	Plant Shutdown	Backup generators	Consequence	Good back up procedures in place, effective in keeping the water supply running.	Yes	~ Turn 40 kVa to a mobile trailerable generator.	Water Department

	1	2	3	4	5	6	7	8	9
	Scheme Component / Sub-component	Hazardous Event	Hazard	Existing Preventive Measures / Barriers.	Which risk factor/s does the existing preventative measure/s impact on (i.e., likelihood &/or consequence)	How effective is/are the existing preventative measure/s & on what basis has this been determined?	Is the level of residual risk acceptable	Proposed measures to reach an acceptable level or residual risk	Responsible Work Unit/Organisation (& arrangements with external organisation if applicable)
40	WTP	Flooding	Plant Shutdown (pending on magnitude of flooding)	~ All water treatment plants are constructed above any known flood event. ~ Most WTP can be attended by competent persons who live in the vicinity of the area, otherwise access by helicopter is required ~ Most supplies have more than one water supply source. Scheme 1 has two WTP's which provides two water supplies to the Ingham district. Scheme 2 is connected to Scheme 1 and also has two WTP's. Forrest Beach is the only standalone WTP, but depending on funding there is a proposed connection to Scheme 1. ~ Built in redundancy ~ Emergency Planning requires people to have 3 days of provisions.	Consequence	Effective, but some more organisation prior to wet season could help decrease the consequence.	Yes	~ Cyclone/Flooding season preparations	Water Department - WTP Operators
41	WTP	Chemical Dosing Failures	Bacterial Chemical	~ Telemetry system monitoring (alarms are set well before any critical levels) ~ Scada ~ Every plant is inspected everyday ~ Built in redundancy	Likelihood & Consequence	Effective, the Scada system in place has proven to be an effective way in controlling and monitoring the water supply. Daily monitoring is an effective measure to ensure all systems are operating efficiently.	Yes		
42	WTP	Inadequate mixing	Bacterial Chemical	~ Recirculation systems ~ Continuous online monitoring ~ Daily inspections	Likelihood & Consequence	Effective, the Scada system in place has proven to be an effective way in controlling and monitoring the water supply. Daily monitoring is an effective measure to ensure all systems are operating efficiently.	Yes		
43	WTP	Inadequate filter operation	Bacterial Loss of Performance	~ Replacement of sand media when required. ~ Daily inspections	Likelihood	Effective, chemical and bacterial monitoring shows that filtration systems are effective.	Yes		
44	WTP	Open filtration system causing growth of cyanobacteria	Cyanobacteria	Nil.	Nil	Possible issue within some treatment plants, measures will need to be put in place to minimise risk.	No	~ Testing during hot months of the year ~ Improvements to the aeration and filtration system	Water Department - WTP Operators
45	WTP	Ineffective disinfection	Bacteria	~ Daily checking of equipment ~ Online monitoring	Nil	Effective, the Scada system in place has proven to be an effective way in controlling and monitoring the water supply. Daily monitoring is an effective measure to ensure all systems are operating efficiently.	Yes		
50	WTP	Supply failure	Bacteria	~ Ensure adequate stock	Likelihood	Effective, but issue with number of suppliers for our region.	Yes		
51	WTP	Inadequate backup	Bacteria	~ Ensure emergency preparedness before cyclone/flood season	Likelihood	Effective, WTPs are generally inaccessible during flooding so it is important to ensure adequate stock is available at each plant.	Yes		

	1	2	3	4	5	6	7	8	9
	Scheme Component / Sub-component	**Hazardous Event**	**Hazard**	**Existing Preventive Measures / Barriers.**	**Which risk factor/s does the existing preventative measure/s impact on (i.e., likelihood &/or consequence)**	**How effective is/are the existing preventative measure/s & on what basis has this been determined?**	**Is the level of residual risk acceptable**	**Proposed measures to reach an acceptable level or residual risk**	**Responsible Work Unit/Organisation (& arrangements with external organisation if applicable)**
46	WTP	Failure of alarms and monitoring equipment	Overdose/ Ineffective dose	~ Daily checking of equipment and manual confirmation of testing equipment ~ Calibration of instruments	Likelihood	Effective, checking and calibration process has proven to keep equipment well maintained to reduce failures.	Yes		
47	WTP	Sabotage	Unknown	~ Security fencing ~ Daily checking	Nil	Effective, no previous sabotage events to water supply, all facilities locked with security fencing.	Yes		
48	WTP	Formation of disinfection by-products	Trihalomethanes	~ Occasional testing	Nil	Ok, more frequent testing should be done to increase certainty.	Yes	~ Enforce testing on a yearly basis.	WTP Operators
49	WTP	Significant flow variations through water treatment system	Chemical	~ Online monitoring	Likelihood	Effective, online monitoring has	Yes		
TREATMENT SYSTEMS - Scheme 2 Lower Herbert Water Supply									
54	WTP	Storm Surge	Plant Shutdown	~ Backup supply between both WTP and connection to Ingham Water Supply	Consequence	Effective, connection to scheme 1 allows adequate backup in the event of a storm surge.	Yes		
TREATMENT SYSTEMS - Scheme 3 Forrest Beach Water Supply									
56	WTP	Groundwater unsuitable for treatment	Chemical Bacteria	~ Monitoring to ensure suitability of groundwater	Nil	Ok, monitoring allows understanding of groundwater, but not an effective measure in reducing the risk.	Yes	~ Current application to government for funding in order to connect into Scheme 1 and 2.	
57	WTP	Storm Surge	Plant Shutdown	Nil	Nil	No existing preventative measures. Could be catastrophic if to occur and no existing backup supply.	Yes	~ Current application to government for funding in order to connect into Scheme 1 and 2.	
SERVICE RESERVOIRS AND DISTRIBUTION SYSTEMS - APPLICABLE TO ALL SCHEMES									
59	Reservoir	Biofilms, sloughing and resuspension, regrowth	Cyanotoxin	~ Clean tanks yearly and sealing	Likelihood	Effective, good maintenance procedures on tanks.	Yes		
60	Reservoir	Intentional contamination of reservoir (sabotage)	Unknown	~ Security fencing ~ Daily checking	Nil	Effective, no previous sabotage events to water supply, all facilities locked with security fencing.	Yes		
61	Reticulation	Faulty backflow prevention devices installed	Harmful Substance (not identified)	~ All devices have to be tested every year. ~ Local authorities have a register.	Consequence	Effective, pressure monitoring shows that losses of pressure in the main to allow for this would be very rare.	Yes	Very rare for loss of pressure in the main to create the vacuum.	
62	Reticulation	Corrosion of reservoirs and pipe system	Loss of Supply	~ Inspection programs, building maintenance program, daily site visits	Likelihood	Effective, maintenance has prevented any major corrosion issues.	Yes		
63	Reticulation	Cyclone & Flooding	Bacteria	~ When a significant cyclone is forecasted for the district the water supply is turned off until possible breaks can be assessed.~ Boil alert when turning on reticulation	Consequence	Effective, in the cyclone Yasi event it was an effective measure to prevent contamination of supply and to ensure levels in the reservoirs remained stable.	Yes		
64	Reticulation	Aged pipes, infrastructure (pipes break or leak)	Bacteria	~ Flushing of hydrants	Likelihood	Effective, infrastructure is monitored for frequency of breaks and flushed regularly in areas where high detention periods could be expected.	Yes		

	1	2	3	4	5	6	7	8	9
	Scheme Component / Sub-component	Hazardous Event	Hazard	Existing Preventive Measures / Barriers.	Which risk factor/s does the existing preventative measure/s impact on (i.e., likelihood &/or consequence)	How effective is/are the existing preventative measure/s & on what basis has this been determined?	Is the level of residual risk acceptable	Proposed measures to reach an acceptable level or residual risk	Responsible Work Unit/Organisation (& arrangements with external organisation if applicable)
65	Reticulation	Inadequate repair and maintenance, inadequate system flushing	Bacteria	~ Flushing critical points in the system	Likelihood	Effective, current system in place for flushing of critical points.	Yes		
66	Reticulation	Commissioning new mains	Bacteria	~ Flush hydrants ~ Sterilise	Likelihood	Effective, not a frequent thing in our district but measures have proven to be effective.	Yes		
67	Reticulation	Stagnation	Bacteria	~ Flushing of hydrants	Likelihood	Effective, flushing of hydrant in critical points to allow flow in areas that are expected to have long detention periods.	Yes		
68	Reticulation	Cleaning of mains (use of improper equipment, incorrect methods, lack of cleaning strategy)	Bacteria	~ Scouring and flushing ~ Supervision during cleaning process	Likelihood	Effective, supervision by managers during cleaning process has proven to be effective.	Yes		
SERVICE RESERVOIRS AND DISTRIBUTION SYSTEMS - Scheme 2 Lower Herbert Water Supply									
69	Reticulation	High pH levels in areas that are acceptable to long detention times.	pH	~ Flushing of the water main from hydrant monthly ~ Quarterly monitoring.	Likelihood	Effective, flushing of hydrant in critical points to allow flow in areas that are expected to have long detention periods.	Yes		
70	Reservoir	Animals access through overflow drains, etc.	Bacteria		Nil	No existing preventative measure, but is not a problem.	Yes		
SERVICE RESERVOIRS AND DISTRIBUTION SYSTEMS - Scheme 3 Forrest Beach Water Supply									
71	Reservoir	Rainwater ponding on reservoir roof	Bacteria		Nil	No existing preventative measure, action to be taken.	No	~ Investigate costs into sealing roof	Manager of Water Department

5.2 Operational and Maintenance Procedures

For each existing preventative measure or action, an operation and maintenance procedure should be in place to ensure that the measures/actions are implemented correctly. Currently Hinchinbrook Shire Council does not have any existing procedures that are updated and in the format that is required for this Drinking Water Quality Management Plan. This is a recognised issue and it has been included in the Risk Improvement Plan.

Council currently has informal procedures in place which are stored on the council server. These currently do not exist in an Operations and Procedures Manual, but instead exist as operational log books, with tasks being completed under the supervision of the Works Supervisor. The process in documenting all tasks into an Operation and Procedure Manual is a complex and difficult task, which will require a collaborated effort between all staff within the Water Department.

An organisational chart is shown in Figure 5.1, which helps to understand the department structure and how the day-to-day operation works. This should hopefully assist in understanding the operation of the Water Supply within Hinchinbrook Shire Council. As per Table 5-5 a summary of Water Quality Management Information is provided, which lists all documents in relation to the day-to-day operation of the water supply.

A list of Operation and Maintenance Procedures that is to be developed is provided below. Please note that this only preliminary and is subject to change. Appendix J contains a list of procedures currently under development.

- Raw water selection procedure:
    - Intra-scheme treated water selection:
        - Includes water source selection during dry and wet periods;
        - Priority use of the Ingham Depot bores, then the 2 Herbert River Pump Station site bores, then the Herbert River. This is to manage Protozoa;
        - Priority use of the bores in the remaining schemes in terms of turbidity and other water quality issues such as PFAS.
        - Check of Trihalomethane and Chlorate levels for Scheme No.1 at the River Pump Station Reservoir and the Halifax Depot. Adjustments of chlorine concentration and tank water level if required.
    - Inter-scheme treated water selection:
        - Principally selection of Ingham scheme water to the 2 other schemes;
        - Back feed from the Lower Herbert and Forrest Beach schemes to Ingham.
- Backflow Prevention
- Commissioning New Main
- Connection of Water Services
- Decommissioning a Bore
- Detection of E. Coli in Drinking Water
- Facility Security
- Groundwater Bore Operation and Maintenance
- Hydrant Maintenance
- Maintenance of Floating Cover on Reservoir
- On Call Monitoring
- Repair of Mains Break
- Responding to Customer Water Quality Complaints
- Sand Filter Monitoring and Maintenance
- Sedimentation Channel Maintenance
- Sodium Hypochlorite – storage, handling, monitoring and ordering.
- Sodium Hypochlorite Dosing Systems
- Super chlorination of Water Mains
- Valve Maintenance
- Water Interruption Notification
- Water Main Flushing

- Water Main Installation
- Water Quality Sampling
- Water Treatment Plant Operating Manual – Forrest Beach
- Water Treatment Plant Operating Manual – Halifax
- Water Treatment Plant Operating Manual – Ingham Depot
- Water Treatment Plant Operating Manual – Ingham Pump Station
- Water Treatment Plant Operating Manual – Macknade
- Working with Asbestos Cement (AC) Pipes

5.2.1 Sand Filter Monitoring and Maintenance

Along with disinfection, sand filter monitoring and maintenance are key critical control point activities. The paragraphs below describe the operational actions that are routinely undertaken.

Monitoring - All WTPs:

- Daily attendance;
- Sand replacement trigger – low filter rates after a rake and after a skim;
- Low flow rate trigger currently determined manually by operator judgement by reviewing clear water storage level, and if filter bed flooding is starting to occur;
- Operational checklists for weekends used for all WTPs and are also included in Appendix J;

Operations and Maintenance:

- Ingham Depot:
    - 4 Filters are used and are alternated with 2 on and 2 off;
    - The filters are 850 mm deep;
    - Raked once per week;
    - Skimming is not required;
    - The sand was replaced recently after approximately 20 years of service, but was based on 1 bore in use. There are now 2 bores so the sand is expected to last only 10 years;
    - Ground reservoirs 1 and 2 can be individually isolated in the event that breached water enters a one of them.

- Macknade WTP:
    - 2 Filters are used and are alternated with 1 on and 1 off;
    - The filters are 850 mm deep;
    - Raked twice per week;
    - Skimming of the top 200 mm occurs at 6 monthly intervals usually in October/November before the dry season, and after the wet season;
    - The sand is replaced every 3-4 years.

- Forest Beach WTP:
    - 2 Filters are used and are alternated with 1 on and 1 off;
    - The filters are 850 mm deep;
    - Raked minimum twice per week but sometime more as the plant has issues with iron;
    - Skimming of the top 200 mm occurs at 6 monthly intervals usually in October/November before the dry season, and after the wet season;
    - The sand is replaced every 3-4 years.

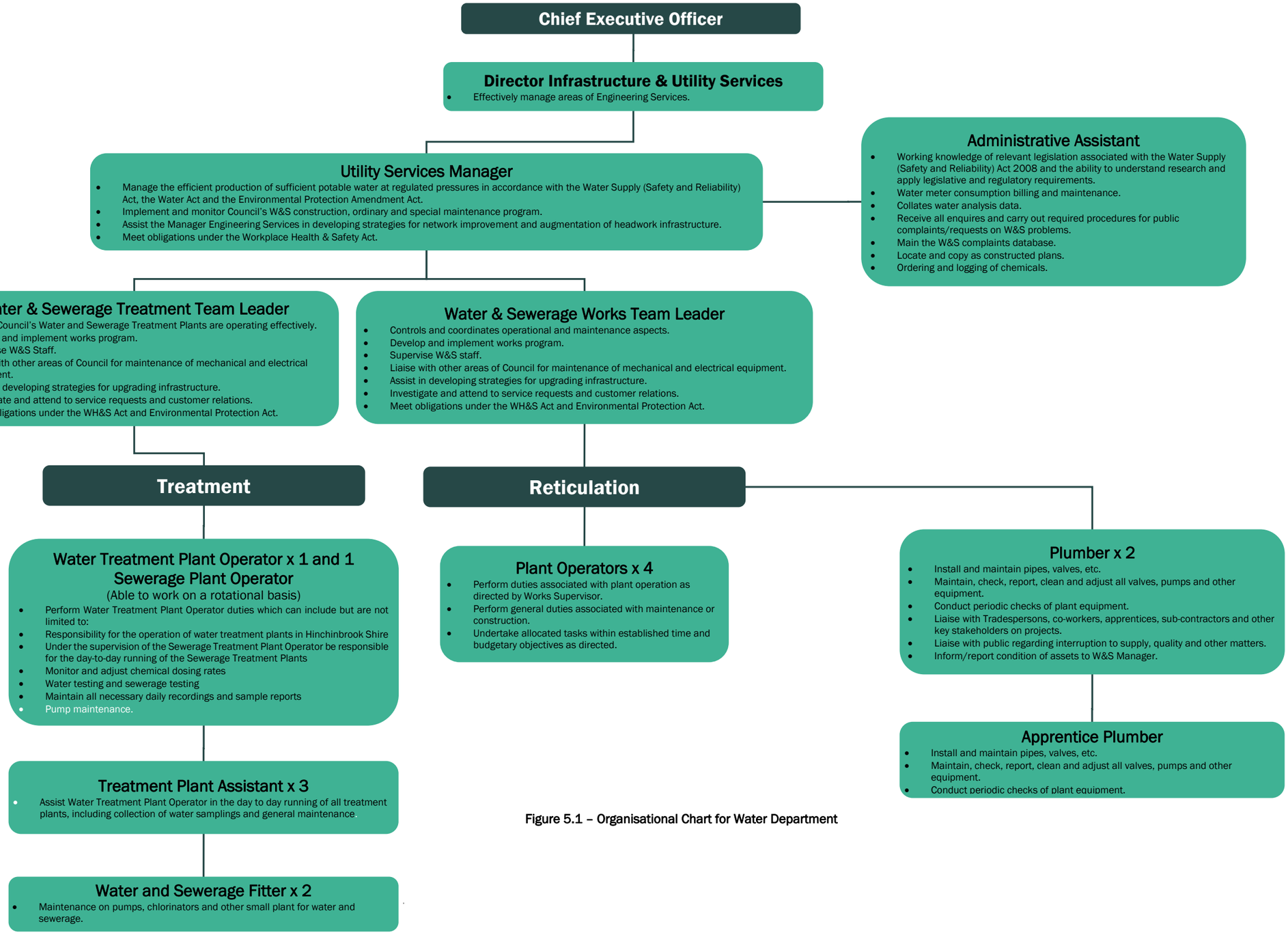


Figure 5.1 – Organisational Chart for Water Department

5.3 Management of Incidents and Emergencies

Table 5-2 provides an explanation of how incident and emergency levels are described and how they might be interpreted, while Table 5-3 outlines specific incidents and emergencies and how they are managed and who is responsible.

Table 5-2 Incident/Emergency Levels

Incident/ Emergency Level	Description of Level
Level 5	Widespread outbreak of waterborne disease. Declared disaster that disrupts normal operation of supply – Cyclone, major flooding, loss of power. Supply has been turned off or not available. Gross exceedance of ADWG guideline of a chemical parameter that poses a serious threat to consumers. Any cybersecurity activity that causes a Level 5 water quality incident.
Level 4	High level of pathogens detected in reticulation/reservoir. E.g., E.coli greater than 5CFU/100mL. Failure of infrastructure – severe or emergency level supply restrictions required to ensure continuity of supply. Any cybersecurity activity that causes a Level 4 water quality incident.
Level 3	Mid-range detection of E Coli and other pathogens. E.g., E. Coli between 1-5 CFU/100mL. Failure of infrastructure – short term water restrictions may be required. Minor restrictions of ADWG guideline of a chemical parameter. Minor Flooding. Any cybersecurity activity that causes a Level 3 water quality incident.
Level 2	Failure of infrastructure or source supply (possible water quality issue, e.g., Bore water has high turbidity). Still able to provide drinking water but there will be exceedances in ADWG aesthetic guideline. Any cybersecurity activity that causes a Level 2 water quality incident.
Level 1	Exceedance of operational limit has occurred but managed through operational and maintenance procedures. Any cybersecurity activity that causes a Level 1 water quality incident.

Table 5-3 Management of Incidents and Emergencies and Emergency Contact Details and Protocols

Management of Incidents and Emergences				Emergency Contact Details and Protocols		
Level	**Incident or Emergency**	**Summary of actions to be taken**	**Position responsible**	**Business Unit/ Organisation**	**Contact Person(s)**	**Communication protocols**
5	Cyclone, that has an expected path within a 200km radius of the shire	• Communicate with the Bureau of Meteorology of the intensity and expected impact time. • Alert public to fill water bottles, etc in case of the need to turn off water reticulation. • Ensure all reservoirs are at capacity prior to the event. • If destructive path of cyclone is within range of the shire and above category 2 proceed with turning off the water supply. • Ensure communication with the public on expected time the water reticulation will be turned on. • Check for breakages from fallen trees. • If ok, turn on water supply and monitor for any significant losses in storage.	Utility Services Manager WTP Operator	Water & Waste Water / Hinchinbrook Shire Council Bureau of Meteorology (for updates on event) Local Disaster Management Group	Utility Services Manager Peter Martin (07) 4776 4777 Bureau of Meteorology Townsville Field Meteorological Offices (07) 4779 5999 Acting CEO of HSC James Stewart (07) 4776 4600	- Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F.
5	Major Flooding	• Communicate with the Bureau of Meteorology for expected rainfall that could influence the catchment. • Monitor river heights. • Ensure each treatment plant has adequate supply and organise for staff to monitor plant if possible.	Utility Services Manager WTP Operator	Water & Waste Water / Hinchinbrook Shire Council Bureau of Meteorology (for updates on event) Local Disaster Management Group	Utility Services Manager Peter Martin (07) 4776 4777 Bureau of Meteorology Townsville Field Meteorological Offices (07) 4779 5999	- Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F.

Management of Incidents and Emergences				Emergency Contact Details and Protocols		
Level	**Incident or Emergency**	**Summary of actions to be taken**	**Position responsible**	**Business Unit/ Organisation**	**Contact Person(s)**	**Communication protocols**
5	Loss of power for extended period of time (usually associated with Cyclones, severe weather, etc)	• Communicate with Ergon Energy to determine extent of damage and expected time for infrastructure to be fixed. • Use backup generators.	Utility Services Manager WTP Operator	Water & Waste Water / Hinchinbrook Shire Council Ergon Energy	Utility Services Manager Peter Martin (07) 4776 4777 Ergon Energy 13 10 46	- Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F.
5	Major Earthquake	• A major earthquake can be associated with a Tsunami, so communication with the Bureau will need to take place to be made aware of the impending tsunami that is likely to occur. • Buildings will need to be checked for any structural damage and all pumps, electrical equipment, etc will need to be checked for any faults.	Utility Services Manager WTP Operator	Water & Waste Water / Hinchinbrook Shire Council Local Disaster Management Group Bureau of Meteorology (for updates on event)	Utility Services Manager Peter Martin (07) 4776 4777 CEO of HSC Kelvin Tytherleigh Director of Infrastructure & Utility Services James Stewart (07) 4776 4600 Bureau of Meteorology Townsville Field Meteorological Offices (07) 4779 5999	- Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F.

Management of Incidents and Emergences				Emergency Contact Details and Protocols		
Level	**Incident or Emergency**	**Summary of actions to be taken**	**Position responsible**	**Business Unit/ Organisation**	**Contact Person(s)**	**Communication protocols**
5	Tsunami	• If the Bureau of Meteorology has issued a Tsunami warning for the Hinchinbrook region, an immediate evacuation would occur until the tsunami has passed. • It is not until the tsunami has passed until the extent of the damage can be assessed. It is quite likely that infrastructure in Lower Herbert and Forrest Beach would sustain significant damage, in which actions will need to be taken to assess the damage in order of priority.	Utility Services Manager WTP Operator	Water & Waste Water / Hinchinbrook Shire Council Local Disaster Management Group Bureau of Meteorology (for updates on event)	Utility Services Manager Peter Martin (07) 4776 4777 CEO of HSC Kelvin Tytherleigh Director of Infrastructure & Utility Services James Stewart (07) 4776 4600 Bureau of Meteorology Townsville Field Meteorological Offices (07) 4779 5999	- Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F.
5	Fire, possibly associated with bush fire but more than likely caused by equipment malfunction, etc	• Contact the Queensland Fire Department immediately to cease fire and assess any damage that it may have cause. • Check building for any structural damage and ensure it is safe to entre. • Assess equipment that has been damaged and if it can be replaced in order to keep the plant operational. • If damage is extensive and to the entire plant, alternative options will need to be made. Scheme 1 and 2 are interconnected so there are 4 treatment plants in total that can be used. If damage was to occur to the Forrest Beach Treatment Plant, high water restrictions will need to be set to ensure the reservoir levels has capacity for the required number of days.	Utility Services Manager WTP Operator	Water & Water Waste / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	- Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F. - In the event of equipment malfunction, isolate the equipment and use appropriate fire extinguisher to put out the fire. Contact Queensland Fire Services as soon as possible.
5	Cybersecurity Breach	Same as Level 3 cybersecurity actions, plus Level 5 Disaster actions.	Utility Services Manager WTP Operator	Water & Water Waste / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F.

Management of Incidents and Emergences				Emergency Contact Details and Protocols		
Level	**Incident or Emergency**	**Summary of actions to be taken**	**Position responsible**	**Business Unit/ Organisation**	**Contact Person(s)**	**Communication protocols**
4	Detection of E. Coli greater than 5 CFU/100mL in reticulation	Boil Water Alert as per Queensland Health Guidelines	Manger Water & Waste Water Manager Environmental Health Services WTP Operator	Water & Waste Water / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	- Boil Water Alert as per Queensland Health Guidelines - Report exceedance to Regulator
4	Cybersecurity Breach	Same as Level 3 cybersecurity actions, plus Level 4 Disaster actions.	Manger Water & Waste Water Manager Environmental Health Services WTP Operator	Water & Waste Water / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F.
3	Detection of 1-5 CFU/100mL E. Coli in reticulation	Boil Water Alert as per Queensland Health Guidelines	Manger Water & Waste Water WTP Operator	Water & Waste Water / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	- Boil Water Alert as per Queensland Health Guidelines - Report exceedance to Regulator
3	PFAS in reticulation	• Turn off water supply. • Restrict water usage. • Flush reticulation lines. • Switch raw water sources, if not possible, switch to treated water sources from another scheme.	Manger Water & Waste Water WTP Operator	Water & Waste Water / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	- Report exceedance to Regulator
3	Minor Flooding	• Scheme 2 Lower Herbert Water Supply could become isolated.	Manager Water & Sewerage WTP Operator Labourer	Water & Waste Water / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	- Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F.
3	Cybersecurity Breach	• Level 3 Disaster actions. • Level 2 cybersecurity actions, plus: ○ Detailed investigation attack source and entry point. ○ Full network review. ○ Review master control and actions.	Manager Water & Sewerage WTP Operator Labourer	Water & Waste Water / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	- Refer to Local Disaster Management Plan in Appendix H and Evacuation Sub Plan in Appendix F.

Management of Incidents and Emergences				Emergency Contact Details and Protocols		
Level	**Incident or Emergency**	**Summary of actions to be taken**	**Position responsible**	**Business Unit/ Organisation**	**Contact Person(s)**	**Communication protocols**
2	Water Main/ Service Break	• Identify broken main and isolate area. • Repair main. • Turn water on and flush hydrant.	WTP Operator Labourer	Water & Waste Water / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	- Works requested issued by public or if identified by council staff, Manager Water and Waste Water notified. - If after hours on call person notified. - Labours sent to job site. - When complete Manager Water and Waste Water notified.
2	High levels of Turbidity in source water	• Follow standard treatment process. • For scheme 1, if turbidity has increased in the source water, use alternative sources.	WTP Operator	Water & Waste Water / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	- WTP Operator to contact Utility Services Manager as soon as possible. - If exceeds ADWG, report to Regulator.
2	Cybersecurity Breach	Level 1 cybersecurity actions, plus: • Contact Police if relevant • Contact Australian Cyber Security Centre for all external activity 1300 292 371 • Contact insurer • Investigate and address attack source and entry point	WTP Operator	Water & Waste Water / Hinchinbrook Shire Council	Utility Services Manager Peter Martin (07) 4776 4777	- WTP Operator to contact Utility Services Manager as soon as possible. - Report to Regulator.
1	Exceedance in drinking water parameter in source water (incl PFAS)	• Follow standard treatment process. • Monitor to ensure effective treatment.	WTP Operator	Water Department	Utility Services Manager Peter Martin (07) 4776 4777	- WTP Operator to contact Utility Services Manager as soon as possible. - Report exceedance to Regulator if required.
1	Cybersecurity Breach	• Rectify water quality incident • Contact Police if relevant • Contact Australian Cyber Security Centre for all external activity 1300 292 371 • For internal unintentional cybersecurity breach: o Check master controls and actions o Determine lack of cyber security control o Rectify control to prevent further incidents	WTP Operator	Water Department	Utility Services Manager Peter Martin (07) 4776 4777	- WTP Operator to contact Utility Services Manager as soon as possible. - Report to Regulator.

5.3.1 Communication Protocol – Notifying the Consumer

Local radio, newspaper and television stations are generally used to communicate with the public. A more direct approach that has been previously used in the event of a cyclone is a service provided by Telstra that allows a SMS Message or recorded phone message (landlines) be distributed to an area specified by council. This area is normally transferred to Telstra using a KML file produced in council's GIS system. In the event of a major detection of E. Coli that would require a boil water alert, it is intended that this message be used to broadcast the required actions.

5.3.2 Communication Protocol – Notifying the Regulator

The Regulator must be contacted in the event of a water quality incident. When an event occurs, the following protocol shall be followed:

Report details to:

6 Who	7 Within 3 Hours 9 Phone	8 Within 24 Hours and at Completion of the Investigation 10 Email
Water Supply Regulator	1300 596 709: Verbal report: • Type of incident • Service Provider details • Affected scheme • When and where • Immediate corrective actions taken	DrinkingWater.Reporting@dnrme.qld.gov.au: Incident Forms – Either: a) WSR507 – Notification of a Drinking Water Event or detection of a parameter with no water quality criteria – Initial notification then Investigation Report. b) WSR503 – Drinking water quality : incident reporting – Part A then Part B. c) Notice of non-compliance with water quality criteria – drinking water – Initial notification then Investigation Report. Information Required: • Type of incident. • Service Provider details. • How was the incident investigated. • What was found. • Corrective actions. • Evidence that the incident has been resolved. • Declarations. • Other items as per to forms.

The reporting officer will need to know which form to use. This information can be found at: https://www.business.qld.gov.au/industries/mining-energy-water/water/industry-infrastructure/industry-regulation/drinking-water/incidents-reporting.

10.1 Risk Management Improvement Program

A Risk Management Improvement Plan (RMIP) is outlined in Table 5-4 and its aim is to:

- Manage any unacceptable residual risks identified by the hazard/risk assessment.
- Manages any gaps in the Plan.

- Improve those parts of the Plan where deficiencies in information (e.g.; catchments characterisation or uncertainties in the risk assessment) did not allow the criteria to be completely and accurately addressed.

The priorities for implementing aspects of the RMIP are based on the level of risk being addressed and the historical performance of the scheme. The priorities will range between Low, Medium, High and Very High.

Table 5-4 Risk Management Improvement Plan

	1	2	3	4	5	6	7	8	9	10	11	12
	Scheme	Scheme Component/ Sub-component	Hazard/ Hazardous Event	Proposed Preventative Measure	Priority	Actions			Target Date/s	Estimated Cost	Responsibility	Completed
						Interim	Short-term	Long-term				
	Reducing Residual Risk											
1	All	River and Groundwater Systems	Inadequate well or bore head protection	~ Improve borehead construction under the borehead replacement program	Medium	Investigate upgrade of Halifax Bores as first priority. Halifax has a total of 5 bores, but not all are used due to low pump rates and the possibility of saline intrusion. Cyclone Yasi has also damage fencing and there is currently a power supply issue to some bores.	Commence upgrade of Halifax Bores, if required seal and abandon unused bore.	Complete an inspection report for all bores (Macknade, Forrest Beach, Halifax and Como Road) and complete a works program for required maintenance.	2017	$200000 /year	Utility Services Manager Water Treatment Plant Operator	Completed
2	All	River and Groundwater Systems	Industrial chemical waste discharge contaminating groundwater &/or surface water	~ No control over private enterprise. ~ Continue to monitor chemical levels in raw water supplies.	Low	Investigate private enterprises within the district that could affect drinking water quality and the possible risks that they present. Those identified will be posing a direct risk to council's drinking water supply.		Continue with existing chemical monitoring and identify any significant changes.	Ongoing	Part of budget for employee (Project and Technical Support Officer)	Utility Services Manager Project and Technical Support Officer	Standard Water Analysis and Pesticide/Herbicide Testing has been continued. Depot WTP upgrade and now main source of supply – Bores Supply
3	3 (Forrest Beach)	Groundwater	High iron levels in groundwater	~ Current proposal for funding in place to connect the Forrest Beach Water Supply to Scheme 1 & 2 which will allow a backup water supply if groundwater quality is not suitable for consumption. ~ Looking at new filtration systems	Medium	Submit application for funding assistance to the government.	Advertise a tender for the works to be completed. If works can be done internally prepare quote.	Construction phase. Finalise project.	Funding dependant	$2.1 million	Utility Services Manager	Completed
4	All	WTP	Open filtration system causing growth of cyanobacteria	~ Testing during hot months of the year ~ Improvements to the aeration and filtration system	Very High	Provide temporary shading.	Issue Expression of Interest for consultants to investigate council's existing water treatment plants and what would be required for their upgrade.	Depending on results from consultant's report, budget for upgrades to commence.	Dependant on consultant's report. Report to be completed by Mid-2014	Dependant on consultant's report	Utility Services Manager	Completed
5	3 (Forrest Beach)	Reservoir	Rainwater ponding on reservoir roof	~ Investigate costs into sealing roof	Low	Prepare specification for require work. Complete cost estimate. WTP Operator to check condition of reservoir roof and conduct any remedial works that can be completed to reduce risk of contamination from ponding rainwater.	Advertise a tender for the works to be completed. If works can be done internally prepare quote.	Construction phase. Finalise project.	December 2013	$15,000	Utility Services Manager	Completed
6	2	WTP	Chemical Dosing Failure - Soda Ash	~ A pH test is always conducted prior to dosing with soda ash.	Medium	Investigate existing options and equipment.	Prepare site for installation.	Install and commission chemical dosing equipment.	June 2014	Utilise existing dosing pump and equipment	WTP Operator Utility Services Manager	Completed
7	1	River and Groundwater Systems	High Turbidity in river water	~ Installation of turbidity meter	High	Set control points and critical limits to be monitored.	Purchase and installation of turbidity meter.	Monitor turbidity in supply. If control points exceeded then river system is to shut off with use to only recommence when turbidity has reached an acceptable level.	Dec-17	$10,000	WTP Operator Utility Services Manager Project and Technical Support Officer	Completed
8	1	River and Groundwater Systems	Protozoa Control	~	High	Determine appropriate process and control points for testing of Protozoa.		Continual testing for protozoa. If protozoa are found, the relevant health authority to be advised and necessary measure put in place.	Jun-21	Included in budget for Project and Technical Support Officer	WTP Operator	Identified in DWQMP Audit completed on 28 April 2017.

	1	2	3	4	5	6	7	8	9	10	11	12
	Scheme	Scheme Component/ Sub-component	Hazard/ Hazardous Event	Proposed Preventative Measure	Priority	Actions			Target Date/s	Estimated Cost	Responsibility	Completed
						Interim	Short-term	Long-term				
						Unwritten operational controls currently include source selection and turbidity control.		Operational controls: source selection and turbidity control to be added to a detailed procedure and is included in another action item. Investigate feasibility of UV systems for River . Upgraded Depot WTP primary source of supply			Utility Services Manager Project and Technical Support Officer	
9	1	WTP	Increase storage capacity	~ Current proposal for funding in place to construct new bore at Como Rd along with upgrading the Depot WTP, which will allow a secure water supply if river water quality is not suitable for consumption.	High	Submit application for funding assistance to the government.	Advertise a tender for the works to be completed.	Construction phase. Finalise project.	Funding Dependent	$4.4 Million	Utility Services Manager	Completed
	Increasing the level of Certainty											
10	All	River and Groundwater Systems	Contamination from Septic tanks & Sewer Mains (breakages, etc)	~ Undertake testing monthly for the presence of E. Coli in raw water and monitor the data to identify any peaks associated with high rainfall, etc.	Medium	E. Coli testing in river and bore sources. Conduct during dry and wet seasons.	Investigate laboratory results.	Depending on results, further investigations may need to take place to find the source of bacteria into raw source. Some bacteria are to be expected.	Commence first round of testing early 2013	Already included in yearly budget	WTP Operator Utility Services Manager	Completed E. Coli testing has been undertaken in the raw water source and will continue as part of the testing program – Completed.
11	All	Groundwater	Discharge from urban stormwater during rainfall events	~ Terrain currently completing a study on the effects of pesticides to the catchments water supply. Results expected in a 2-year timeframe. ~ Improve borehead construction under the borehead replacement program	High	As per Item 1 (borehead construction)	As per Item 1 (borehead construction)	As per Item 1 (borehead construction)	As per Item 1 (borehead construction)	Prior funding assistance has been issued to Terrain	Terrain Utility Services Manager	As per item 1
12	All	WTP	Formation of disinfection by-products	~ Enforce testing on a yearly basis.	Medium	Commence testing on yearly basis. Depending on results further action may need to be taken, but this will need to be assessed when further information is available.	As per interim.	As per interim.	Commence first round of testing early 2013	$1,500	Utility Services Manager WTP Operator	Testing has not been completed. First Round of testing to be completed by 31 December 2018. Ongoing monitoring program
	Other											
13	All	Operational & Maintenance Procedures	N.A.	N.A.	Very High, lacking operational and maintenance procedures.	Prepare templates for all procedures. Collate any relevant data that could be of use.	Conduct a meeting between relevant tasks to discuss the templates that have been produced and make notes on areas for improvements. Conduct site inspections and take photos to include in the procedure.	Create a final Manual of Operation and Maintenance Procedures and begin the implementation process. All procedures are to be uploaded to the Council's intranet and distributed to all staff members.	Jul-21	Included in budget for Project and Technical Support Officer	Utility Services Manager WTP Operators Infrastructure Engineer Project and Technical Support Officer	Currently in Draft version. Updated target date – June 30 2022 Council's asset management plans have been finalised with operational procedures to be updated.
14	All	Mapping of Water Assets	N.A.	N.A.	Very High, important as required for modelling software to improve water	Work in conjunction with council surveyor to collate existing data and determine areas where data is missing.	Assign asset numbers and produce drawings that can be distributed to staff.	Final dataset of mapped assets, including a full list of assets with unique numbering which will work in conjunction with council's asset management system.	Dec-12	Included in budget for Project and Technical Support Officer	Project and Technical Support Officer	Completed

	1	2	3	4	5	6	7	8	9	10	11	12
	Scheme	Scheme Component/ Sub-component	Hazard/ Hazardous Event	Proposed Preventative Measure	Priority	Actions			Target Date/s	Estimated Cost	Responsibility	Completed
						Interim	Short-term	Long-term				
					quality and distribution needs.							
15	All	Staff Training	N.A.	N.A.	High, to meet national requirements	Commence training for Water Treatment Assistants. Certificate II or III in Water and Waste Water Treatment.	Provide assistance to staff undertaking Certificate II or III.	Have sufficient staff who have completed the required training as per national requirements. Continue to provide any training that would be beneficial to the day-to-day operations.	July 2014 (based on a two-year completion)	Dependant on subject fees (TAFE)	Utility Services Manager Water Treatment Plant Operators Water Treatment Assistants	Completed
16	All	Customer Complaint Performance	N.A.	N.A.	Low, review effectiveness of customer complaint processes			Council upgrading the Financial System which will include a new component to handle customer complaints. It will be a major upgrade to the system and it will include easier access to data, e.g., Response times.	December 2014	Included in Financial System Package (budgeted by council)	Utility Services Manager Administration	Completed – CRM system no in place.
17	All	Historical Data Database	N.A.	N.A.	Medium	Discuss with council staff that are familiar with creating databases and work out an approach to creating the database.	Gather all water quality data into the format required and create database.	Have a fully functional database.	December 2014	Included in budget for Project and Technical Support Officer	Utility Services Manager Project and Technical Support Officer	Completed
18	All	Drinking Water Policy	N.A.	N.A.	High	Prepare draft Drinking Water Policy.	Conduct a meeting with relevant parties to discuss policy and make notes on areas for improvements.	Finalise policy and get Council to endorse.	Jun-22	Included in budget for Consultant to prepare	Utility Services Manager Project and Technical Support Officer	Identified in DWQMP Audit completed on 28 April 2017. New policy to come.
19	All	SCADA Alarm Procedure	N.A.	N.A.	High	Prepare templates for procedure. Collate any relevant data that could be of use.	Conduct a meeting between relevant tasks to discuss the template that has been produced and make notes on areas for improvements. Conduct site inspections and take photos to include in the procedure.	Create a final Procedure and begin the implementation process. Procedures are to be uploaded to the Council's intranet and distributed to all staff members.	Jun-22	Included in budget for Project and Technical Support Officer	Utility Services Manager Project and Technical Support Officer	Identified in DWQMP Audit completed on 28 April 2017. New procedure to come.
20	All	Hydraulic Model	N.A.	N.A.	Low		Council to procure consultant to construct Hydraulic Model of Council's water network.	Maintain and update as required.	Jun-16	$55,000	Utility Services Manager Project and Technical Support Officer	Completed
21	All	All	Lack of asset management	IT Management System with oversight	Medium	High level review and meeting with IT	Gather system information	**MC-01-Vulnerability assessment** Undertake a cybersecurity audit including a penetration test: - identify critical sites and those with cyber access, devices and access points specific to the Supervisory Control and Data Acquisition (SCADA) for water quality management. These will include 1) pump sites. 2) related operational technology systems - servers, firewalls, network switches, access points, Remote Terminal Units (RTUs) and Programmable Logic Controllers (PLCs). 3) Implement actions to maintain effective cyber security controls of SCADA and Industrial Control Systems (ICS). 4) Implement actions and integration consisting of standards and processes to manage both information technology (IT) and operational	Jun-22	Internal Wages	Utility Services Manager Project and Technical Support Officer ICT	

	1	2	3	4	5	6	7	8	9	10	11	12
	Scheme	Scheme Component/ Sub-component	Hazard/ Hazardous Event	Proposed Preventative Measure	Priority	Actions			Target Date/s	Estimated Cost	Responsibility	Completed
						Interim	Short-term	Long-term				
								technology (OT). 5) Implement a single point access to enter the telemetry network. 6) Implement a secure entry protocol/procedure to the IT/OT network.				
22	All	All	Inability to detect critical Assets	IT Management System with oversight	Medium	High level review and meeting with IT	Gather system information	**MC-02 -Governance structure** - Framework to be in place with responsibilities - Procedures for information technology and operation technology security to be created. **MC-03- Security safeguards** - Create a list of permitted applications to be installed / run within Council's Standard Operating Environment (SOE)	Jun-22	Internal Wages	Utility Services Manager Project and Technical Support Officer ICT	
23	All	All	Disruption of Cyber information (IT)	IT Management System with oversight	Medium	High level review and meeting with IT	Gather system information	**MC - 04 Detection process** - Require SOE security monitoring system that reports anomalies. e.g., high CPU use, user accounts, high network traffic. **MC-05 Response & Recovery** - Organise routine backups / archiving for ICS equipment, servers and applications.	Jun-22	Internal Wages	Utility Services Manager Project and Technical Support Officer ICT	
24	All	All	Cyber Security – Access to sites	Unauthorised access to sites	Increase site security to decrease the chances of unauthorised access.	Ensure all sites are secure if there are no personnel onsite.	Update camera systems and number of cameras to deter intruders.	Install security card access to all sites.	Jun-22	Already included in yearly budget	Utility Services Manager Project and Technical Support Officer ICT	
25	All	All	Cyber Security – Access to drives, chlorinators, controllers, etc	Unauthorised access to drives, chlorinators, controllers, etc	Improve security for these devices to decrease the chances of unauthorised access.	Ensure all drives, chlorinators, controllers, etc are secure if there are no personnel onsite.		Passcode protect all drives, chlorinators, controllers, etc to operators, managers, supervisors and fitters	Jun-22	Already included in yearly budget	ICT	
26	All	All	Disruption of Cyber information (IT)	Private network and access management	Medium	High level review and meeting with IT	Gather system information	**MA - 01 Build out private SCADA network** - requires testing and cutover for all water facilities, sites & equipment to ensure the existing network is fully private. **MA - 02 Build single point of access and authentication method** - Undertake after MA-01. A single point access should be built as a mechanism to enter the telemetry network. **MA - 03 Implement rules to prevent across network access** - After MA-01 & MA-02, SCADA IT section to create and document a procedure for secure entry to the IT/OT network. **MA - 04 Consider disallowing open internet access** - To be actioned with MA-01 & MA-02. Address vulnerability scenarios but also allows for system updates (e.g., allowing Windows Update).	Jun-23		ICT	
27	All	All	Cyber Security – Antivirus scan	N.A	N.A	Council use Sophos antivirus software to scan antivirus on systems	Moving to cloud version for better security and operation which will covers Application whitelisting, application hardening	**MA-05 Install and enable active virus scanning** - OT SCADA machines will not have anti-virus installed as it can interfere with SCADA installed software. Cybersecurity of OT SCADA machines is controlled by restricting internet	Jun-23	Already included in yearly budget	ICT	

	1	2	3	4	5	6	7	8	9	10	11	12
	Scheme	Scheme Component/ Sub-component	Hazard/ Hazardous Event	Proposed Preventative Measure	Priority	Actions			Target Date/s	Estimated Cost	Responsibility	Completed
						Interim	Short-term	Long-term				
								access and eliminating the use of external USB drives and fire wall settings.				
28	All	All	Cyber Security – Patches to Systems	N.A	N.A	Automatic Install windows patches to end user's workstation and laptops on Council Systems	Quarterly install Windows Patches on Servers on Council Systems. SCCM patch management software planning to implement for better operation	**MA-06 Activate and set windows firewall rules** - Do after MA-01 is completed **MA-07 Implement maintenance and updates schedule** - Maintenance will be ongoing in terms of updating SCADA software. All upgrades or changes to a PLC or SCADA shall have their configuration files backed up and saved on each workstation on-site and off-site. **MA-08 Consider certificate or key based authentication for remote access** - Do after MA-01 is completed **MA-09 Consider Two factor authentication** - Do after MA-01 is completed.	Jun-23	Already included in yearly budget	ICT	
29	All	All	Cyber Security – Backups	N.A	N.A	Council following daily, weekly and monthly backup plans with 3—2-1 strategies of all Servers	Council following monthly backup tapes off-site	**MA-10 Implement backup schedule** - To be done as part of regular maintenance of IT/OT systems. Backups of configurations files to be made and stored onsite with a copy stored off-site in the secure corporate Drive, and with the SCADA provider. **MA-11 Ensure validity of software licences used across machines** - Ongoing as all SCADA OT software is licenced and authentication is used across SCADA OT machines.	Jun-20	Already included in yearly budget	ICT	Backups completed
30	All	All	Cyber Security – AusCERT Membership	N.A	N.A			Council is member of AusCERT organisation and follow the incident and service management for cyber security	Dec-22	Already included in yearly budget	ICT	
31		All	Inability to detect a cyber security event	Increased awareness from operators surrounding physical security access on ICS sites, provided by means of training sessions. Add this to the procedures	Medium	Meeting with IT Officer	Allocated above	Once cyber security is implemented, create a procedure to monitor status.	Dec-23	Internal Wages	Utility Services Manager Project and Technical Support Officer ICT	
32	All	Filtration	High Raw Water Turbidity affecting filter performance	Change raw water source, reduce filter hydraulic through put. Increase disinfection.	Medium	Change raw water source. Continue with weekly filtered/CWS turbidity monitoring using grab samples.	Write procedure	Gauge the raw versus filtered water to determine their performance based on HBT. This will set the disinfection level needed, but is also dependent on if UV is added, although likely not needed for all water sources excluding Herbert River.	Dec-22	Internal Wages	Utility Services Manager Project and Technical Support Officer	
33	All	Raw Water	High Raw Water Turbidity affecting filter performance	Change raw water source, reduce filter hydraulic through put. Increase disinfection.	Medium	Commence weekly raw turbidity monitoring using grab samples.	Write procedure	Consider online turbidity meters for each raw water source to ensure that the source can be turned off if turbidity reaches a set threshold.	Dec-23	Internal Wages	Utility Services Manager Project and Technical Support Officer	
34	Ingham	Raw Water	High Raw Water Turbidity affecting filter performance due to use of Herbert River water source	Provide additional bore site.	Medium	Change raw water source within scheme or obtain water from another scheme.	Write procedure	Add duplication of Bore in the Ingham Depot WTP scheme to the RMIP.	Dec-23	$80,000	Utility Services Manager Project and Technical Support Officer	
35	Lower Herbert	Raw Water	PFAS	Selection of raw water sources	Medium	Selection of raw water sources	Procedure	Investigate securing Kemps Rd Bore as this have no PFAS issues and has a high yield. Decommission Bores 3 & 4 if Kemps Rd is feasible, alternatively	Dec-23	$50,000	Utility Services Manager	

	1	2	3	4	5	6	7	8	9	10	11	12
	Scheme	Scheme Component/ Sub-component	Hazard/ Hazardous Event	Proposed Preventative Measure	Priority	Actions			Target Date/s	Estimated Cost	Responsibility	Completed
						Interim	Short-term	Long-term				
								investigate other options for these bores.			Project and Technical Support Officer	
36	Lower Herbert & Ingham	Raw Water	Trihalomethanes and Chlorates	Selection of raw water sources	Medium	Selection of raw water sources	Procedure	Consider changing the Halifax Depot to a chlorine gas facility to reduce the risk of THMs and Chlorates.	Dec-23	$50,000	Utility Services Manager Project and Technical Support Officer	
37	All	Water Quality Data	All	Use SWIMLocal to record all water quality information	Medium	Continue with current system	Transfer all existing Water Quality Data to SWIMLocal and use basic functions in alignment with existing practise.	Strategic enhancement of information within SWIMLocal including alerts, reporting, additional operational monitoring, and alignment of operational monitoring.	Dec-23	Internal wages, $2000, Purchase of SWIMLocal Basic Version + Required Modules, $10,000 for enhancement of information	Utility Services Manager Project and Technical Support Officer	

10.2 Service Wide Support – Information Management

Table 5-5 summaries all information related to the management of drinking water quality and how they are managed so that information is readily accessible, accurate, reliable, timely and up to date.

Table 5-5 Summary of Water Quality Management Information

Information/ Documentation	Format	Where stored	Position Responsible/ Business Unit	Comments
Chlorine Supply Register (Operational Monitoring)	Hardcopy	Waste Water Treatment Plants	WTP Operator	Register only when supply was from ICI. GE Power & Water is current supplier.
Daily pH Readings (Operational Monitoring)	Hardcopy and Electronic	Waste Water Treatment Plants	WTP Operator and W&S Administration	WTP Operator collects daily readings and at the end of the month passes hardcopies to administration to enter in spreadsheet.
Bacteria Testing (Verification Monitoring)	Electronic (Excel) and original copies from laboratory in filing cabinet	Server and Ingham Waste Water Treatment Plant	W&S Administration	When testing results are received from laboratory administration enters into spreadsheet.
Chemical Testing (Verification Monitoring)	Electronic (Excel) and original copies from laboratory in filing cabinet	Server and Ingham Waste Water Treatment Plant	W&S Administration	When testing results are received from laboratory administration enters into spreadsheet.
Drinking Water Quality Complaints	Electronic (Excel)	Server	W&S Administration	When complaint is received it is logged in a database and administration staff distributes the complaint to the Works Supervisor to be investigated.
Mains break GIS Mapping	Electronic ESRI Shapefile	Server	W&S Administration	When a broken main occurs, the location of the break is mapped onto GIS to keep a record of the location of breaks.
Pressure Management System (Operational Monitoring)	Radwin Software	Server	Utility Services Manager IT Department	Several pressure monitors are located around the reticulation system, which send a live feed, where pressures can be viewed through the Radwin Software.
Operations Control System (Operational Monitoring)	SCADA	Server	Manager W&S IT Department	SCADA is the main control for Water Operations. It displays reservoir levels, chlorine levels, pump rates, pump hours, etc.

10.2.1 Record Retention Requirements

All documents related to the operation of the water supply are kept either electronically or by hardcopy. It is Council's intention to maintain these documents for as long as possible as they are perceived as valuable information. All documents maintained in a hardcopy format are kept as long as possible or transferred to electronic format and all electronic copies will be maintained on the server system indefinitely.

11 OPERATIONAL AND VERIFICATION MONITORING PROGRAMS

Hinchinbrook Shire Council uses the Queensland Health laboratory in Brisbane for all water samples. In some instances when immediate results are required (e.g., during flooding), samples are sent to Townsville City Council laboratory. The costs for processing samples at Townsville City Council are much higher than the costs associated with freight to send the samples to Queensland Health.

Hinchinbrook Shire Council has an Operation Procedure for the Collection of Water Samples. This process outlines important factors and steps that are associated with water sampling. This procedure addresses data handling, monitoring program, communication procedures and transportation of samples.

Locations:
Raw water samples are taken both direct from the bore and at the aerator. For Ingham Pump Station a raw water sample is collected from the river intake. Treated water samples are taken from the reservoirs associated to each treatment plant. Critical points in the reticulation have been identified as sample locations.

Transportation:
The samples are collected by the Water Treatment Plant operator and is packed into eskies and sent to Townsville via road freight and then flown to Brisbane overnight and then received at the Queensland Health Laboratory in Brisbane.

11.1 Operational Monitoring

Daily following operational monitoring is undertaken by trained operators:

- Water quality monitoring at critical control points to assess and confirm the performance of preventative measures.
- On-line operational monitoring of indicator water quality parameters. This is a key component of process control and "real-time" management of drinking water quality. Hinchinbrook Shire Council is currently using SCADA to monitor specific sections of the water supply, mainly chlorine residual, reservoir levels and pump hours and flow rates.
- Online and manual data is reviewed and used as a trigger for corrective actions to improve drinking water quality. Examples include chlorine residual and fluoride.

Table 11-1 identifies the operational monitoring program. This program has been created around critical control points and has been selected from the risk assessment which was created from an understanding of the water supply system including the water quality management issues faced. This understanding is summarised in Section 2, Section 5, and elsewhere in this plan. These principally includes turbidity monitoring, however a number of key parameters in the verification monitoring program influence the operational management of each scheme. These include Protozoa, PFAS, Trihalomethane and Chlorates. A turbidity critical limit for treated water has been set at 1 NTU to ensure the chlorine disinfection effectiveness is not influenced by turbidity. It is acknowledged that raw water turbidity will affect filter performance and an initial critical limit has been set at 3 NTU. An action item has been included to investigate filter performance against raw water turbidity levels which will be traced back to health-based target limits.

Table 11-1 Operational Monitoring – Scheme 1, 2 and 3

Process Step/ Critical Control Point/ Location in System	What is the operational monitoring parameter	Associated Hazard	Sampling			Target Limit	Action if target limit exceeded	Critical Limit	Action if critical limit exceeded
			Frequency	Method	Analysis				
SCHEME 2: Pre-filtration • **Halifax WTP – not in use.** • **Macknade WTP – turbidity analyser on raw pump pipelines.** **SCHEME 3: Pre-filtration** • **Forrest Beach WTP – turbidity analyser on raw pump pipelines.**	Turbidity	Physical	Weekly 3 monthly on individual bores	Grab Samples	Manager Water and Waste Water WTP Operator On-Call Staff (weekends/public holidays)	2 NTU	• Conduct a manual test to ensure machine is reading correctly. • Change water source to one with a lower turbidity.	3 NTU	• Conduct a manual test to ensure machine is reading correctly. • Change water source to one with a lower turbidity. • If an alternative water source is not available, switch to another scheme, otherwise issue a boil water notice.

Process Step/ Critical Control Point/ Location in System	What is the operational monitoring parameter	Associated Hazard	Sampling			Target Limit	Action if target limit exceeded	Critical Limit	Action if critical limit exceeded
			Frequency	Method	Analysis				
SCHEME 1: Post-Filtration • **Ingham Pump Station – turbidity analyser on filtered water pipeline to CWS.** • **Ingham Depot WTP – turbidity analyser on filtered water pipeline to CWS.** **SCHEME 2: Post-Filtration** • **Halifax WTP – not in use** • **Macknade WTP – turbidity analyser on filtered water pipeline to CWS.** **SCHEME 3: Post-Filtration** • **Forrest Beach WTP – turbidity analyser on filtered water pipeline to CWS.**	Turbidity	Physical	Continuous (Ingham PS) Weekly (all other locations)	Online (SCADA) (Ingham PS) Grab Samples (all other locations)	Manager Water and Waste Water WTP Operator On-Call Staff (weekends/public holidays)	0.8 NTU	• Conduct a manual test to ensure machine is reading correctly. • Change water source to one with a lower turbidity.	0.9 NTU	• Conduct a manual test to ensure machine is reading correctly. • Change water source to one with a lower turbidity. • If an alternative water source is not available, switch to another scheme, otherwise issue a boil water notice.
SCHEME 1: • **Ingham Pump Station – Chlorine Analyser after pump to reticulation.** • **Ingham Depot WTP – Chlorine Analyser on recirculation pump.** **SCHEME 2:** • **Halifax WTP – Chlorine Analyser on recirculation pump.** • **Macknade WTP – Chlorine Analyser on recirculation pump.** **SCHEME 3:** • **Forrest Beach WTP – Chlorine Analyser on recirculation pump.**	Chlorine Residual	Chemical	Continuous	Online (SCADA)	Manager Water and Waste Water WTP Operator On-Call Staff (weekends/public holidays)	1.5 mg/L and 1.75 mg/L during high rainfall	• Conduct a manual test to ensure machine is reading correctly. • If so, contact Manager Water and Waste Water for machine to be calibrated. • If manual reading is high, contact Manager Water and Waste Water to organise for dosing to be changed.	0.6 mg/L (minimum)	• Conduct a manual test to ensure machine is reading correctly. • If so, contact Manager Water and Waste Water for machine to be calibrated. • If manual reading is low, contact Manager Water and Waste Water and continue with manual dosing.
SCHEME 1: • **Bypass at raw water underground timber gallery. Bypasses section of the gallery when larger flow rate is required.**	Demand	Physical Bacterial	When required	Observations of water usage and river quality	Manager Water and Waste Water WTP Operator	River water quality good	• Depending on river water quality (e.g., bypass would not be used after significant rainfall) the bypass flap can be opened.	High Turbidity levels caused by rain events.	• Bypass well to be shut and to allow for extra filtration. • If river quality bad, use Ingham Depot bores as main source.

Process Step/ Critical Control Point/ Location in System	What is the operational monitoring parameter	Associated Hazard	Sampling			Target Limit	Action if target limit exceeded	Critical Limit	Action if critical limit exceeded
			Frequency	Method	Analysis				
Reservoir (Ground or Elevated)	Reservoir Levels	-	Continuous	Online (SCADA) Alarming limits set to page out	Manager Water and Waste Water WTP Operator	Above critical level	• Investigation required as to why levels are low. Ensure all pumps are working efficiently. Check the demand.	Critical Level	• Manually operate pumps until reservoir fills to required level.
Filtered Water	Filter Bed Capacity	Supply	Daily	Visual	WTP Operator	No ponding	• Rake sand filter	Bed Flooded	• Rake or skim filter; • Replace sand if required.
Treated Water	pH	Physical	Daily	Online (SCADA) Manual	WTP Operator	6.5 – 8.5	Not applicable. If pH falls between 6.5 – 8.5 levels comply with ADWG.	Less than 6.5 or greater then 8.5	• Retest • Investigate • Modify processes
Reticulation	Pressure Recorders	-	Continuous	Online (SCADA)	Manager Water and Waste Water	22 m head	• Locate nearest pressure monitor on Radwin software. • Assess reasons as to why pressure could be low. E.g., Water trucks extracting from main, high usage from other nearby areas. • Review reservoir levels to ensure are adequate. • Possibility of mains break. Assess for possible leak.	Less than 22 m head	As per target limit.
Fencing (security)	Observation of fence integrity	Unknown	Weekly	Visual	WTP Operator	No evidence of stock access and fence intact	Fix the fence and check stock for inconsistencies.	Evidence of stock access and fence intact.	Fix the fence and remove stock.
Backflow prevention	Testing of devices	Bacterial	Annually	Inspection as per AS 2845.3 2010	Plumbing Inspector	100% compliance	Provide notice to be fixed within 6 weeks. Reinspect after notice period.		

11.2 Verification Monitoring

Table 11-2 identifies the verification monitoring program. Verification of drinking water quality provides an assessment of the overall performance of the system and the ultimate quality of drinking water being supplied to customers. The water quality verification monitoring plan includes monitoring at representative points throughout the supply system. All source waters, treatment processes and distribution systems are routinely monitored for a range of parameters as recommended in the Australian Drinking Water Guidelines.

As mentioned in Section 6.1 – Operational Monitoring, specific parameters are tested including Protozoa, PFAS, Trihalomethane and Chlorates. These assist the operators in selecting raw water sources/removed water sources from service/adjusting operational controls to meet guidelines.

Test frequency was determined by the following judgements:

- The frequency of E. coli testing is that required by QLD Health.
- For specific parameters of concern, testing occurs at specific seasonal/operational times.
- For Pesticides and Herbicides these are of low concern and a minimal testing regime has been selected.
- The remaining parameters are monitored monthly to ensure operational responses can occur in a reasonable time.

Table 11-2 Verification Monitoring – Scheme 1, 2 and 3

Parameter	Location	ADWG &/or Regulation Value	Associated Hazard	Frequency		Analysing Authority	Response to Exceedances
				@ Treatment Plant Outlet	In Distribution System		
Pesticides and Herbicides	See Table 11-3 for monitoring locations. Protozoa, PFAS, Trihalomethanes, and Chlorates only at specific locations shown under frequency column.	As per ADWG	Chemical	6 months – low concern	Nil	Queensland Health Forensic and Scientific Services 39 Kessels Road Cooper Plains QLD 4108	
Escherichia Coli		0 counts per 100 mL	Bacterial	Weekly	Weekly		Refer Table 5-3
Protozoa		As per ADWG	Bacterial	In filtered water from Ingham pump station prior to disinfection and introduction to the network. Occurs 3-4 weeks prior to turning on the water source.			Refer Table 5-3
PFAS		As per ADWG	Chemical	3 monthly raw water testing in Macknade Bores 3 & 4 when in use.			Refer Table 5-3
Trihalomethane and Chlorates				6 monthly (Sept/Oct & Mar/Apr) raw water testing at Ingham pump station and			

	Parameter	Location	ADWG &/or Regulation Value	Associated Hazard	Frequency		Analysing Authority	Response to Exceedances
					@ Treatment Plant Outlet	In Distribution System		
					Halifax Depot after disinfection occurs.			
Standard Water Analysis	Alkalinity		No guideline		Monthly – for operational control reasons	Quarterly		• Retest • Investigate • Modify processes
	Aluminium		0.2 mg/L	Physical				
	Bicarbonate		No guideline					
	Boron		4 mg/L	Physical				
	Calcium		No guideline					
	Carbonate		No guideline					
	Chloride		250 mg/L					
	Colour		15 HU	Physical				
	Conductivity		No guideline					
	Copper		2 mg/L					
	Figure of Merit Ratio		No guideline					
	Fluoride		1.5 mg/L					
	Hardness as CaCO3		200 mg/L					
	Iron		0.3 mg/L	Physical				• 0.3 mg/L is a guideline value based on the taste threshold. • It is established that concentrations above 3mg/L could cause health concerns, but at this point it is unlikely that water would be consumed.
	Manganese		0.5 mg/L					• Retest • Investigate • Modify processes
	Mole Ratio		No guideline					
	Nitrate as NO3							
	Nitrite		No guideline					
	pH		6.5 – 8.5					
	pH @ 25°C		No guideline					
	pH Sat		No guideline					
	Potassium		No guideline					
	Residual Alkali		No guideline					
	Saturation Index		No guideline					
	Silica		No guideline					
	Sodium		180 mg/L	Physical (taste)				
	Sodium Adsorption Ration		No guideline					
	Sulfate		500 mg/L	Physical (taste)				

Parameter	Location	ADWG &/or Regulation Value	Associated Hazard	Frequency		Analysing Authority	Response to Exceedances
				@ Treatment Plant Outlet	In Distribution System		
Temporary Hardness		No guideline					
Total Dissolved Ions		No guideline					
Total Dissolved Solids		600 mg/L	Physical				
Turbidity		1 NTU	Physical				
Zinc		3 mg/L	Physical				

Table 11-3 Verification Monitoring Locations for Scheme 1, 2 and 3

Scheme 1	Scheme 2	Scheme 3
Treated Water Samples taken at each treatment plant: • Ingham Pump Station – High Lift Reservoir • Ingham Depot – Ingham Water Tower **Reticulation Sample Point Locations:** (Sampling is on a rotational basis – not all sampled at one time) • Jabiru Street, Toobanna (*Sample Point 5)* • Trebonne State School (*Sample Point 6)* • 46 Orient Road, Blackrock (*Sample Point 7)* • 44 Gorton Street, Trebonne (*Sample Point 10)* • 32 Halifax Road (*Sample Point 18)* • 10 Victoria Mill Road (*Sample Point 19)* • Ingham Water Tower (*Sample Point 21)* • Tokalon Tower (*Sample Point 22)* • High Lift at Depot (*Sample Point 23)* • Trebonne Water Tower (*Sample Point 24)* • Hi Lift at River (*Sample Point 25)* • Townsville Road Old Library (*Sample Point 31)* • Sewerage Plant (*Sample Point 33)* • 1 Davidson Street, Ingham (*Sample Point 35)* • 12 Marina Parade, Ingham (*Sample Point 36)* • 1 Forgan Street, Ingham (*Sample Point 37)* • 29 Palm Terrace, Ingham (*Sample Point 38)* • 43 Sir Arthur Fadden Parade, Ingham (*Sample Point 39)* • Kelly Hall (*Sample Point 40)* • Ingham Nursery (*Sample Point 41)*	**Treated Water** Samples taken at each treatment plant: • Macknade WTP • Halifax WTP **Reticulation Sample Point Locations:** (Sampling is on a rotational basis – not all sampled at one time) • Bemerside Hurley's (Sample Point 1) • 26 Marbelli Street (Sample Point 2) • Rupp's on Alma Street (Sample Point 3) • Anderssen Street (Sample Point 4) • Lucinda Water Tower (Sample Point 11) • End of Patterson Parade (Sample Point 12) • Corner of Bruce Parade and Vass Street (Sample Point 13) • Dungeness (Sample Point 14) • Taylors Beach Water Tower (Sample Point 15) • End of John Dory Street (Sample Point 16) • 2 Sardine Street (Sample Point 17) • Washaway Booster Pump Station (Sample Point 28) • Halifax Treatment Plant (Sample Point 29) • Halifax Water Tower (Sample Point 30) • Halifax Depot (Sample Point 31) • Macknade Treatment Plant (Sample Point 32) • Lucinda Caravan Park (Sample Point 32) • Lions Park (Sample Point 33) • Mona Road (Sample Point 39) • Cordelia School Road (Sample Point 40)	**Treated Water** • Samples taken at Forrest Beach Treatment Plant **Reticulation Sample Point Locations:** (Sampling is on a rotational basis – not all sampled at one time) End of Allamanda Avenue *(Sample Point 7)* Coconut Grove *(Sample Point 9)* End Beatts Road *(Sample Point 20)* Hi Lift Pumps Forrest Beach *(Sample Point 26)* Water Tower Forrest Beach *(Sample Point 27)* End of Pangola Street *(Sample Point 37)* Bill Johnson Drive *(Sample Point 36)* Blackbean Street *(Sample Point 38)* Forrest Beach Boat Ramp *(Sample Point 48)* Forrest Beach Picnic Area *(Sample Point 49)* *The locations of sample points have been chosen in areas that are most likely to receive the highest reading (e.g., low pressure areas, end of reticulation mains). Samples are also taken from the reservoir to monitor the water being distributed to the reticulation. Samples are taken on a rotational basis; it would be almost impossible to complete all samples on a weekly basis.*

• Bruce Highway, Toobanna (*Sample Point 42)* • Ingham Showgrounds (*Sample Point 43)* • Shire Hall (*Sample Point 44)* • International Club (*Sample Point 45)* • Rotary Park (*Sample Point 46)* • Trebonne Park (*Sample Point 47)* *The locations of sample points have been chosen in areas that are most likely to receive the highest reading (e.g., low pressure areas, end of reticulation mains). Samples are also taken from the reservoir to monitor the water distributed to the reticulation. Samples are taken on a rotational basis; it would be almost impossible to complete all samples on a weekly basis.*	• Mill Road (Sample Point 41) • Taylors Beach Boat Ramp (Sample Point 50) • Taylors Beach Picnic Area (Sample Point 51) • Borello Park (Sample Point 52) • Halifax Library (Sample Point 53) *The locations of sample points have been chosen in areas that are most likely to receive the highest reading (e.g., low pressure areas, end of reticulation mains). Samples are also taken from the reservoir to monitor the water being distributed to the reticulation. Samples are taken on a rotational basis; it would be almost impossible to complete all samples on a weekly basis.*	

APPENDIX A - APPROVAL APPLICATION FORM

Drinking Water Quality Management Plan Approval Application

Queensland Government

Water Supply (Safety and Reliability) Act 2008, section 95

Privacy Disclaimer: Collection of information provided in this approved form and any attachments is authorised under the *Water Supply (Safety and Reliability) Act 2008* and is being used for the purpose of applying to the Office of the Water Supply Regulator for approval of a drinking water quality management plan. The Department of Environment and Resource Management will endeavour to maintain any confidentiality of information relating to your form. However, consideration of your form may involve consultation and if so, details of your form may be disclosed to third parties. This information will not otherwise be disclosed outside of the department unless required or authorised by law (for example as under the *Right to Information Act 2009*).

Note: This is an approved form under the *Water Supply (Safety and Reliability) Act 2008*, to be used by the drinking water service provider, to apply to the regulator for approval of a drinking water quality management plan (DWQMP).

Before submitting this approved form, please be fully aware of your rights and obligations under the *Water Supply (Safety and Reliability) Act 2008*.

1. Drinking Water Service Provider Details

Drinking water service provider	SPID
Hinchinbrook Shire Council	SP62

2. Contact Details

Principal Contact

Family name	Given name(s)	Position
Martin	Peter	Manager Water & Waste Water

Postal address

PO Box 366

INGHAM QLD Postcode 4850

Telephone number	Fax number	Mobile number
(07) 47764673	(07) 47763233	0417143224

Email address

pmartin@hinchinbrook.qld.gov.au

3. Drinking Water Scheme Details

Please **list** the drinking water scheme(s) to which this plan applies

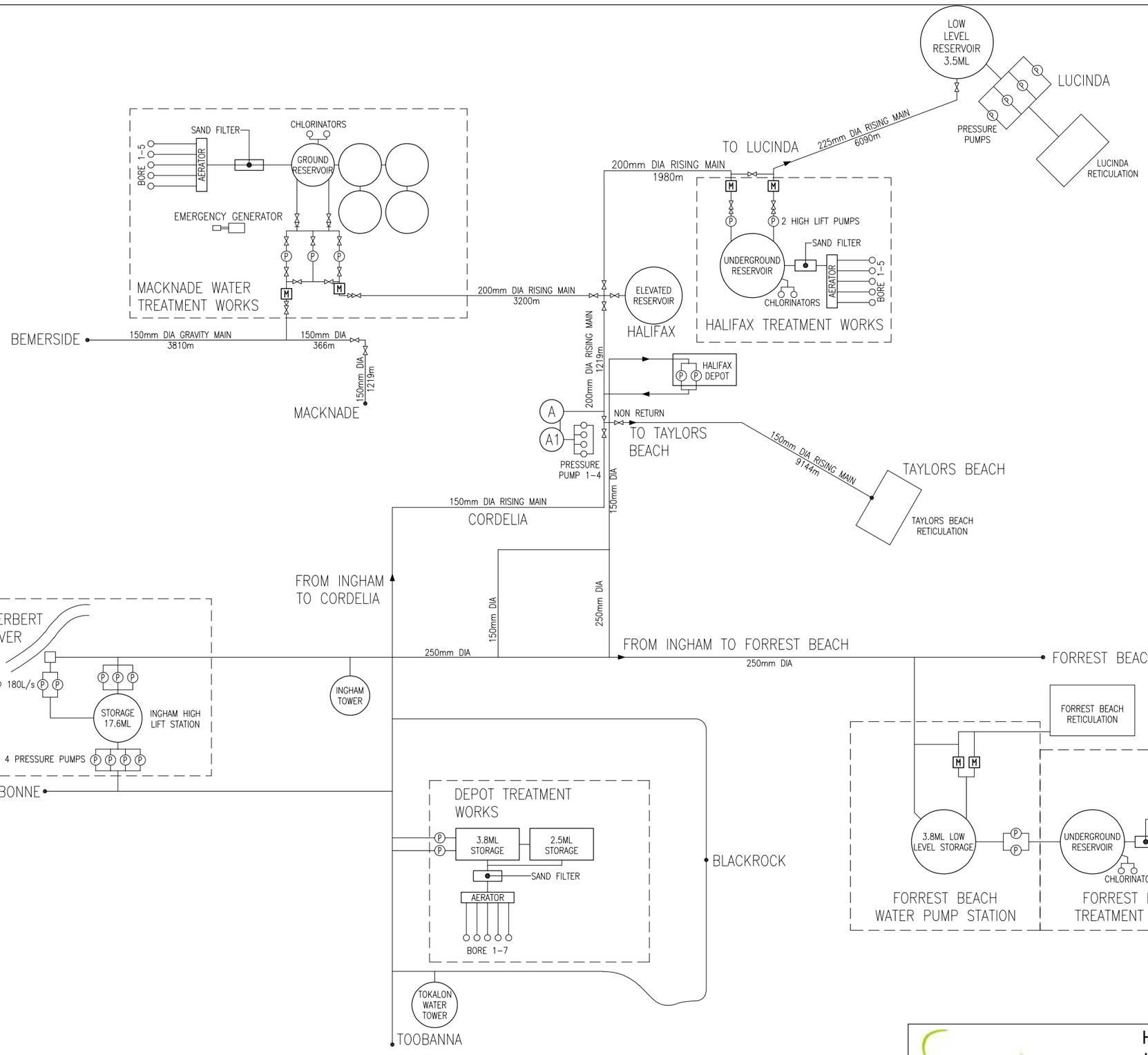
Scheme 1 - Ingham Water Supply
Scheme 2 - Lower Herbert Water Supply
Scheme 3 - Forrest Beach Water Supply

(If space provided is insufficient, additional information may be attached)

Form WSR505 V01 Jan 2010 SSA Multimedia Services Page 1 of 2

APPENDIX B – OVERALL SCHEMATIC AND SYSTEM SCHEMATICS

Overall Schematic Layout



FOR INFORMATION ONLY
NOT TO BE USED FOR CONSTRUCTION

NOT TO SCALE

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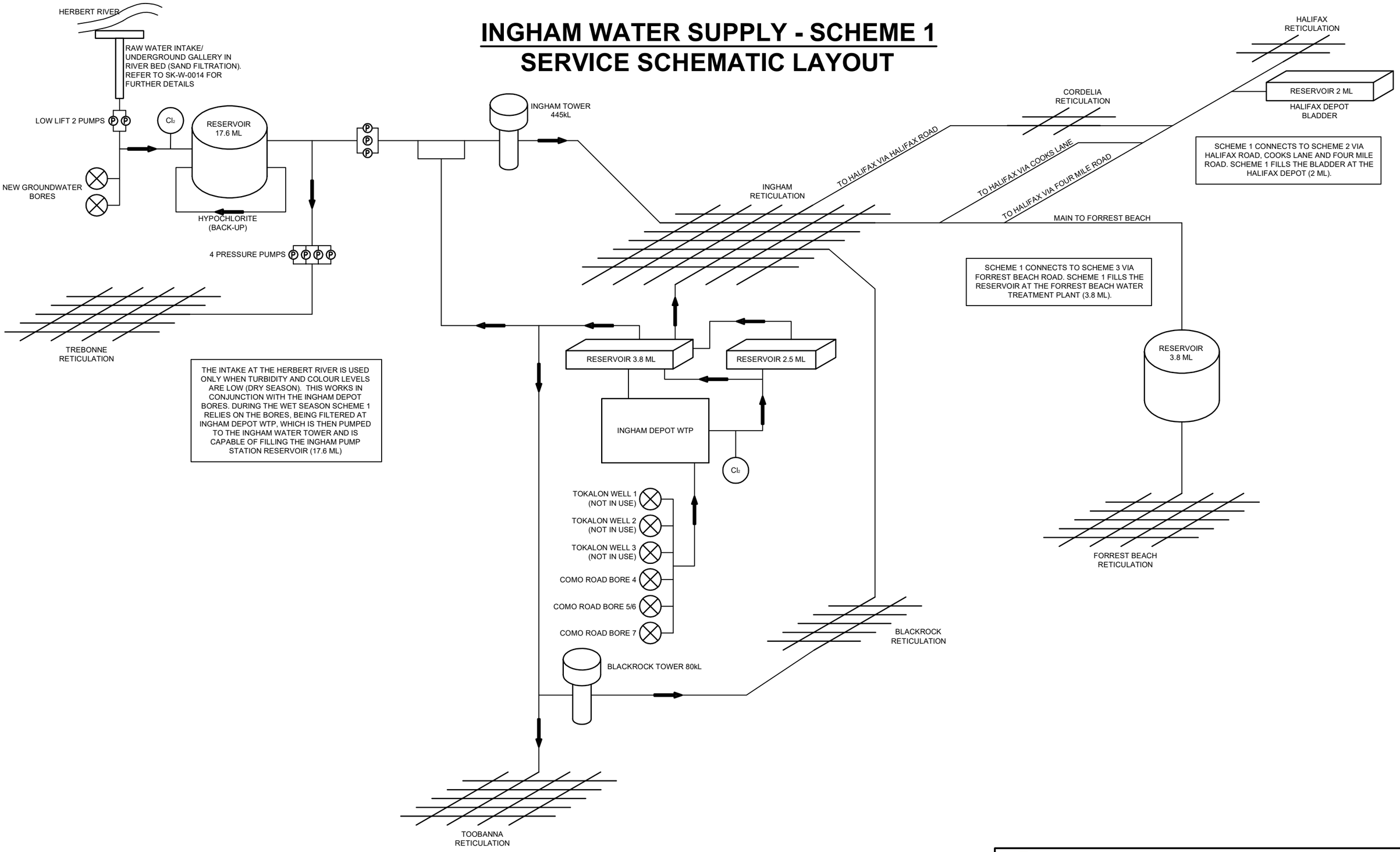
HINCHINBROOK SHIRE COUNCIL

HINCHINBROOK SHIRE COUNCIL
HINCHINBROOK WATER SUPPLY
OVERALL CAPCITY & SCHEMATIC LAYOUT
SK-W-0001
Version No. 03

Scheme 1 – Ingham Water Supply

INGHAM WATER SUPPLY - SCHEME 1
SERVICE SCHEMATIC LAYOUT



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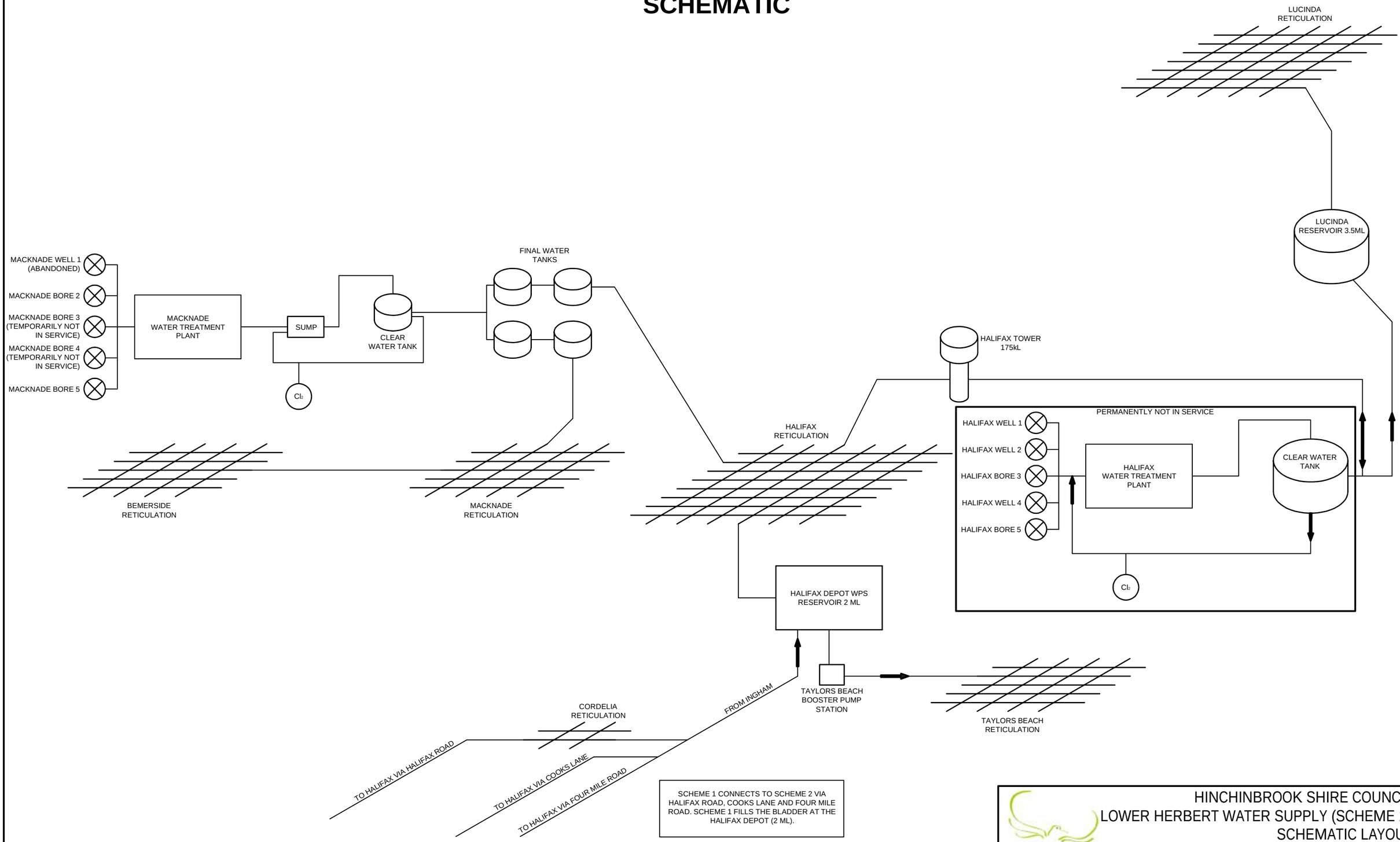
HINCHINBROOK SHIRE COUNCIL

HINCHINBROOK SHIRE COUNCIL INGHAM WATER SUPPLY (SCHEME 1) SCHEMATIC LAYOUT SK-W-0002 Version No. 05

Scheme 2 – Lower Herbert Water Supply

LOWER HERBERT WATER SUPPLY - SCHEME 2
SCHEMATIC



SCHEME 1 CONNECTS TO SCHEME 2 VIA HALIFAX ROAD, COOKS LANE AND FOUR MILE ROAD. SCHEME 1 FILLS THE BLADDER AT THE HALIFAX DEPOT (2 ML).

HINCHINBROOK SHIRE COUNCIL

HINCHINBROOK SHIRE COUNCIL

LOWER HERBERT WATER SUPPLY (SCHEME 2)
SCHEMATIC LAYOUT
SK-W-0003
Version No. 04

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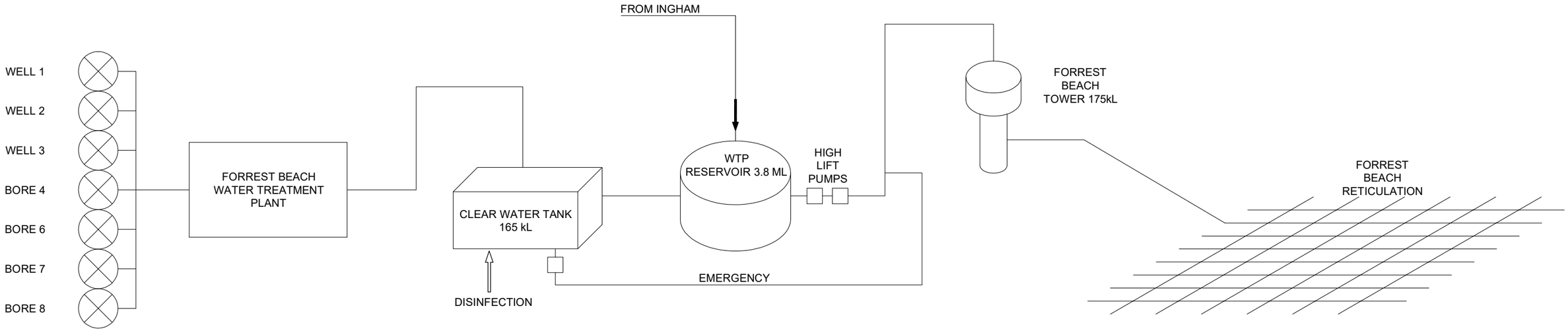
Scheme 3 – Forrest Beach Water Supply

FORREST BEACH WATER SUPPLY - SCHEME 3
SCHEMATIC



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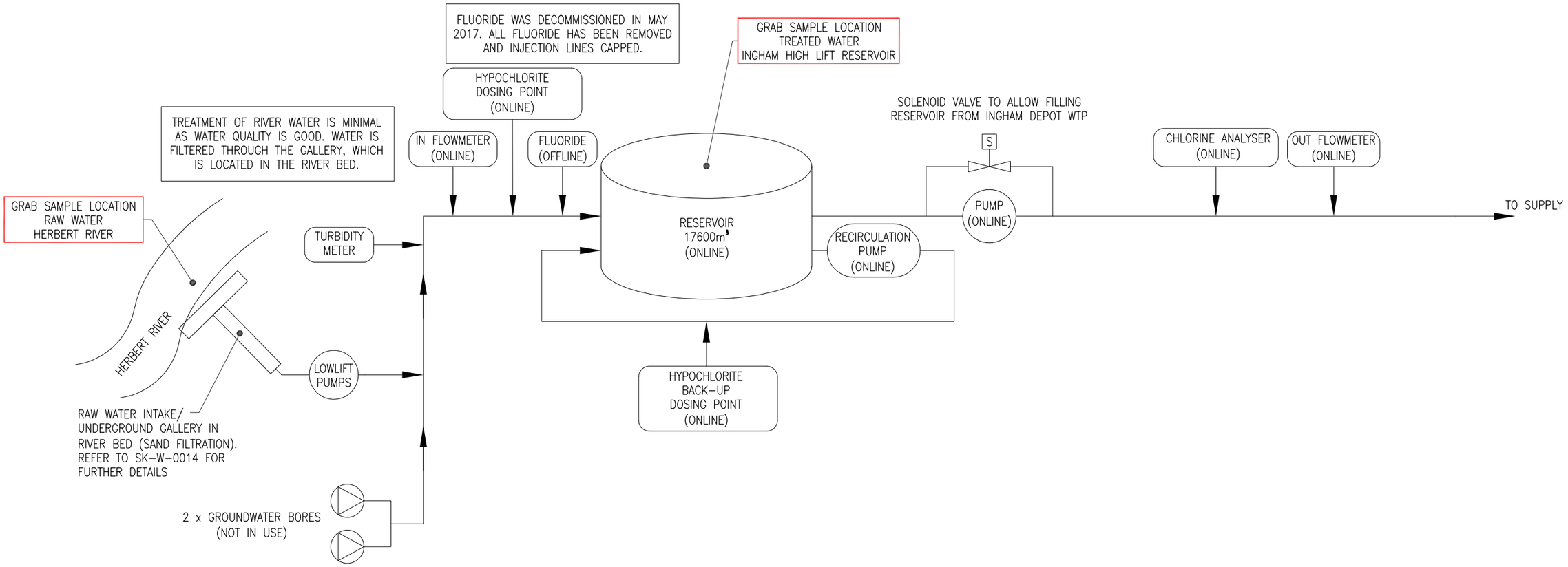
HINCHINBROOK SHIRE COUNCIL
FORREST BEACH WATER SUPPLY (SCHEME 3)
SCHEMATIC
SK-W-0004
Version No. 03

APPENDIX C - WATER TREATMENT PLANT SCHEMATICS

Water Treatment Plants Schematics Scheme 1



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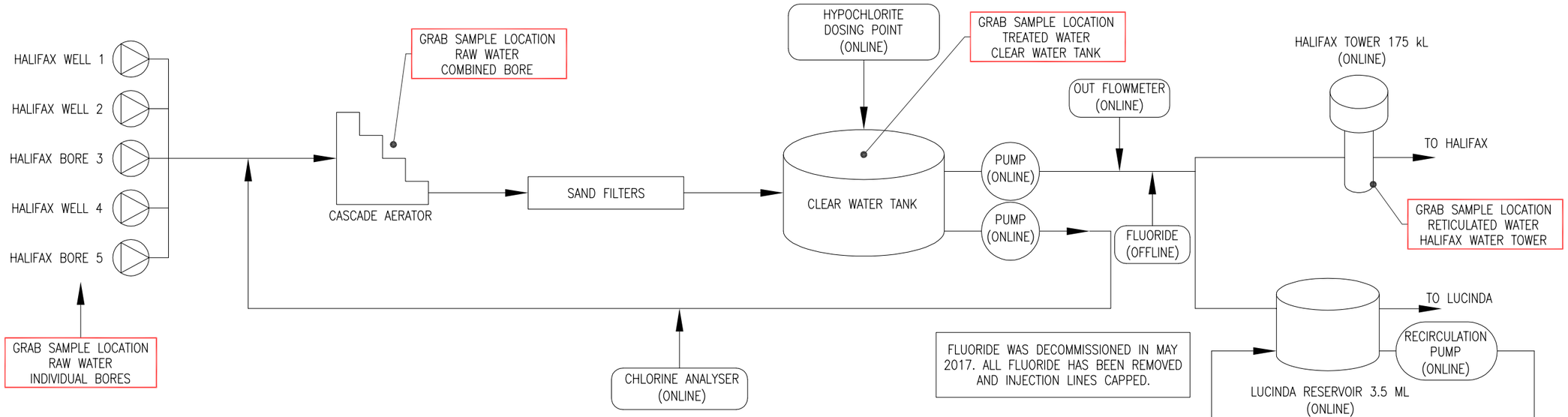
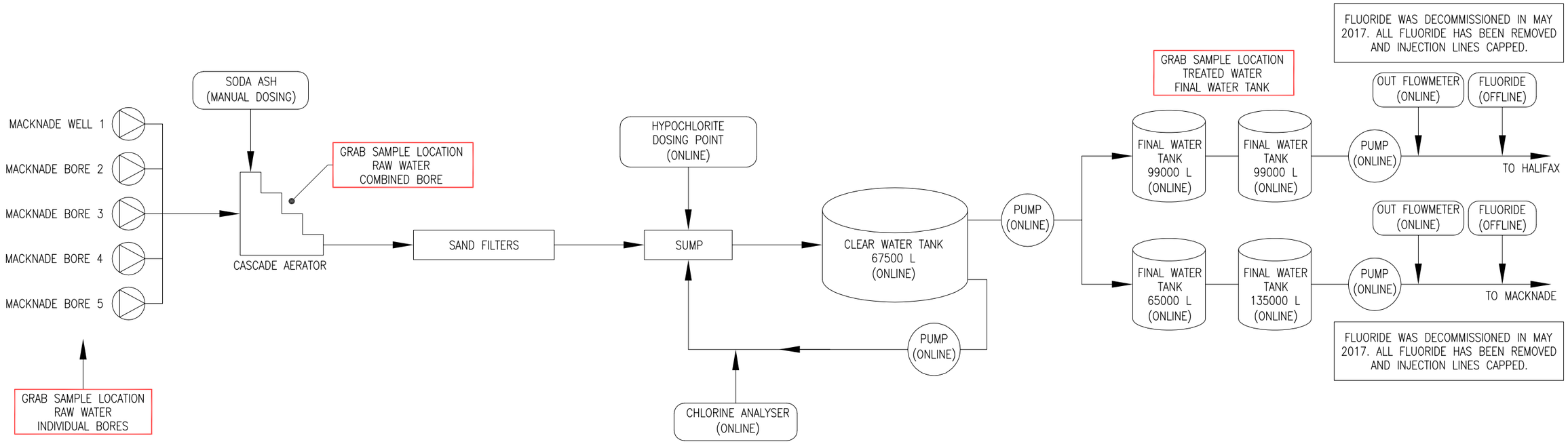
HINCHINBROOK SHIRE COUNCIL
WATER TREATMENT PLANTS SCHEME 1
SCHEMATIC
SK-W-0005
Version No. 05

Water Treatment Plants Schematics Scheme 2



HALIFAX WATER TREATMENT PLANT
SCHEMATIC



MACKNADE WATER TREATMENT PLANT
SCHEMATIC

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DATE PLOTTED: Wednesday, 16 May 2018 3:32:48 PM

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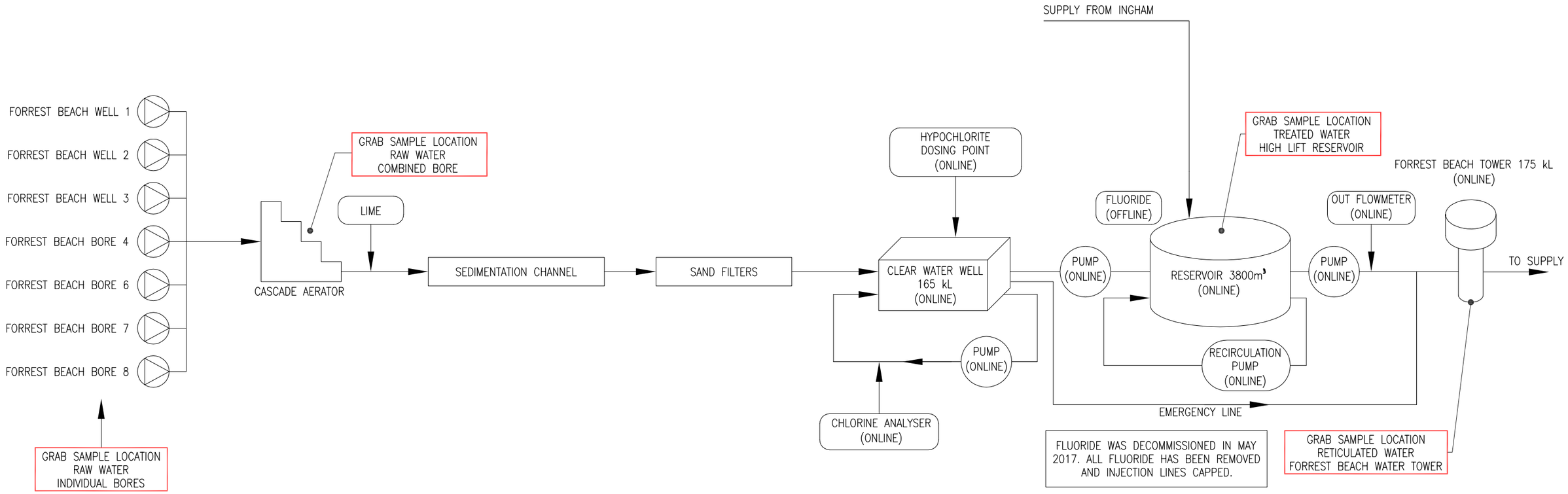
WATER TREATMENT PLANTS SCHEME 2
SCHEMATIC
SK-W-0006
Version No. 04

Water Treatment Plant Schematics Scheme 3



FORREST BEACH WATER TREATMENT PLANT
SCHEMATIC

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HINCHINBROOK SHIRE COUNCIL
WATER TREATMENT PLANTS SCHEME 3
SCHEMATIC
SK-W-0007
Version No. 04

APPENDIX D - WATER QUALITY DATA

Water Sample Data – Summary by Scheme (Previous 5 Year Period)

Data Period: 1 March 2016 – 1 March 2021

SCHEME 1 - Quarterly Monitoring Results Table

Enter Start Date: 01-March-2016 **Enter End Date:** 01-March-2021

Parameter	Scheme Component	Name of Scheme Component	Laboratory Name	Unit of Measure	Limit of Reporting for Chemical Parameters	Total Number of Samples Taken	Number of samples in which the parameter was detected.	Number of samples exceeding health guideline value or in which pathogens were detected.	Minimum concentration or Count	Maximum concentration or Count	Average (mean) concentration or count	Health Guideline Value	
Raw Water													
Nitrate	SW	Various Raw Water Sites		mg/L	0.5	18	16	0	<0.5	15	6.71	50	
Sulphate	SW	Various Raw Water Sites		mg/L	1	20	17	0	1	23	4.79	500	
Fluoride	SW	Various Raw Water Sites		mg/L	0.05	20	15	0	0.05	0.22	0.08	1.5	
pH (Lab)	SW	Various Raw Water Sites			0	20	20	0	6.14	7.37	6.75	6.5	8.5
Turbidity	SW	Various Raw Water Sites		NTU	1	20	10	4	1	18	6.20	5	
Aluminium	SW	Various Raw Water Sites		mg/L	0.05	20	6	3	0.08	0.45	0.22	0.2	
Boron	SW	Various Raw Water Sites		mg/L	0.02	20	2	0	0.02	0.02	0.02	4	
Copper	SW	Various Raw Water Sites		mg/L	0.03	20	7	0	0.03	0.07	0.04	2	
Iron	SW	Various Raw Water Sites		mg/L	0.01	20	9	0	0.03	0.25	0.13	0.3	
Manganese	SW	Various Raw Water Sites		mg/L	0.01	20	2	0	0.003	0.12	0.04	0.5	
Zinc	SW	Various Raw Water Sites		mg/L	0.01	20	10	0	0.01	0.09	0.03	3	
Pesticides/Herbicides	SW	Summary to be provided. Only identify samples that have positive detections. All nil results (i.e. less than the limit of reporting) can be summarised and reported as total pesticides with zeros entered for maximum, minimum and average concentration.											
Treated Water													
Nitrate	WTP	Various Treated Water Sites		mg/L	0.5	34	33	0	0.9	15	10.26	50	
Sulphate	WTP	Various Treated Water Sites		mg/L	1	34	34	0	1.1	5.8	3.56	500	
Fluoride	WTP	Various Treated Water Sites		mg/L	0.05	34	33	0	0.05	0.61	0.35	1.5	
pH (Lab)	WTP	Various Treated Water Sites			0	34	34	0	6.44	0	0.00	6.5	8.5
Turbidity	WTP	Various Treated Water Sites		NTU	1	34	10	1	2	5	2.90	5	
Aluminium	WTP	Various Treated Water Sites		mg/L	0.05	34	1	0	#VALUE!	0.05	0.05	0.2	
Boron	WTP	Various Treated Water Sites		mg/L	0.02	34	10	0	0.02	0.02	0.02	4	
Copper	WTP	Various Treated Water Sites		mg/L	0.03	34	0	0	0.008	#VALUE!	0.01	2	
Iron	WTP	Various Treated Water Sites		mg/L	0.01	34	17	0	0.01	0.05	0.02	0.3	
Manganese	WTP	Various Treated Water Sites		mg/L	0.01	34	0	0	<0.01	0	#DIV/0!	0.5	
Zinc	WTP	Various Treated Water Sites		mg/L	0.01	34	23	0	0.01	0.12	0.04	3	
Pesticides/Herbicides	WTP	Summary to be provided. Only identify samples that have positive detections. All nil results (i.e. less than the limit of reporting) can be summarised and reported as total pesticides with zeros entered for maximum, minimum and average concentration.											
Reticulated Water													
Nitrate	R	Various Reticulated Water Sites		mg/L	0.5	32	32	0	2.1	15	11.73	50	
Sulphate	R	Various Reticulated Water Sites		mg/L	1	32	32	0	1.3	7.1	4.68	500	
Fluoride	R	Various Reticulated Water Sites		mg/L	0.05	32	32	0	0.05	0.55	0.10	1.5	
pH (Lab)	R	Various Reticulated Water Sites		0	0	32	32	0	6.5	7.85	7.17	6.5	8.5
Turbidity	R	Various Reticulated Water Sites		NTU	1	32	10	0	1	4	1.70	5	
Aluminium	R	Various Reticulated Water Sites		mg/L	0.05	32	2	0	0.06	0.07	0.07	0.2	
Boron	R	Various Reticulated Water Sites		mg/L	0.02	32	2	0	0.03	0.03	0.03	4	
Copper	R	Various Reticulated Water Sites		mg/L	0.03	32	0	0	0.004	0.014	0.01	2	
Iron	R	Various Reticulated Water Sites		mg/L	0.01	32	15	0	0.01	0.13	0.02	0.3	
Manganese	R	Various Reticulated Water Sites		mg/L	0.01	32	0	0	0.001	0.001	0.00	0.5	
Zinc	R	Various Reticulated Water Sites		mg/L	0.01	32	10	0	0.01	0.06	0.02	3	
Pesticides/Herbicides	R	Summary to be provided. Only identify samples that have positive detections. All nil results (i.e. less than the limit of reporting) can be summarised and reported as total pesticides with zeros entered for maximum, minimum and average concentration.											
E.Coli	R	Refer to E.Coli Reporting Spreadsheet											

SCHEME 2 - Quarterly Monitoring Results Table

Enter Start Date: 01-March-2016 **Enter End Date:** 01-March-2021

Parameter	Scheme Component	Name of Scheme Component	Laboratory Name	Unit of Measure	Limit of Reporting for Chemical Parameters	Total Number of Samples Taken	Number of samples in which the parameter was detected.	Number of samples exceeding health guideline value or in which pathogens were detected.	Minimum concentration or Count	Maximum concentration or Count	Average (mean) concentration or count	Health Guideline Value	
Raw Water													
Nitrate	SW	Various Raw Water Sites		mg/L	0.5	12	12	0	0.9	24	13.492	50	
Sulphate	SW	Various Raw Water Sites		mg/L	1	12	12	0	3	17	11.917	500	
Fluoride	SW	Various Raw Water Sites		mg/L	0.05	12	8	0	0.05	0.7	0.148	1.5	
pH (Lab)	SW	Various Raw Water Sites			0	12	12	0	6.25	6.91	6.710	6.5	8.5
Turbidity	SW	Various Raw Water Sites		NTU	1	12	7	2	1	13	4.143	5	
Aluminium	SW	Various Raw Water Sites		mg/L	0.05	12	0	0	<0.05	0	#DIV/0!	0.2	
Boron	SW	Various Raw Water Sites		mg/L	0.02	12	10	0	0.03	0.07	0.045	4	
Copper	SW	Various Raw Water Sites		mg/L	0.03	12	0	0	<0.03	0	#DIV/0!	2	
Iron	SW	Various Raw Water Sites		mg/L	0.01	12	1	0	0.01	0.01	0.010	0.3	
Manganese	SW	Various Raw Water Sites		mg/L	0.01	12	6	0	0.015	0.06	0.028	0.5	
Zinc	SW	Various Raw Water Sites		mg/L	0.01	12	4	0	0.01	0.04	0.023	3	
Pesticides/Herbicides	SW	Summary to be provided. Only identify samples that have positive detections. All nil results (i.e. less than the limit of reporting) can be summarised and reported as total pesticides with zeros entered for maximum, minimum and average concentration.											
Treated Water													
Nitrate	WTP	Various Treated Water Sites		mg/L	0.5	25	25	0	2.6	17	13.14	50	
Sulphate	WTP	Various Treated Water Sites		mg/L	1	25	25	0	4	19	12.39	500	
Fluoride	WTP	Various Treated Water Sites		mg/L	0.05	25	21	0	0.05	0.61	0.35	1.5	
pH (Lab)	WTP	Various Treated Water Sites			0	25	25	0	6.59	7.86	7.19	6.5	8.5
Turbidity	WTP	Various Treated Water Sites		NTU	1	25	14	0	1	4	1.36	5	
Aluminium	WTP	Various Treated Water Sites		mg/L	0.05	25	0	0	<0.05	0.05	#DIV/0!	0.2	
Boron	WTP	Various Treated Water Sites		mg/L	0.02	25	24	0	0.02	0.06	0.04	4	
Copper	WTP	Various Treated Water Sites		mg/L	0.03	25	0	0	0.004	0.004	0.00	2	
Iron	WTP	Various Treated Water Sites		mg/L	0.01	25	7	0	0.01	0.02	0.01	0.3	
Manganese	WTP	Various Treated Water Sites		mg/L	0.01	25	0	0	<0.01	0	#DIV/0!	0.5	
Zinc	WTP	Various Treated Water Sites		mg/L	0.01	25	16	0	0.01	0.09	0.03	3	
Pesticides/Herbicides	WTP	Summary to be provided. Only identify samples that have positive detections. All nil results (i.e. less than the limit of reporting) can be summarised and reported as total pesticides with zeros entered for maximum, minimum and average concentration.											
Reticulated Water													
Nitrate	R	Various Reticulated Water Sites		mg/L	0.5	28	28	0	9.4	17	13.58	50	
Sulphate	R	Various Reticulated Water Sites		mg/L	1	28	28	0	5	18	10.60	500	
Fluoride	R	Various Reticulated Water Sites		mg/L	0.05	28	26	0	0.05	0.59	0.13	1.5	
pH (Lab)	R	Various Reticulated Water Sites		0	0	28	27	0		8.5		6.5	8.5
Turbidity	R	Various Reticulated Water Sites		NTU	1	28	11	0	1	2	1.18	5	
Aluminium	R	Various Reticulated Water Sites		mg/L	0.05	28	0	0	<0.05	0	#DIV/0!	0.2	
Boron	R	Various Reticulated Water Sites		mg/L	0.02	28	21	0	0.02	0.07	0.04	4	
Copper	R	Various Reticulated Water Sites		mg/L	0.03	28	1	0	0.003	0.11	0.02	2	
Iron	R	Various Reticulated Water Sites		mg/L	0.01	28	17	0	0.01	0.03	0.02	0.3	
Manganese	R	Various Reticulated Water Sites		mg/L	0.01	28	0	0	0.001	0.001	0.00	0.5	
Zinc	R	Various Reticulated Water Sites		mg/L	0.01	28	5	0	0.02	0.05	0.03	3	
Pesticides/Herbicides	R	Summary to be provided. Only identify samples that have positive detections. All nil results (i.e. less than the limit of reporting) can be summarised and reported as total pesticides with zeros entered for maximum, minimum and average concentration.											
E.Coli	R	Refer to E.Coli Reporting Spreadsheet											

SCHEME 3 - Quarterly Monitoring Results Table

Enter Start Date: 01-March-2016 **Enter End Date:** 01-March-2021

Parameter	Scheme Component	Name of Scheme Component	Laboratory Name	Unit of Measure	Limit of Reporting for Chemical Parameters	Total Number of Samples Taken	Number of samples in which the parameter was detected.	Number of samples exceeding health guideline value or in which pathogens were detected.	Minimum concentration or Count	Maximum concentration or Count	Average (mean) concentration or count	Health Guideline Value	
Raw Water													
Nitrate	SW	Various Raw Water Sites		mg/L	0.5	11	9	0	0.9	3.8	2.20	50	
Sulphate	SW	Various Raw Water Sites		mg/L	1	11	11	0	11	21	15.93	500	
Fluoride	SW	Various Raw Water Sites		mg/L	0.05	11	6	0	0.05	0.7	0.17	1.5	
pH (Lab)	SW	Various Raw Water Sites			0	11	11	0	6.13	7.12	6.61	6.5	8.5
Turbidity	SW	Various Raw Water Sites		NTU	1	11	11	9	4	20	12.73	5	
Aluminium	SW	Various Raw Water Sites		mg/L	0.05	11	0	0	<0.05	0	#DIV/0!	0.2	
Boron	SW	Various Raw Water Sites		mg/L	0.02	11	11	0	0.02	0.04	0.03	4	
Copper	SW	Various Raw Water Sites		mg/L	0.03	11	0	0	<0.03	0	#DIV/0!	2	
Iron	SW	Various Raw Water Sites		mg/L	0.01	11	7	0	0.01	0.25	0.06	0.3	
Manganese	SW	Various Raw Water Sites		mg/L	0.01	11	11	0	0.015	0.08	0.04	0.5	
Zinc	SW	Various Raw Water Sites		mg/L	0.01	11	3	0	0.02	0.02	0.02	3	
Pesticides/Herbicides	SW	Summary to be provided. Only identify samples that have positive detections. All nil results (i.e. less than the limit of reporting) can be summarised and reported as total pesticides with zeros entered for maximum, minimum and average concentration.											
Treated Water													
Nitrate	WTP	Various Treated Water Sites		mg/L	0.5	20	20	0	2.4	11	6.46	50	
Sulphate	WTP	Various Treated Water Sites		mg/L	1	20	20	0	7	13	9.77	500	
Fluoride	WTP	Various Treated Water Sites		mg/L	0.05	20	19	0	0.05	0.62	0.32	1.5	
pH (Lab)	WTP	Various Treated Water Sites			0	20	20	0	6.86	8.31	7.66	6.5	8.5
Turbidity	WTP	Various Treated Water Sites		NTU	1	20	16	0	1	4	1.63	5	
Aluminium	WTP	Various Treated Water Sites		mg/L	0.05	20	0	0	0.04	0.04	0.04	0.2	
Boron	WTP	Various Treated Water Sites		mg/L	0.02	20	17	0	0.02	0.03	0.02	4	
Copper	WTP	Various Treated Water Sites		mg/L	0.03	20	0	0	0.003	0.005	0.00	2	
Iron	WTP	Various Treated Water Sites		mg/L	0.01	20	20	10	0.08	#VALUE!	0.35	0.3	
Manganese	WTP	Various Treated Water Sites		mg/L	0.01	20	0	0	0.0006	0.002	0.00	0.5	
Zinc	WTP	Various Treated Water Sites		mg/L	0.01	20	4	0	0.01	0.09	0.05	3	
Pesticides/Herbicides	WTP	Summary to be provided. Only identify samples that have positive detections. All nil results (i.e. less than the limit of reporting) can be summarised and reported as total pesticides with zeros entered for maximum, minimum and average concentration.											
Reticulated Water													
Nitrate	R	Various Reticulated Water Sites		mg/L	0.5	19	19	0	3.2	9	6.98	50	
Sulphate	R	Various Reticulated Water Sites		mg/L	1	19	19	0	7	13	9.76	500	
Fluoride	R	Various Reticulated Water Sites		mg/L	0.05	19	19	0	0.05	0.52	0.14	1.5	
pH (Lab)	R	Various Reticulated Water Sites		0	0	19	19	0	6.09	8.74	7.37	6.5	8.5
Turbidity	R	Various Reticulated Water Sites		NTU	1	19	14	0	1	3	2.07	5	
Aluminium	R	Various Reticulated Water Sites		mg/L	0.05	19	0	0	0.03	0.04	0.04	0.2	
Boron	R	Various Reticulated Water Sites		mg/L	0.02	19	18	0	0.02	0.03	0.02	4	
Copper	R	Various Reticulated Water Sites		mg/L	0.03	19	0	0	0.003	0.01	0.01	2	
Iron	R	Various Reticulated Water Sites		mg/L	0.01	19	19	7	0.12	52	3.01	0.3	
Manganese	R	Various Reticulated Water Sites		mg/L	0.01	19	0	0	0.001	0.009	0.00	0.5	
Zinc	R	Various Reticulated Water Sites		mg/L	0.01	19	3	0	0.01	0.02	0.01	3	
Pesticides/Herbicides	R	Summary to be provided. Only identify samples that have positive detections. All nil results (i.e. less than the limit of reporting) can be summarised and reported as total pesticides with zeros entered for maximum, minimum and average concentration.											
E.Coli	R	Refer to E.Coli Reporting Spreadsheet											

Water Sample Data – Detailed for each Test Site (Historical to 2021)

Data Period: Commencement of Testing – 1 March 2021
Available as a separate attachment (72 Pages)

HINCHINBROOK SHIRE COUNCIL

SCHEME 1
INGHAM WATER SUPPLY
RAW WATER
Scheme Component: SW

METHOD		PARAMETER	UNITS	HEALTH	AESTHETIC												
						LABORATORY NAME											
						REPORT #			ID_HIN010		ID_HIN042	ID_HIN069	ID_HIN068	ID_HIN065	ID_HIN072	ID_HIN073	ID_HIN098	ID_HIN099
						SAMPLE TYPE	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
						FINANCIAL YEAR	1988/1989	1997-1998	1997-1998	1999-2000	1999-2000	2000-2001	2000/2001	2000/2001	2000-2001	2000/2001	2001-2002	2001/2002
						DATE SAMPLE TAKEN	15-March-1989	17-April-1989	10-March-1998	23-February-2000	21-June-2000	02-February-2001	02-February-2001	02-February-2001	20-June-2001	20-June-2001	06-March-2002	06-March-2002
						SAMPLE LOCATION	SP56 - Combined Bores	SP56 - Combined Bores	SP56 - Combined Bores	SP56 - Combined Bores	SP56 - Combined Bores	SP56 - Combined Bores	SP15 - Como Rd Bore 5	SP55 - Herbert River	SP56 - Combined Bores	SP55 - Herbert River	SP56 - Combined Bores	SP55 - Herbert River
18320		Conductivity @ 25' C	us/cm				140	330	165	178	151	182	178	83	161	93	165	61
18226		pH @ 21' C			6.5-8.5		5.5	5.75	6.4	6.17	6.02	5.71	6.68	6.81	6.03	7.24	6.4	7
18209		Total Hardness CaCO3/L	mg		200		34	31	34	38.4	26	34.9	25.3	17.1	46.2	17.6	34.5	13
18209		Temp Hardness CaCO3/L	mg															
18208		Alkalinity CaCO3/L	mg				45		38	39	47	42	45	24	46	30	43.5	19.5
18209		Residual Alkalinity	meq/L						0.1	0.2	0.6	0.3	0.6	0.2	0.2	0.4	0.2	0.1
18195		Silica	mg/L						39	38	46	32	32		40	22	37	14
18209		Total Dissolved Ions	mg/L		500				120								120	47
18209		Total Dissolved Solids	mg/L				100	250	130	91	80	96	86	47	97	50	130	49
18206		Colour	HAZEN		15				<1	0	0.2			15	1	12	<1	24
18212		Turbidity	NTU		5				<1	0.78	0			6	0.1	2.4	<1	130
18209		pH SAT* (calc for CaCO3)																
18209		Saturation Index							-2.5								-2.5	
18209		Mole Ratio							3.5								3.5	
18209		Sodium Adsorption Ratio							1.5	1.4	1.7	1.5	1.7	1	1.7	1	1.5	0.7
18209		Figure Of Merit Ratio							0.8								0.8	1
		CATIONS																
18195		Sodium	mg/L		180		17	17	19.5	19.9	19.5	20.6	20.2	9.1	26.3	10.1	21	5.8
18195		Potassium	mg/L				1.3	3	1.1	1.6	1.1	1.2	1.1	1.4	1.5	1.2	0.8	1.3
18195		Calcium	mg/L				6.5	6.3	8.1	10.1	6.3	8.7	8	3.7	12.9	3.6	8	2.6
18195		Magnesium	mg/L				3	3	3.3	3.2	2.5	3.2	1.3	1.9	3.4	2.1	3.5	1.6
18209		Hydrogen	mg/L						0								0	0
		ANIONS																
18209		Bicarbonate	mg/L				45	47	46.5	47.7	56.9	50.9	55.5	29.3	56	36.2	53	24
18209		Carbonate	mg/L				0		0	0	0	0	0	0	0	0	0	0
18209		Hydroxide	mg/L				0		0	0	0	0	0	0	0	0	0	0
18204		Chloride	mg/L		250				11.5	11.7	10	14	13	9	13	7	12	6.8
18204		Fluoride	mg/L	1.5					<0.1	0.04	0.1	0.3	0.3	0.31	0.11	0.11	<0.1	<0.1
18204		Nitrate as NO3	mg/L	50													19	4
18204		Sulphate	mg/L	500	250				4.7	13	5	17	8	3	4	3	5.3	<2
		OTHER DISSOLVED ELEMENTS																
18195		Iron	mg/L		0.3		1.7	1.1	<0.02	0.02	0.01	0.02	0	0.32	0	0.15	<0.01	0.07
18195		Manganese	mg/L	0.5	0.1		0.22	0.22	<0.02	0.05	0.01	0	0	0.01	0.04	0.01	<0.03	<0.03
18195		Zinc	mg/L		3				0.05	0	0.01	0	0.03	0.01	0	0	0.07	0.02
18195		Aluminium	mg/L		0.2				<0.05	0.01	0.08	0	0	0.02	0	0	<0.05	0.1
18195		Boron	mg/L	4					<0.1								<0.02	<0.02
18195		Copper	mg/L	2	1				<0.05	0		0.02	0.05	0.02	0	0	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY RAW WATER Scheme Component:	SW	ID_HIN129 SWA 2002/2003 13-August-2002 SP15 - Como Rd Bore 5	ID-HIN SWA 2002/2003 13-August-2002 SP60 - Tokalon Well 1	SWA 2002/2003 13-August-2002 SP63 - Como Rd Bore 4	ID-HIN130 SWA 2002/2003 13-August-2002 SP61 - Tokalon Well 2	ID-HIN131 SWA 2002/2003 13-August-2002 SP62 - Tokalon Well 3	ID-HIN127 SWA 2002/2003 13-August-2002 SP56 - Combined Bores	ID-HIN136 SWA 2002/2003 13-August-2002 SP55 - Herbert River	ID-HIN194 SWA 2002/2003 14-March-2003 SP55 - Herbert River	ID-HIN197 SWA 2002/2003 16-April-2003 SP55 - Herbert River	ID-HIN196 SWA 2002/2003 17-April-2003 SP60 - Tokalon Well 1	ID-HIN199 SWA 2002/2003 17-April-2003 SP63 - Como Rd Bore 4	ID-HIN194 SWA 2002/2003 17-April-2003 SP61 - Tokalon Well 2	ID-HIN198 SWA 2002/2003 17-April-2003 SP62 - Tokalon Well 3	ID-HIN193 SWA 2002/2003 17-April-2003 SP15 - Como Rd Bore 5	ID-HIN195 SWA 2002/2003 17-April-2003 SP56 - Combined Bores
PARAMETER	UNITS															
Conductivity @ 25' C	us/cm	160	165	170	170	170	165	97	54	100	165	160	160	160	165	160
pH @ 21' C		6.25	6.1	6.25	6.15	6.2	6.15	7.15	6.55	7.5	6.55	6.35	6.35	6.3	6.45	6.45
Total Hardness CaCO3/L	mg	34	33	38.5	34	33.5	34.5	22	7.7	20.5	30.5	30.5	31.5	30.5	30.5	30
Temp Hardness CaCO3/L	mg															
Alkalinity CaCO3/L	mg	41	42.5	46.5	47	47	41.5	36	8.9	29	62	37.5	41	40	42	42.5
Residual Alkalinity	meq/L	0.2	0.2	0.2	0.3	0.3	0.1	0.3	0	0.2	0.6	0.1	0.2	0.2	0.2	0.3
Silica	mg/L	41	42	38	39	38	42	26	17	29	55	49	49	49	49	50
Total Dissolved Ions	mg/L	120	120	120	120	120	120	76	32	69	120	110	110	110	120	110
Total Dissolved Solids	mg/L	130	130	130	130	130	140	80	43	80	140	140	140	140	140	140
Colour	HAZEN	<1	<1	<1	<1	<1	<1	2	2	7	<1	<1	1	<1	<1	<1
Turbidity	NTU	<1	<1	<1	<1	<1	<1	1	185	2	3	<1	7	<1	<1	<1
pH SAT* (calc for CaCO3)																
Saturation Index		-2.7	-2.8	-2.5	-2.7	-2.7	-2.8	-2	-3.7	-1.8	-2.2	-2.7	-2.6	-2.7	-2.5	-2.5
Mole Ratio		3.6	3.8	3.8	3.9	3.9	3.7	2.7	3.9	2.6	3.2	3.6	3.6	3.6	3.4	3.4
Sodium Adsorption Ratio		1.4	1.5	1.4	1.5	1.5	1.4	1	1.1	1	1.8	1.5	1.4	1.5	1.5	1.5
Figure Of Merit Ratio		0.8	0.8	0.9	0.8	0.8	0.9	0.9	0.5	0.9	0.6	0.7	0.8	0.7	0.8	0.7
CATIONS																
Sodium	mg/L	19	19.5	20	20.5	20	19	11	6.9	10.5	22	19	18.5	19	18.5	19
Potassium	mg/L	1.1	1.1	2.1	1.9	1.9	1.1	1.2	2	1.6	0.8	1	1	1	1	1
Calcium	mg/L	8.1	8	10.5	8.6	8.4	8.3	5.1	1.5	4.3	8.2	7.3	7.6	7.3	7.3	7.3
Magnesium	mg/L	3.3	3.2	3.1	3	3.1	3.4	2.2	0.9	2.4	2.5	3	3	3	3	2.9
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	50	52	57	57	57	51	44	11	35	75	46	50	48.5	51	52
Carbonate	mg/L	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	11	12	20	19.5	20	11.5	9.8	7.4	13	14	12	13	13	12.5	12
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	21	18	2.5	2.7	2.4	21	0.8	0.9	<0.5	1	17	17	17.5	17.5	14.5
Sulphate	mg/L	4.5	3.9	5.8	4.7	5.1	4.5	<2	<2	<2	<2	4.3	4.6	4.7	4.8	4
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	<0.03	0.03	0.08	0.04	0.03	<0.03	0.06	<0.03	<0.03	0.08	<0.03	<0.03	<0.03	<0.03	<0.03
Zinc	mg/L	0.05	0.03	0.04	0.02	0.18	1	0.01	0.02	<0.01	0.04	0.01	0.03	0.01	0.9	0.04
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.03	0.04	0.03	0.05	0.03	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/L	0.07	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.12	<0.03

SCHEME 1 INGHAM WATER SUPPLY RAW WATER Scheme Component:	SW	ID-HIN226 SWA 2003/2004 05-August-2003 SP60 - Tokalon Well 1	ID-HIN225 SWA 2003/2004 05-August-2003 SP61 - Tokalon Well 2	ID-Hin223 SWA 2003/2004 05-August-2003 SP55 - Herbert River	ID-HIN228 SWA 2003/2004 06-August-2003 SP55 - Herbert River	ID-HIN234 SWA 2003-2004 08-August-2003 SP56 - Combined Bores	ID-HIN232 SWA 2003/2004 14-August-2003 SP62 - Tokalon Well 3	ID-HIN233 SWA 2003/2004 14-August-2003 SP63 - Como Rd Bore 4	ID-HIN247 SWA 2003-2004 22-October-2003 SP56 - Combined Bores	ID-Hin248 SWA 2003/2004 22-October-2003 SP55 - Herbert River	ID-HIN266 SWA 2003-2004 16-December-2003 SP56 - Combined Bores	ID-Hin265 SWA 2003/2004 16-December-2003 SP55 - Herbert River	ID-HIN277 SWA 2003-2004 18-February-2004 SP56 - Combined Bores	ID-HIN283 SWA 2003-2004 20-May-2004 SP56 - Combined Bores	ID-HIN285 SWA 2003/2004 20-May-2004 SP55 - Herbert River	ID-HIN292 SWA 2003/2004 16-June-2004 SP55 - Herbert River
PARAMETER	UNITS															
Conductivity @ 25' C	us/cm	215	165	78	180	180	165	165	165	110	165	115	160	165	80	75
pH @ 21' C		6.75	6.55	7.3	6.45	6.55	6.35	6.2	6.3	7.35	6.75	7.6	6.3	6.3	7.2	7.1
Total Hardness CaCO3/L	mg	34	32.5	13.5	36.5	32	32.5	32.5	32	21	30	20.5	27.5	27	9.4	11
Temp Hardness CaCO3/L	mg															
Alkalinity CaCO3/L	mg	74	43.5	22.5	44.5	53	41	41	40.5	34.5	47	42	40	44	18.5	19
Residual Alkalinity	meq/L	0.8	0.2	0.2	0.2	0.4	0.2	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.2	0.2
Silica	mg/L	44	42	17	44	41	42	43	43	29	45	37	45	45	23	24
Total Dissolved Ions	mg/L	160	120	51	130	130	120	120	120	76	120	84	110	120	46	48
Total Dissolved Solids	mg/L	160	130	54	150	140	140	140	130	84	140	95	130	130	57	60
Colour	HAZEN	<1	<1	5	<1	<1	<1	<1	<1	2	1	6	<1	<1	13	10
Turbidity	NTU	56	4	<1	<1	12	<1	<1	<1	2	2	<1	<1	<1	5	3
pH SAT* (calc for CaCO3)																
Saturation Index		-1.9	-2.4	-2.4	-2.4	-2.3	-2.6	-2.7	-2.6	-1.9	-2.1	-1.5	-2.7	-2.7	-2.7	-2.7
Mole Ratio		3.2	3.4	2.8	3.4	3.3	3.6	3.7	3.6	2.6	3.2	2.2	3.6	3.6	3	3
Sodium Adsorption Ratio		2.5	1.5	0.9	1.5	1.7	1.5	1.5	1.5	1.2	1.7	1.3	1.6	1.7	1.1	1.1
Figure Of Merit Ratio		0.5	0.8	0.8	0.8	0.7	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.5	0.6
CATIONS																
Sodium	mg/L	33.5	20	7.8	20.5	22	19.5	19.5	19.5	13	21	13.5	19	20	7.9	8.2
Potassium	mg/L	1.5	1.3	1.1	1.1	1.1	1.1	1	1.1	1.2	1.4	1.2	1	1.1	1.3	1.3
Calcium	mg/L	9	8.1	2.7	9	8	7.8	7.8	7.6	4.5	7.2	4.3	6.5	6.3	1.9	2.2
Magnesium	mg/L	2.8	3	1.7	3.5	3	3.1	3.1	3.1	2.4	2.9	2.4	2.8	2.8	1.1	1.3
Hydrogen	mg/L	0	0		0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	91	53	27.5	55	64	50	50	49.5	42	57	51	49	54	22.5	23.5
Carbonate	mg/L	0	0	0	0	0	0	0	0	0.1	0	0.1	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	24.5	12.5	9.7	12	14	11.5	11.5	11.5	10.5	16.5	10.5	11.5	12	9.3	9.1
Fluoride	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	<0.5	16.5	<0.5	23	16	20.5	20	17.5	<0.5	9	<0.5	15	15.5	1.3	1.3
Sulphate	mg/L	<2	4.6	<2	5.2	4.1	5.1	5	5.3	<2	4.9	<2	4.5	4.7	<2	<2
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	0.14	0.07
Manganese	mg/L	0.15	<0.03	<0.03	<0.03	0.06	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Zinc	mg/L	0.05	0.02	<0.03	0.6	0.6	0.03	0.01	0.01	<0.01	0.03	0.02	0.01	0.02	0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	<0.05
Boron	mg/L	<0.02	<0.02	<0.02	<0.02	0.03	0.05	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	0.03
Copper	mg/L	<0.03	<0.03	<0	0.27	0.04	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	0.04	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY RAW WATER Scheme Component:	SW	ID-HIN300 SWA 2004/2005 07-July-2004 SP15 - Como Rd Bore 5	ID-HIN301 SWA 2004/2005 07-July-2004 SP55 - Herbert River	ID-HIN310 SWA 2004/2005 21-October-2004 SP55 - Herbert River	ID-HIN324 SWA 2004/2005 09-November-2004 SP55 - Herbert River	ID-HIN336 SWA 2004/2005 09-December-2004 SP15 - Como Rd Bore 5	ID-HIN340 SWA 2004/2005 09-December-2004 SP55 - Herbert River	ID-HIN343 SWA 2004/2005 12-January-2005 SP15 - Como Rd Bore 5	ID-HIN366 SWA 2004/2005 13-April-2005 SP15 - Como Rd Bore 5	ID-HIN367 SWA 2004/2005 13-April-2005 SP55 - Herbert River	ID- HIN382 SWA 2004/2005 09-June-2005 SP56 - Combined Bores	ID-383 SWA 2004/2005 09-June-2005 SP55 - Herbert River	ID-HIN401 SWA 2005/2006 03-August-2005 SP15 - Como Rd Bore 5	ID-397 SWA 2005/2006 03-August-2005 SP55 - Herbert River	ID-HIN412 SWA 2005/2006 08-February-2006 SP15 - Como Rd Bore 5	ID-HIN413 SWA 2005/2006 08-February-2006 SP55 - Herbert River
PARAMETER	UNITS															
Conductivity @ 25' C	us/cm	165	76	110	114	160	114	160	159	60	171	64	160	66	159	85
pH @ 21' C		6.4	7.2	7.3	7.39	6.5	7.3	6.33	6.49	7.19	6.44	7.18	6.31	6.74	6.4	7
Total Hardness CaCO3/L	mg	30	14.5	18.5	20	28	19	28	29	7.6	31	9.1	26	8.6	30	19
Temp Hardness CaCO3/L	mg															
Alkalinity CaCO3/L	mg	42.5	20.5	35	39	44	37	39	0.4	15	53	18	43	13	42	25
Residual Alkalinity	meq/L	0.2	0.1	0.3	0.4	0.3	0.4	0.2	0.4	0.2	0.4	0.2	0.3	0.1	0.2	0.1
Silica	mg/L	43	27	37	36	43	30	44	47	19	42	19	45	17	45	22
Total Dissolved Ions	mg/L	120	53	76	81	114	80	107	114	38	123	43	108	39	109	57
Total Dissolved Solids	mg/L	130	67	91	93	130	88	127	132	48	132	51	127	48	129	64
Colour	HAZEN	<1	6	7	7	2	12	<1	<1	22	<1	10	7	19	<1	39
Turbidity	NTU	<1	2	2	2	<1	1	<1	<1	11	<1	2	<1	20	1	30
pH SAT* (calc for CaCO3)																
Saturation Index		-2.6	-2.4	-2	-1.8	-2.5	-2	-2.7	-2.4	-2.9	-2.4	-2.7	-2.7	-3.3	-2.6	-2.4
Mole Ratio		3.4	2.9	2.6	2.4	3.3	2.6	3.5	3.3	3	3.4	2.9	3.6	3.5	3.5	3
Sodium Adsorption Ratio		1.5	1.2	1.3	1.3	1.6	1.3	1.6	1.6	1.1	1.4	1.1	1.6	1.1	1.5	0.8
Figure Of Merit Ratio		0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.7	0.5	0.8	0.6	0.7	0.6	0.7	1.1
CATIONS																
Sodium	mg/L	19	10.5	13	14	19	13	19	20	7	19	7	18	7	19	8
Potassium	mg/L	1	0.8	1.3	1.4	1	1.8	1.1	0.9	1.3	1	1	1	1.2	0.9	1.8
Calcium	mg/L	7.1	3.1	3.8	4.1	6.6	3.9	6.5	6.8	1.5	7.4	1.8	6.1	1.7	7.1	4.1
Magnesium	mg/L	3	1.6	2.2	2.4	2.9	2.2	2.9	2.9	0.9	3.1	1.1	2.7	1	2.9	2.3
Hydrogen	mg/L	0	0	0		0	0	0	0	0	0		0	0	0	0
ANIONS																
Bicarbonate	mg/L	52	25	42.5	47	54	45	48	57	19	65	22	52	16	51	30
Carbonate	mg/L	0	0	0	0.1	0	0.1	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	11	9.1	9.7	10	11	12	11	12	8.5	13	8.5	12	9.2	14	9.1
Fluoride	mg/L	<0.1	<0.1	0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	9.1
Nitrate as NO3	mg/L	16	1.6	1.7	0.8	14	1	13	10	<0.5	10	0.5	10	1.1	10	1
Sulphate	mg/L	6.4	<2	<2	<2.0	5.2	<2.0	5.2	5	<1.0	4.8	<1.0	5.4	1.5	4.8	<1.0
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	0.04	0.03	<0.01	<0.01	0.03	<0.01	<0.01	0.06	<0.01	0.04	<0.01	0.11	<0.01	0.25
Manganese	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.9	<0.03	<0.03	<0.03	<0.03	<0.03	<0.3
Zinc	mg/L	0.06	0.03	0.01	<0.01	<0.01	0.01	0.02	0.03	<0.01	1.6	<0.01	0.05	<0.01	<0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.5	0.05	<0.05	0.26	<0.05	0.05
Boron	mg/L	0.06	0.04	0.03	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.13	0.07	0.62	<0.03	0.03	<0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY RAW WATER Scheme Component:	SW	ID- HIN428 SWA 2005/2006 26-May-2006 SP56 - Combined Bores	ID-HIN448 SWA 2006/2007 13-September-2006 SP15 - Como Rd Bore 5	ID-HIN463 SWA 2006/2007 04-May-2007 SP15 - Como Rd Bore 5	HIN464 SWA 2006/2007 04-May-2007 SP55 - Herbert River	ID-HIN SWA 2006/2007 28-July-2007 SP15 - Como Rd Bore 5	HIN477 SWA 2007/2008 30-July-2007 SP55 - Herbert River	ID-HIN494 SWA 2007/2008 02-November-2007 SP55 - Herbert River	ID-HIN513 SWA 2007/2008 29-February-2008 SP15 - Como Rd Bore 5	HIN515 SWA 2007/2008 05-March-2008 SP55 - Herbert River	ID-HIN519 SWA 2007/2008 22-April-2008 SP15 - Como Rd Bore 5	HIN520 SWA 2007/2008 22-April-2008 SP55 - Herbert River	ID_HIN619 SWA 2008/2009 27-October-2008 SP56 - Combined Bores	ID-HIN620 SWA 2008/2009 27-October-2008 SP55 - Herbert River	ID-HIN678 SWA 2009/2010 31-July-2009 SP55 - Herbert River	ID-HIN699 SWA 2009/2010 22-October-2009 SP55 - Herbert River
PARAMETER	UNITS															
Conductivity @ 25' C	us/cm	164	168	174	78	166	81	103	176	62	181	91	226	90	116	142
pH @ 21' C		6.39	6.44	6.54	7.28	6.38	7.24	7.25	6.57	6.84	6.44	7.24	7.92	7.4	7.36	7.59
Total Hardness CaCO3/L	mg	30	30	32	14	28	15	20	33	11	33	17	32	17	28	30
Temp Hardness CaCO3/L	mg															
Alkalinity CaCO3/L	mg	42	43	42	0.2	42	21	34	40	19	40	25		26	39	47
Residual Alkalinity	meq/L	0.2	0.3	1.6	0.2	0.2	0.1	0.3	0.1	0.2	0.1	0.2	0.3	0.2	0.2	0.3
Silica	mg/L	45			25		23	29	44	23	43	25	42	23	26	34
Total Dissolved Ions	mg/L	113	111	118	55	101	53	76	119	44	120	59	148	61	84	100
Total Dissolved Solids	mg/L	132	130	136	66	123	63	83	138	55	139	69	161	68	87	105
Colour	HAZEN	2	1	2	13	<1	5	10	1	38	2	<1	<1	12	3	5
Turbidity	NTU	1	<1	<1	1	<1	2	4	<1	32	1	4	<1	3	1	1
pH SAT* (calc for CaCO3)																
Saturation Index		-2.6	-2.5	-2.4	-2.3	-2.6	-2.3	-2	-2.4	-2.9	-2.6	-2.3	-1	-2.1	-1.7	-1.4
Mole Ratio		3.6	3.5	3.3	2.7	3.6	2.8	2.7	3.5	3.1	3.6	2.8	2.4	2.6	2.5	2.3
Sodium Adsorption Ratio		1.5	1.6	1.6	1	1.5	1.1	1.2	1.6	0.9	1.5	1	2.3	1	1	1.2
Figure Of Merit Ratio		0.7	0.7	0.7	0.7	0.8	0.7	0.8	0.7	0.8	0.7	0.8	0.5	0.8	1.1	0.9
CATIONS																
Sodium	mg/L	19	19	20	9	19	10	12	20	7	20	10	30	10	12	15
Potassium	mg/L	1	0.9	1	1.1	1	1.1	1.4	1.1	1.4	1.1	1.3	1	1.2	1.3	1.4
Calcium	mg/L	7	7	7.5	3	7.3	3.2	4	7.5	2.3	7.7	3.6	7.8	3.5	5.6	5.7
Magnesium	mg/L	3.1	2.9	3.2	1.5	3.2	1.6	2.3	3.4	1.3	3.4	2.1	3.1	2	3.4	4
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	51	52	51	28	51	25	42	48	23	48	3.1	57	32	47	58
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0.1	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	15	15	16	9.2	16	9.6	11	17	7.1	17	9.7	34	11	12	13
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	0.1	0.06	0.06	0.05	0.05	<0.1	<0.1	0.05	0.07	0.07	0.11
Nitrate as NO3	mg/L	12	8.5	14	1.8	13	1.3	1.7	16	<0.5	17	1.1	9.6	0.6	1.2	1.2
Sulphate	mg/L	4.4	5.4	4.6	1.1	4.6	1.2	1.6	4.6	1	4.6	1.2	4.7	1.3	1.6	2
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	0.12	<0.01	0.04	0.02	<0.01	0.29	<0.01	0.06	<0.01	0.07	<0.01	<0.01
Manganese	mg/L	<0.03	<0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.3	0.04	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	<0.01	<0.01	0.04	0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	0.06	<0.05	<0.05	<0.05	<0.05	0.71	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.01	0.02	0.02	<0.02	<0.02	0.02	0.02	<0.02	0.02	0.02	0.02	0.02	<0.02	0.02
Copper	mg/L	0.74	0.04	0.05	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY RAW WATER Scheme Component:		ID- HIN698 SWA 2009/2010 22-October-2009 SP56 - Combined Bores	ID-HIN767 SWA 2010/2011 14-April-2011 SP55 - Herbert River	ID-HIN801 SWA 2011/2012 19-January-2012 SP15 - Como Rd Bore 5	ID-HIN802 SWA 2011/2012 19-January-2012 SP55 - Herbert River	ID-HIN801 SWA 2012/2013 30-August-2012 SP15 - Como Rd Bore 5	ID-HIN836 SWA 2012/2013 30-August-2012 SP55 - Herbert River	ID-HIN848 SWA 2012/2013 14-November-2012 SP55 - Herbert River	ID-HIN853 SWA 2012/2013 27-November-2012 SP15 - Como Rd Bore 5	ID-HIN861 Pest/Herb 2012/2013 29-November-2012 SP56 - Combined Bores	ID-HIN862 Pest/Herb 2012/2013 29-November-2012 SP55 - Herbert River	QLD Government ID-HIN868 SWA 2012/2013 21-May-2013 SP55 - Herbert River	QLD Government HIN903 SWA 2013/2014 20-November-2013 SP15 - Como Rd Bore 5	QLD Government HIN897 SWA 2013/2014 20-November-2013 SP55 - Herbert River	QLD Government HIN979 Blue Green Algae Count 2014/2015 03-December-2014 SP55 - Herbert River	QLD Government HIN1013 2014/2015 19-May-2015 Lot 1 Palmas Rd, Hoose Tap
PARAMETER	UNITS															
Conductivity @ 25' C	us/cm	214	138	170	80	182	94	119	162			66	166	102		201
pH @ 21' C		7.72	6.4	6.42	7.02	6.44	7.35	7.56	6.53			7.31	6.23	7.13		6.39
Total Hardness CaCO3/L	mg	32	27	34	17	35	19	24	31			11	33	21		36
Temp Hardness CaCO3/L	mg												33	21		36
Alkalinity CaCO3/L	mg	41	46	44	22	46	34	39	41			16	41	32		50
Residual Alkalinity	meq/L	0.2	0.4	0.2	0.1	0.2	0.3	0.3	0.2			0.1	0.1	0.2		0.3
Silica	mg/L	45	63	42	20	43	22	30	42			21	45	30		82
Total Dissolved Ions	mg/L	131	103	121	55	132	71	83	111			42	112	71		135
Total Dissolved Solids	mg/L	152	138	136	61	146	72	89	127			53	132	81		186
Colour	HAZEN	<1	1	2	70	<1	5	5	1			15	1	8		1
Turbidity	NTU	1	<1	<1	48	<1	1	1	<1			6	<1	2		<1
pH SAT* (calc for CaCO3)													8.9	9.3		8.9
Saturation Index		-1.2	-2.7	-2.4	-2.5	-2.4	-2	-1.6	-2.4			-2.5	-2.7	-2.1		-2.5
Mole Ratio		2.5	3.3	3.5	3	3.4	2.6	2.2	3.3			2.8	3.7	2.8		3.6
Sodium Adsorption Ratio		2.1	1.5	1.5	0.9	1.5	1	1.1	1.5			1	1.4	1.1		1.7
Figure Of Merit Ratio		0.5	0.7	0.8	0.9	0.8	0.9	0.9	0.7			0.7	0.8	0.8		0.7
CATIONS																
Sodium	mg/L	27	18	21	9	21	10	13	19			8	19	12		24
Potassium	mg/L	1.2	0.9	1	1.8	1.2	1.4	1.5	1			1.4	1	1.5		1.3
Calcium	mg/L	7.5	4.9	8.2	3.2	8.5	3.8	4.8	7.3			2.3	7.9	4.4		7.6
Magnesium	mg/L	3.2	3.5	3.4	2.2	3.5	2.2	2.9	3.1			1.3	3.3	2.4		4.3
Hydrogen	mg/L	0	0	0	0	0	0	0	0			0	0	0		0
ANIONS																
Bicarbonate	mg/L	49	56	54	27	56	41	48	50			19	50	39		61
Carbonate	mg/L	0.1	0	0	0	0	0	0.1	0			0	0	0		0
Hydroxide	mg/L	0	0	0	0	0	0	0	0			0	0	0		0
Chloride	mg/L	27	9.7	16	9.6	12	10	12	13			8.1	14	10		20
Fluoride	mg/L	0.05	0.08	<0.1	0.09	<0.1	<0.1	0.08	<0.1			<0.05	<0.05	0.1		<0.05
Nitrate as NO3	mg/L	11	8.3	14	1.2	25	0.7	<0.5	13			0.6	13	<0.5		15
Sulphate	mg/L	4.5	2.7	4.1	1.4	4.4	1.2	1.4	4.1			1	4.2	1.4		2
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	0.4	<0.01	0.03	0.02	<0.01			0.12	<0.01	0.04		<0.01
Manganese	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	<0.01	<0.01		0.01
Zinc	mg/L	<0.01	<0.01	0.04	0.01	0.03	0.01	<0.01	0.07			<0.01	<0.01	<0.01		0.31
Aluminium	mg/L	<0.05	<0.05	<0.05	1	<0.05	<0.05	<0.05	<0.05			0.1	<0.05	<0.05		<0.05
Boron	mg/L	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	0.08			<0.02	<0.02	<0.02		0.02
Copper	mg/L	<0.03	<0.03	0.03	<0.03	0.06	0.03	<0.03	0.03			<0.03	<0.03	<0.03		0.09

SCHEME 1 INGHAM WATER SUPPLY RAW WATER Scheme Component:	SW	QLD Government HIN1133 2016/2017 13-January-2017 River L/Lift Bore 1	QLD Government HIN1134 2016/2017 13-January-2017 River L/Lift Bore 2	QLD Government HIN1143 SWA 2016/2017 09-February-2017 SP55 - Herbert River	QLD Government HIN1146 SWA 2016/17 15-February-2017 SP15 - Como Rd Bore 5	QLD Government HIN1166 SWA 2016/2017 16-May-2017 SP55 - Herbert River	QLD Government HIN1193 SWA 2016/17 08-August-2017 SP15 - Como Rd Bore 5	QLD Government HIN1194 SWA 2016/2017 08-August-2017 SP55 - Herbert River	QLD Government HIN1233 SWA 2017/18 06-June-2018 SP15 - Como Rd Bore 5	QLD Government HIN1234 SWA 2017/18 06-June-2018 SP - Como Rd Bore 6	QLD Government HIN1282 SWA 2018/19 28-November-2018 SP55 - Herbert River	QLD Government HIN1287 SWA 2018/19 05-December-2018 SP - Como Rd Bore 6	QLD Government HIN1309 SWA 2018/2019 18-February-2019 SP15 - Como Rd Bore 5	QLD Government HIN1314 SWA 2018/19 06-March-2019 SP55 - Herbert River	QLD Government HIN1319 SWA 2018/2019 06-March-2019 SP15 - Como Rd Bore 5	QLD Government HIN1322 SWA 2018/2019 13-March-2019 SP15 - Como Rd Bore 5
PARAMETER	UNITS															
Conductivity @ 25' C	us/cm	66	69	61	173	76	170	82	168	174	123	172	169	100	170	207
pH @ 21' C		6.18	6.14	6.57	7.35	7.22	6.69	6.87	6.85	6.76	7.37	6.55	6.68	6.63	6.54	6.95
Total Hardness CaCO3/L	mg			9.9	33	13	33	15	32	32	26	33	33	28	33	35
Temp Hardness CaCO3/L	mg			9.9	33	13	33	15	32	32	26	33	33	28	33	35
Alkalinity CaCO3/L	mg	12.2	15.6	15	52	20	48	23	44	51	43	42	43	28	42	62
Residual Alkalinity	meq/L			0.1	0.4	0.1	0.3	0.2	0.2	0.4	0.3	0.2	0.2	0	0.2	0.5
Silica	mg/L	34.1	35.4	19	45	23	45	22	44	47	36	44	40	28	43	48
Total Dissolved Ions	mg/L			43	130	49	119	55	117	124	89	119	119	74	117	149
Total Dissolved Solids	mg/L			53	143	60	135	63	134	139	99	137	132	85	135	159
Colour	HAZEN	3	8	47	<1	8	<1	4	<1	<1	6	2	1	8	<1	1
Turbidity	NTU	13.8	12.2	18	<1	1	<1	1	<1	1	<1	1	<1	3	<1	<1
pH SAT* (calc for CaCO3)				9.9	8.8	9.7	8.9	9.6	8.9	8.9	9.1	8.9	8.9	9.2	8.9	8.8
Saturation Index				-3.3	-1.4	-2.4	-2.2	-2.7	-2.1	-2.1	-1.7	-2.4	-2.2	-2.6	-2.4	-1.8
Mole Ratio				3.6	2.5	2.9	3.2	3.2	3.2	3.2	2.5	3.5	3.3	3.1	3.5	3
Sodium Adsorption Ratio				1.4	1.6	1	1.6	1.1	1.5	1.7	1.2	1.6	1.5	0.9	1.5	2.2
Figure Of Merit Ratio				0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.9	0.7	0.7	1.1	0.8	0.5
CATIONS																
Sodium	mg/L	8.9	7.6	10	21	9	21	10	20	22	14	21	20	11	20	29
Potassium	mg/L	0.6	0.4	1.5	1	1.2	1	1.2	1	1	1.3	1	1	1.4	1	1
Calcium	mg/L	2.7	3.6	2.1	7.9	2.8	7.9	3.2	7.7	7.6	5.3	8	7.7	6	7.8	8.2
Magnesium	mg/L	1.2	1.4	1.1	3.3	1.5	3.2	1.7	3.2	3.1	3	3.3	3.3	3.1	3.3	3.4
Hydrogen	mg/L			0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L			18	63	24	58	28	54	62	52	52	52	34	51	75
Carbonate	mg/L			0	0.1	0	0	0	0	0	0.1	0	0	0	0	0
Hydroxide	mg/L			0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	10.5	10.2	8.3	14	9	14	10	17	17	12	16	16	11	16	20
Fluoride	mg/L	0.05	0.06	0.07	<0.05	<0.05	<0.05	<0.05	0.06	0.08	0.11	0.06	0.06	0.06	0.06	0.11
Nitrate as NO3	mg/L			<0.5	15	0.5	9.3	0.9	10	5.3	<0.5	13	14	5.6	14	5.7
Sulphate	mg/L	<.50	1	2	4	<1	5	1	5	5	2	4	4	2	4	5
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	0.17	0.25	0.21	<0.01	0.09	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.09	<0.01	<0.01
Manganese	mg/L	0.12	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<.005	<0.005	0.01	0.01	<0.01	0.09	<0.01	0.02	<0.01	<0.01	0.01	0.04	0.01	0.03	<0.01
Aluminium	mg/L	0.19	0.206	0.28	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05	<0.05
Boron	mg/L	<0.010	<0.010	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/L	<.001	<.001	<0.03	0.07	<0.03	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	0.05	<0.03

SCHEME 1 INGHAM WATER SUPPLY RAW WATER Scheme Component:	SW	QLD Government HIN1335 SWA 2018/19 29-May-2019 SP55 - Herbert River	QLD Government HIN1342 SWA 2018/2019 11-June-2019 SP15 - Como Rd Bore 5	QLD Government HIN1402 SWA 2020/2021 21-July-2020 SP55 - Herbert River	QLD Government HIN1404 SWA 2020/2021 21-July-2020 SP15 - Como Rd Bore 5	QLD Government HIN1439 SWA 2020/2021 22-January-2021 SP15 - Como Rd Bore 6
PARAMETER	UNITS					
Conductivity @ 25' C	us/cm	58	168	65	247	179
pH @ 21' C		6.82	6.39	6.8	7.12	6.43
Total Hardness CaCO3/L	mg	9.7	32	11	50	37
Temp Hardness CaCO3/L	mg	9.7	32	11	50	37
Alkalinity CaCO3/L	mg	15	43	18	76	43
Residual Alkalinity	meq/L	0.1	0.2	0.1	0.5	0.1
Silica	mg/L	22	43	22	74	44
Total Dissolved Ions	mg/L	39	119	45	184	124
Total Dissolved Solids	mg/L	52	135	55	211	142
Colour	HAZEN	40	2	5	<1	<7
Turbidity	NTU	9	<1	2	<1	<1
pH SAT* (calc for CaCO3)		9.9	8.9	9.8	8.5	8.9
Saturation Index		-3.1	-2.5	-3	-1.4	-2.5
Mole Ratio		3.4	3.6	3.3	2.7	3.6
Sodium Adsorption Ratio		1	1.5	1	2	1.5
Figure Of Merit Ratio		0.7	0.7	0.7	0.7	0.8
CATIONS						
Sodium	mg/L	7	20	7.7	33	21
Potassium	mg/L	1.1	1	1.1	0.97	1.1
Calcium	mg/L	2	7.7	2.4	12	8.7
Magnesium	mg/L	1.1	3.2	1.2	5.2	3.7
Hydrogen	mg/L	0	0	0	0	0
ANIONS						
Bicarbonate	mg/L	18	52	22	92	52
Carbonate	mg/L	0	0	0	0.1	0
Hydroxide	mg/L	0	0	0	0	0
Chloride	mg/L	8	16	8.7	17	17
Fluoride	mg/L	<0.05	0.06	0.05	0.22	0.06
Nitrate as NO3	mg/L	0.5	14	0.66	1.4	11
Sulphate	mg/L	<1	4	1	23	9.4
OTHER DISSOLVED ELEMENTS						
Iron	mg/L	0.22	0.04	0.07	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.001	0.006	0.003
Zinc	mg/L	<0.01	0.03	<0.06	<0.06	0.07
Aluminium	mg/L	0.45	<0.05	0.09	<0.03	<0.03
Boron	mg/L	<0.02	<0.02	<0.02	0.02	<0.02
Copper	mg/L	<0.03	0.04	<0.003	0.031	0.04

HINCHINBROOK SHIRE COUNCIL

SCHEME 1
INGHAM WATER SUPPLY
TREATED WATER

Scheme Component: WTP

METHOD	PARAMETER	UNITS	HEALTH	AESTHETIC	LABORATORY NAME	ID-HIN137	ID-HIN163	ID-HIN187	ID-HIN178	ID-HIN224	ID-HIN254	ID-HIN322	ID_HIN323	ID-381	ID_HIN474	ID_HIN446	ID_HIN602	HIN601	HIN625
					REPORT #														
					SAMPLE TYPE	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
					FINANCIAL YEAR	2002/2003	2002/2003	2002/2003	2002/2003	2003/2004	2003/2004	2004/2005	2004/2005	2005/2006	2006/2007	2006/2007	2008/2009	2008/2009	2008/2009
					DATE SAMPLE TAKEN	13-Aug-02	08-Jan-03	26-Feb-03	14-Mar-03	14-Aug-03	23-Oct-03	09-Nov-04	09-Nov-04	09-Jun-05	30-Jul-06	13-Sep-06	10-Sep-08	10-Sep-08	29-Nov-08
					SAMPLE LOCATION	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	Lift	Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift
18320	Conductivity @ 25° C	us/cm				105	160	165	160	94	120	140	372	328	178	176	116	107	123
18226	pH @ 21° C			6.5-8.5		6.8	7.35	7.35	7.55	7.1	7.6	7.08	8	8.2	7.4	7.35	7.42	7.27	7.1
18209	Total Hardness CaCO3/L	mg		200		27.5	29	32.5	28	15	20.5	21	30	28	32	30	22	19	16
18209	Temp Hardness CaCO3/L	mg																	
18208	Alkalinity CaCO3/L	mg				34	49.5	43	42.5	23.5	35	38	53	49	41	42		29	30
18209	Residual Alkalinity	meq/L				0.1	0.4	0.2	0.3	0.2	0.3	0.4	0.4	0.4	0.2	0.2	0.2	0.2	0.3
18195	Silica	mg/L				27	40	42	32	19	28	35	44	40	44	44	27	24	24
18209	Total Dissolved Ions	mg/L		500		81	110	120	110	62	83	93	223	198	120	116	81	75	79
18209	Total Dissolved Solids	mg/L				87	120	140	120	66	90	104	235	208	139	135	89	81	85
18206	Colour	HAZEN		15		<1	3	1	3	1	<1	3	1	<1	<1	1	<1	<1	4
18212	Turbidity	NTU		5		1	2	<1	3	2	2	2	1	1	1	1	3	2	4
18209	pH SAT* (calc for CaCO3)																		
18209	Saturation Index					-2.3	-1.6	-1.6	-1.5	-2.5	-1.6	-2.1	-0.8	-0.7	-1.5	-1.6	-1.8	-2.1	-2.3
18209	Mole Ratio					3.2	2.6	2.6	2.6	3.1	2.5	3	2.5	2.3	2.7	2.7	2.7	2.8	3.1
18209	Sodium Adsorption Ratio					1.1	1.7	1.7	1.8	1.2	1.5	1.7	4.9	4.4	1.7	1.7	1.3	1.3	1.7
18209	Figure Of Merit Ratio					1	0.6	0.7	0.6	0.6	0.6	0.5	0.2	0.2	0.7	0.7	0.7	0.7	0.5
	CATIONS																		
18195	Sodium	mg/L		180		13	20.5	22	22.5	11	16	17	62	53	1.7	21	14	13	16
18195	Potassium	mg/L				1.1	1.2	1	1.4	1.1	1.3	1.4	1.4	1.1	1	0.9	1.1	1.2	1.6
18195	Calcium	mg/L				7.3	6.5	8	6.5	3.1	4.5	4.3	8.3	7.2	7.6	7.1	5.3	4	3.3
18195	Magnesium	mg/L				2.2	3.1	3.1	2.9	1.7	2.2	2.4	2.3	2.4	3.2	3	2	2.3	2
18209	Hydrogen	mg/L				0	0	0	0	0	0	0	0	0	0	0	0		0
	ANIONS																		
18209	Bicarbonate	mg/L				41.5	60	52	51	28.5	42.5	47	64	58	50	51	38	36	36
18209	Carbonate	mg/L				0	0.1	0.1	0.1	0	0.1	0	0.3	0.5	0.1	0.1	0	0	0
18209	Hydroxide	mg/L				0	0	0	0	0	0	0	0	0	0	0	0	0	0
18204	Chloride	mg/L		250		12	17.5	15	23	14	14.5	17	69	63	18	17	14	14	18
18204	Fluoride	mg/L	1.5			0.1	0.2	<0.1	0.1	<0.1	<0.1	0.1	0.1	<0.1	0.06	<0.1	0.06	0.06	0.07
	Nitrate as NO3	mg/L	50			2.4	0.5	15	2.9	1.3	0.5	1.9	11	8	13	11	3.2	2	1
18204	Sulphate	mg/L	500	250		<2	2.2	5	2.7	<2	<2	<2.0	5.5	4.4	4.5	5.3	<2.0	<2.0	1.5
	OTHER DISSOLVED ELEMENTS																		
18195	Iron	mg/L		0.3		0.01	0.04	<0.01	0.04	0.06	0.04	0.05	0.02	0.01	<0.01	<0.01	0.11	0.03	0.14
18195	Manganese	mg/L	0.5	0.1		0.11	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.01	<0.03	<0.01	<0.01	<0.01
18195	Zinc	mg/L		3		0.06	0.01	0.01	0.02	0.05	0.01	0.01	<0.01	<0.01	0.03	0.01	0.06	0.04	0.02
18195	Aluminium	mg/L		0.2		<0.05	<0.05	<0.05	<0.05	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08
18195	Boron	mg/L	4			0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	0.01	0.01	<0.02	0.01	<0.02	<0.02	0.03
18195	Copper	mg/L	2	1		<0.03	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY TREATED WATER		ID_HIN626 SWA 2008/2009	ID_HIN632 SWA 2008/2009	ID_HIN643 SWA 2008/2009	HIN642 SWA 2008/2009	HIN674 SWA 2009/2010	ID_HIN725 SWA 2009/2010	HIN756 SWA 2010/2011	HIN849 SWA 2012/2013	ID_HIN854 SWA 2012/2013	QLD Government HIN869 SWA 2012/2013	QLD Government HIN886 SWA 2013/2014	QLD Government HIN886 SWA 2013/2014	QLD Government HIN902 SWA 2013/2014	QLD Government HIN897 SWA 2013/2014	QLD Government HIN909 SWA 2013/2014
Scheme Component:	WTP	20-Nov-08	29-Jan-09	30-Mar-09	30-Mar-09	01-Jul-09	26-Feb-10	12-Nov-10	14-Nov-12	27-Nov-12	21-May-13	29-Aug-13	29-Aug-13	20-Nov-13	20-Nov-13	09-Jan-14
PARAMETER	**UNITS**	**SP23 - Ingham Depot Hi Lift**	**Lift**	**SP23 - Ingham Depot Hi Lift**	**SP25 - Ingham PS High Lift**	**SP25 - Ingham PS High Lift**	**SP23 - Ingham Depot Hi Lift**	**Lift**	**SP25 - Ingham PS High Lift**	**SP23 - Ingham Depot Hi Lift**	**SP25 - Ingham PS High Lift**	**SP25 - Ingham PS High Lift**	**SP23 - Ingham Depot Hi Lift**	**SP23 - Ingham Depot Hi Lift**	**SP25 - Ingham PS High Lift**	**SP23 - Ingham Depot Hi Lift**
Conductivity @ 25° C	us/cm	227	194	191	198	163	185	186	124	180	180	92	200	180	106	173
pH @ 21° C		7.86	7.02	7.41	7.62	6.89	7.46	7.47	7.13	7.5	7.66	6.91	7.51	7.28	6.61	7.32
Total Hardness CaCO3/L	mg	31	33	32	27	26	34	30	22	31	31	15	35	32	21	31
Temp Hardness CaCO3/L	mg										31	15	35	32	21	31
Alkalinity CaCO3/L	mg	45	39	44	41	39	44	38	36	44	41	21	42	42	29	39
Residual Alkalinity	meq/L	0.3	0.1	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.1	0.2	0.2	0.2	0.2
Silica	mg/L	42	41	44	32	31	45	38	31	42	40	24	44	44	32	44
Total Dissolved Ions	mg/L	143	127	129	125	110	130	119	83	122	116	56	129	123	70	113
Total Dissolved Solids	mg/L	158	144	146	133	116	147	133	92	137	131	67	147	140	84	132
Colour	HAZEN	<1	<1	1	2	8	1	<1	2	1	<1	8	5	1	5	<1
Turbidity	NTU	1	<1	<1	2	2	1	1	2	<1	1	2	<1	<1	2	1
pH SAT* (calc for CaCO3)											8.9	9.6	8.9	8.9	9.3	8.9
Saturation Index		-1.1	-1.9	-1.5	-1.4	-2.1	-1.4	-1.5	-2	-1.4	-1.3	-2.7	-1.4	-1.6	-2.7	-1.6
Mole Ratio		2.4	3.1	2.7	2.6	3.3	2.6	2.6	2.9	2.5	2.5	3.2	2.5	2.8	3.4	2.7
Sodium Adsorption Ratio		2.4	1.8	1.8	2.2	1.8	1.7	1.9	1.3	1.7	1.6	1.2	1.8	1.8	1.1	1.6
Figure Of Merit Ratio		0.5	0.7	0.6	0.5	0.6	0.7	0.6	0.7	0.7	0.7	0.7	0.7	0.6	0.8	0.7
CATIONS																
Sodium	mg/L	31	23	23	26	21	22	24	14	22	21	10	24	23	12	21
Potassium	mg/L	1.1	1	1.1	1.5	1.3	1	1	1.4	1	1.2	1.6	1.1	1.1	1.5	1.1
Calcium	mg/L	7.2	7.9	7.5	6.4	6.2	8.1	7.3	4.6	7.5	8.1	3.2	8.4	7.6	4.6	7.3
Magnesium	mg/L	3.1	3.3	3.3	2.6	2.5	3.3	2.8	2.6	3.1	2.8	1.7	3.3	3.1	2.3	3.1
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	55	48	54	49	48	54	47	44	54	49	26	51	51	36	48
Carbonate	mg/L	0.2	0	0.1	0.1	0	0.1	0.1	0	0.1	0.1	0	0.1	0.1	0	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	33	20	20	29	23	19	22	13	18	18	10	20	19	10	16
Fluoride	mg/L	<0.1	<0.1	0.05	0.07	0.07	0.05	0.05	0.07	<0.1	0.05	0.62	0.08	0.6	0.61	0.65
Nitrate as NO3	mg/L	8.5	20	16	7.7	5.4	18	12	1.9	13	12	1	17	12	1.7	11
Sulphate	mg/L	4.7	4.1	4.2	2.9	2.3	4	4	1.5	4.1	3.6	1.4	4.3	5.6	1.5	4.2
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	0.08	0.04	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.04	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	0.02	0.01	<0.01	0.03	<0.01	0.05	0.04	0.01	<0.01	0.02	<0.01	0.01	0.01	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	<0.02	<0.02	0.02	0.02	<0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY TREATED WATER		QLD Government HIN910 SWA 2013/2014 09-Jan-14	QLD Government HIN923 SWA 2013/2014 19-Feb-14	QLD Government HIN924 SWA 2013/2014 19-Feb-14	QLD Government HIN936 SWA 2013/2014 09-Apr-14	QLD Government HIN935 SWA 2013/2014 09-Apr-14	QLD Government HIN942 SWA 2013/2014 13-May-14	QLD Government HIN943 SWA 2013/2014 14-May-14	QLD Government HIN961 SWA 2013/2014 26-Jun-14	QLD Government HIN960 SWA 2013/2014 26-Jun-14	QLD Government HIN967 SWA 2014/2015 25-Jul-14	QLD Government HIN966 SWA 2014/2015 25-Jul-14	QLD Government HIN971 SWA 2014/2015 14-Aug-14	QLD Government HIN972 SWA 2014/2015 14-Aug-14	QLD Government HIN978 SWA 2014/2015 16-Oct-14	QLD Government HIN977 SWA 2014/2015 16-Oct-14
Scheme Component:	WTP	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift
PARAMETER	**UNITS**															
Conductivity @ 25° C	us/cm	116	152	173	177	170	187	182	175	187	189	173	181	101	106	188
pH @ 21° C		6.9	7.41	7.37	7.38	8.12	7.71	7.36	7.58	7.75	7.77	7.24	7.35	6.73	6.39	7.57
Total Hardness CaCO3/L	mg	22	26	31	32	39	33	32	30	32	34	31	31	20	20	32
Temp Hardness CaCO3/L	mg	22	26	31	32	39	33	32	30	32	34	31	31	20	20	32
Alkalinity CaCO3/L	mg	32	36	40	41	50	46	45	46	47	43	41	43	29	27	41
Residual Alkalinity	meq/L	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2
Silica	mg/L	30	35	44	44	30	40	44	43	40	38	44	44	27	32	44
Total Dissolved Ions	mg/L	76	99	115	118	119	123	121	120	126	124	115	119	69	68	122
Total Dissolved Solids	mg/L	86	112	134	136	118	134	137	135	138	134	133	137	78	83	140
Colour	HAZEN	1	<1	<1			1	<1	2	2	1	1	2	2	1	1
Turbidity	NTU	1	1	<1			<1	<1	<1	<1	<1	<1	<1	1	<1	<1
pH SAT* (calc for CaCO3)		9.2	9.1	8.9	8.9	8.6	8.8	8.9	8.9	8.8	8.8	9	8.9	9.3	9.3	8.9
Saturation Index		-2.3	-1.7	-1.6	-1.6	-0.5	-1.1	-1.5	-1.4	-1.1	-1	-1.7	-1.6	-2.5	-2.9	-1.3
Mole Ratio		3.1	2.7	2.7	2.6	1.8	2.3	2.6	2.4	2.3	2.3	2.8	2.6	3.2	3.6	2.5
Sodium Adsorption Ratio		1.2	1.6	1.6	1.7	1.2	1.6	1.6	1.6	1.7	1.6	1.6	1.6	1	1.1	1.8
Figure Of Merit Ratio		0.8	0.6	0.7	0.7	1	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.9	0.8	0.6
CATIONS																
Sodium	mg/L	13	19	21	22	17	21	21	20	22	22	21	21	10	11	23
Potassium	mg/L	1.8	1.6	1.1	1.1	1.5	1.2	1.3	1.2	1.1	1.2	1.2	1.2	1.6	1.3	1.1
Calcium	mg/L	4.7	6.2	7.5	7.5	13	8.7	7.5	7.2	8.9	10	7.2	7.4	4.8	4.6	7.8
Magnesium	mg/L	2.6	2.6	3	3.1	1.6	2.7	3.2	3	2.5	2.2	3.1	3.1	2	2.1	3.1
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	39	44	49	50	60	55	55	55	57	53	50	52	36	33	50
Carbonate	mg/L	0	0.1	0.1	0.1	0.4	0.1	0.1	0.1	0.2	0.2	0	0.1	0	0	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	12	18	16	17	15	19	16	16	19	19	16	16	9.8	9.7	19
Fluoride	mg/L	0.47	0.46	0.35	0.42	0.42	0.41	0.58	0.24	0.38	0.32	<0.05	0.06	0.61	0.49	0.07
Nitrate as NO3	mg/L	1	5.4	12	13	5.2	10	12	12	11	11	13	13	2.8	4	13
Sulphate	mg/L	1.8	2.6	4.3	4.3	3.5	3.8	4.3	4.4	0.42	4.3	4.4	4.5	1.4	1.8	4.3
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	0.01	0.02	<0.01	0.02	0.01	0.01	0.02
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.02	<0.01	0.02	0.02	<0.01	<0.01	0.01	0.01	<0.01	<0.01	0.02	0.02	0.01	0.03	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02	0.02	<0.02	0.02	<0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY TREATED WATER		QLD Government HIN983 SWA 2014/2015 25-Nov-14	QLD Government HIN985 SWA 2014/2015 11-Dec-14	QLD Government HIN986 SWA 2014/2015 11-Dec-14	QLD Government HIN989 SWA 2014/2015 13-Jan-15	QLD Government HIN990 SWA 2014/2015 13-Jan-15	QLD Government HIN1002 SWA 2014/2015 12-Feb-15	QLD Government HIN1003 SWA 2014/2015 12-Feb-15	QLD Government HIN1004 SWA 2014/2015 09-Mar-15	QLD Government HIN1005 SWA 2014/2015 09-Mar-15	QLD Government HIN1011 SWA 2014/2015 22-Apr-15	QLD Government HIN1012 SWA 2014/2015 23-Apr-15	QLD Government HIN1014 SWA 2014/2015 21-May-15	QLD Government HIN1015 SWA 2014/2015 21-May-15	QLD Government HIN1021 SWA 2014/2015 19-Jun-15	QLD Government HIN1022 SWA 2014/2015 19-Jun-15
Scheme Component:	WTP	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift
PARAMETER	**UNITS**															
Conductivity @ 25° C	us/cm	120	217	114	178	142	186	133	182	113	98	186	200	86	200	87
pH @ 21° C		7.04	7.57	6.86	7.32	7.18	7.2	6.77	7.15	6.62	6.57	7.34	7.78	7.06	7.72	6.88
Total Hardness CaCO3/L	mg	23	35	21	33	24	31	20	32	19	17	32	35	16	33	15
Temp Hardness CaCO3/L	mg	23	35	21	33	24	31	20	32	19	17	32	35	16	33	15
Alkalinity CaCO3/L	mg	34	43	32	45	39	47	31	44	25	23	46	46	25	47	19
Residual Alkalinity	meq/L	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.1	0.1	0.3	0.2	0.2	0.3	0.1
Silica	mg/L	34	43	34	45	36	43	30	43	30	27	43	45	25	43	22
Total Dissolved Ions	mg/L	79	138	74	120	95	124	80	122	69	62	128	134	59	135	53
Total Dissolved Solids	mg/L	92	154	89	137	107	138	91	137	83	75	142	151	69	149	63
Colour	HAZEN	1	2	4	<1	1	<1	1	2	1	2	<1	<1	2	<1	7
Turbidity	NTU	1	6	1	<1	1	<1	1	<1	3	3	<1	<1	1	<1	4
pH SAT* (calc for CaCO3)		9.2	8.9	9.2	8.9	9.1	8.9	9.3	8.9	9.4	9.5	8.9	8.9	9.5	8.9	9.7
Saturation Index		-2.1	-1.3	-2.4	-1.5	-1.9	-1.7	-2.5	-1.8	-2.8	-2.9	-1.6	-1.1	-2.4	-1.2	-2.8
Mole Ratio		2.9	2.6	3.1	2.6	2.8	2.8	3.3	2.8	3.5	3.5	2.7	2.3	3	2.4	3.3
Sodium Adsorption Ratio		1.2	2	1.2	1.6	1.5	1.8	1.4	1.7	1.2	1.2	1.8	1.9	1.1	2	1.1
Figure Of Merit Ratio		0.8	0.6	0.8	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.7	0.6	0.7
CATIONS																
Sodium	mg/L	14	27	13	21	17	23	15	22	13	11	23	26	10	26	10
Potassium	mg/L	1.5	1.2	1.4	1.2	1.5	1.1	1.5	1.5	1.4	1.3	1.3	1.4	1.3	1.3	1.3
Calcium	mg/L	4.8	8.3	4.6	7.8	5.3	7.3	4.3	7.5	4.5	4	7.7	8.1	3.5	7.9	3.2
Magnesium	mg/L	2.6	3.4	2.3	3.2	2.7	3.1	2.2	3.2	2	1.8	3.2	3.5	1.8	3.2	1.6
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	42	53	38	55	48	57	38	54	30	28	56	55	30	56	23
Carbonate	mg/L	0	0.1	0	0.1	0	0	0	0	0	0	0.1	0.2	0	0.1	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	11	23	10	15	15	18	14	17	12	10	17	21	9.7	20	10
Fluoride	mg/L	0.62	0.62	0.56	0.72	0.58	0.43	0.67	0.47	0.6	0.68	0.67	0.51	0.48	0.58	0.62
Nitrate as NO3	mg/L	1.5	17	2.1	12	3.2	11	2.9	12	3.7	3.4	14	14	0.9	14	1.6
Sulphate	mg/L	1.9	4.4	1.7	4.2	2.3	3.8	1.9	4.1	1.8	1.7	4.4	4.6	1.3	4.4	1.4
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.02	<0.01	0.02	0.03	<0.01	<0.01	<0.01	<0.01	0.02
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.01	<0.01	0.02	0.02	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	0.02	0.02	0.02	<0.02	<0.02	0.02	0.02
Copper	mg/L	<0.03	0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY TREATED WATER		QLD Government HIN1031 SWA 2015/2016 30-Jul-15	QLD Government HIN1032 SWA 2015/2016 30-Jul-15	QLD Government HIN1035 SWA 2015/2016 25-Aug-15	QLD Government HIN1036 SWA 2015/2016 20-Aug-15	QLD Government HIN1041 SWA 2015/2016 24-Sep-15	QLD Government HIN1051 SWA 2015/2016 20-Oct-15	QLD Government HIN1055 SWA 2015/2016 30-Oct-15	QLD Government HIN1059 SWA 2015/2016 13-Nov-15	QLD Government HIN1058 SWA 2015/2016 19-Nov-15	QLD Government HIN1067 SWA 2015/2016 10-Dec-15	QLD Government HIN1068 SWA 2015/2016 10-Dec-15	QLD Government HIN1072 SWA 2015/2016 19-Jan-16	QLD Government HIN1073 SWA 2015/2016 19-Jan-16	QLD Government HIN1075 SWA 2015/2016 28-Feb-16	QLD Government HIN1076 SWA 2015/2016 29-Feb-16
Scheme Component:	WTP	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift
PARAMETER	**UNITS**															
Conductivity @ 25° C	us/cm	187	89	193	82	188	197	94	96	188	189	115	195	104	181	140
pH @ 21° C		7.43	6.68	7.74	7.07	7.54	7.76	7.21	7.05	7.52	7.58	6.8	7.66	7.06	7.07	6.9
Total Hardness CaCO3/L	mg	32	14	33	13	33	32	14	15	32	32	20	32	18	33	22
Temp Hardness CaCO3/L	mg	32	14	33	13	33	32	14	15	32	32	20	32	18	33	22
Alkalinity CaCO3/L	mg	44	19	45	19	47	45	22	29	47	45	30	44	26	47	34
Residual Alkalinity	meq/L	0.2	0.1	0.3	0.1	0.3	0.3	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.3	0.2
Silica	mg/L	44	22	44	20	44	44	23	27	45	46	34	46	24	45	28
Total Dissolved Ions	mg/L	122	51	130	51	131	128	56	67	130	125	75	127	65	125	91
Total Dissolved Solids	mg/L	139	62	146	59	146	143	66	76	145	143	90	145	73	140	98
Colour	HAZEN	<1	1	<1	2	<1	<1	2	2	<1	<	1	<1	3	1	13
Turbidity	NTU	<1	2	<1	2	<1	1	<1	1	<1	<1	1	9	<1	<1	3
pH SAT* (calc for CaCO3)		8.9	9.7	8.9	9.7	8.9	8.9	9.6	9.5	8.9	8.9	9.3	8.9	9.4	8.9	9.2
Saturation Index		-1.5	-3	-1.1	-2.6	-1.3	-1.1	-2.4	-2.4	-1.4	-1.3	-2.5	-1.2	-2.4	-1.8	-2.3
Mole Ratio		2.6	3.4	2.3	3.1	2.5	2.2	2.9	2.9	2.5	2.4	3.2	2.4	3	2.9	3.3
Sodium Adsorption Ratio		1.8	1.1	1.9	1.2	1.8	1.9	1.3	1.3	1.9	1.8	1.3	1.9	1.2	1.7	1.6
Figure Of Merit Ratio		0.6	0.7	0.6	0.3	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.6	0.7	0.7	0.6
CATIONS																
Sodium	mg/L	23	10	25	10	24	24	11	12	24	24	14	25	12	22	17
Potassium	mg/L	1.3	1.3	1.2	1.3	1.2	1.2	1.5	1.5	1.1	1.2	1.4	1.1	1.6	1.1	1.5
Calcium	mg/L	7.6	3	7.9	2.8	7.9	7.7	3	3.2	7.6	7.6	4.3	7.6	3.7	7.8	4.9
Magnesium	mg/L	3.2	1.5	3.2	1.5	3.2	3.1	1.5	1.8	3.1	3.1	2.2	3.2	2.2	3.2	2.4
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	54	23	55	23	58	55	27	35	58	55	37	54	32	58	41
Carbonate	mg/L	0.1	0	0.2	0	0.1	0.2	0	0	0.1	0.1	0	0.1	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	16	9.2	19	9.6	18	18	10	11	18	18	12	19	12	16	19
Fluoride	mg/L	0.62	0.57	0.65	0.52	0.58	0.47	0.64	0.48	0.45	0.66	0.62	0.44	0.65	0.52	0.59
Nitrate as NO3	mg/L	12	1.8	13	0.7	13	13	<0.5	<0.5	13	12	2.1	12	<0.5	12	2.5
Sulphate	mg/L	4.1	1.2	4.5	1.2	4.5	4.5	1.4	1.5	4.5	4.4	1.8	4.5	1.5	4.7	2
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.01	0.02	<0.01	0.02	<0.01	0.04	0.08	<0.01	<0.01	0.01	0.4	0.02	0.02	0.02	0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	0.02	0.02	0.02	0.02	0.02	0.02
Copper	mg/L	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.05	<0.03

SCHEME 1 INGHAM WATER SUPPLY TREATED WATER		QLD Government HIN1081 SWA 2015/2016 31-Mar-16	QLD Government HIN1082 SWA 2015/2016 31-Mar-16	QLD Government HIN1095 SWA 2015/2016 28-Apr-16	QLD Government HIN1096 SWA 2015/2016 28-Apr-16	QLD Government HIN1102 SWA 2015/2016 26-May-16	QLD Government HIN1103 SWA 2015/2016 26-May-16	QLD Government HIN1107 SWA 2016/2017 29-Jul-16	QLD Government HIN1106 SWA 2016/2017 29-Jul-16	QLD Government HIN1110 SWA 2016/2017 25-Aug-16	QLD Government HIN1111 SWA 2016/2017 25-Aug-16	QLD Government HIN1119 SWA 2016/2017 29-Sep-16	QLD Government HIN1120 SWA 2016/2017 29-Sep-16	QLD Government HIN1125 SWA 2016/2017 27-Oct-16	QLD Government HIN1126 SWA 2016/2017 27-Oct-16
Scheme Component:	WTP	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift
PARAMETER	**UNITS**														
Conductivity @ 25° C	us/cm	179	157	182	174	180	136	175	123	77	184	184	85	184	114
pH @ 21° C		7.26	7.33	7.09	7.06	7.23	6.92	7.31	6.91	6.77	7.43	7.36	6.9	7.44	6.54
Total Hardness CaCO3/L	mg	33	26	33	29	32	22	32	21	12	33	32	13	33	22
Temp Hardness CaCO3/L	mg	33	26	33	29	32	22	32	21	12	33	32	13	33	22
Alkalinity CaCO3/L	mg	50	35	51	46	48	33	49	32	17	52	45	20	51	32
Residual Alkalinity	meq/L	0.3	0.2	0.4	0.3	0.3	0.2	0.3	0.2	0.1	0.4	1.2	0.2	0.4	0.2
Silica	mg/L	45	33	45	37	45	31	44	30	23	45	44	24	45	30
Total Dissolved Ions	mg/L	130	101	133	123	127	91	125	85	48	132	123	52	132	79
Total Dissolved Solids	mg/L	144	112	146	132	142	102	140	95	60	145	139	63	145	89
Colour	HAZEN	1	<1	<1	1	<1	<1	<1	2	3	<1	1	4	<1	<1
Turbidity	NTU	<1	2	<1	2	<1	2	<1	4	2	<1	<1	<1	<1	<1
pH SAT* (calc for CaCO3)		8.8	9.1	8.8	8.9	8.9	9.2	8.9	9.2	9.7	8.8	8.9	9.7	8.8	9.2
Saturation Index		-1.6	-1.8	-1.7	-1.9	-1.6	-2.3	-1.6	-2.3	-3	-1.4	-1.5	-2.8	-1.4	-2.7
Mole Ratio		2.6	2.8	2.8	3	2.7	3.2	2.6	3.2	3.4	2.5	2.6	3.2	2.5	3.5
Sodium Adsorption Ratio		1.7	1.7	1.7	1.8	1.7	1.6	1.7	1.4	1.2	1.8	1.7	1.2	1.8	1.1
Figure Of Merit Ratio		0.7	0.6	0.7	0.6	0.7	0.6	0.7	0.6	0.6	0.6	0.7	0.6	0.7	0.8
CATIONS															
Sodium	mg/L	23	20	23	22	23	17	22	15	10	23	22	10	23	12
Potassium	mg/L	1.1	1.4	1.2	1.3	1.2	1.3	1.1	1.3	1.3	1.2	1.1	1.6	1.2	1.6
Calcium	mg/L	7.8	6	7.8	7.2	7.7	5.2	7.5	4.9	2.6	7.8	7.8	2.8	7.8	4.9
Magnesium	mg/L	3.3	2.6	3.2	2.7	3.2	2.2	3.1	2.1	1.3	3.2	3.2	1.4	3.2	2.3
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS															
Bicarbonate	mg/L	61	43	62	56	58	40	59	39	21	63	55	25	63	39
Carbonate	mg/L	0.1	0	0	0	0.1	0	0.1	0	0	0.1	0.1	0	0.1	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	15	20	17	21	16	16	14	14	9.6	16	16	9.3	17	13
Fluoride	mg/L	0.54	0.51	0.48	0.47	0.53	0.53	0.53	0.47	0.51	0.53	0.6	0.61	0.53	0.53
Nitrate as NO3	mg/L	14	5.6	14	8.7	13	5.6	13	6.4	0.9	13	12	<0.5	12	3.4
Sulphate	mg/L	4.4	2.7	4.3	3.2	4.4	2.4	4.5	2.2	1.1	4.6	4.6	1.2	4	2
OTHER DISSOLVED ELEMENTS															
Iron	mg/L	<0.01	0.02	<0.01	0.01	<0.01	0.01	<0.01	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.02	0.01	0.08	0.08	0.02	0.02	0.02	0.01	0.02	0.02	0.1	<0.01	0.02	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY TREATED WATER		QLD Government HIN1131 SWA 2016/2017 30-Nov-16	QLD Government HIN1132 SWA 2016/2017 30-Nov-16	QLD Government HIN1135 SWA 2016/2017 25-Jan-17	QLD Government HIN1136 SWA 2016/2017 25-Jan-17	QLD Government HIN1142 SWA 2016/2017 09-Feb-17	QLD Government HIN1147 SWA 2016/2017 15-Feb-17	QLD Government HIN1148 SWA 2016/2017 23-Feb-17	QLD Government HIN1149 SWA 2016/2017 23-February-2017	QLD Government HIN1154 SWA 2016/2017 16-March-2017	QLD Government HIN1157 SWA 2016/2017 16-March-2017	QLD Government HIN1167 SWA 2016/2017 16-May-2017	QLD Government HIN1283 SWA 2018/19 28-November-2018	QLD Government HIN1288 SWA 2018/19 05-December-2018
Scheme Component:	WTP	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift	SP25 - Ingham PS High Lift	SP25 - Ingham PS High Lift	SP23 - Ingham Depot Hi Lift
PARAMETER	**UNITS**													
Conductivity @ 25° C	us/cm	183	109	183	96	134	181	159	183	169	183	176	126	183
pH @ 21° C		7.3	6.69	7.28	6.44	6.92	7.6	7.28	7.4	7.75	7.38	7.36	7.1	7.42
Total Hardness CaCO3/L	mg	33	19	34	18	23	33	28	33	30	33	30	24	34
Temp Hardness CaCO3/L	mg	33	19	34	18	23	33	28	33	30	33	30	24	34
Alkalinity CaCO3/L	mg	47	28	45	21	31	53	37	46	40	46	41	39	44
Residual Alkalinity	meq/L	0.3	0.2	0.2	0.1	0.2	0.4	0.2	0.3	0.2	0.3	0.2	0.3	0.2
Silica	mg/L	46	31	46	32	35	45	36	44	37	44	40	35	44
Total Dissolved Ions	mg/L	127	71	127	61	89	134	105	127	113	126	119	89	127
Total Dissolved Solids	mg/L	144	84	145	79	104	147	118	143	125	142	134	100	144
Colour	HAZEN	<1	1	<	2	3	<1	<1	<1	2	1	<1	<1	2
Turbidity	NTU	<1	<1	<1	4	5	<1	3	<1	3	<1	2	<1	<1
pH SAT* (calc for CaCO3)		8.8	9.3	8.9	9.4	9.2	8.8	9	8.9	8.9	8.8	8.9	9.1	8.9
Saturation Index		-1.5	-2.6	-1.6	-3	-2.2	-1.2	-1.7	-1.5	-1.1	-1.5	-1.6	-2	-1.5
Mole Ratio		2.6	3.3	2.7	3.7	3.2	2.3	2.7	2.6	2.3	2.5	2.8	2.9	2.6
Sodium Adsorption Ratio		1.7	1.3	1.8	1	1.5	1.7	1.5	1.7	1.6	1.7	1.9	1.3	1.8
Figure Of Merit Ratio		0.7	0.7	0.7	0.8	0.6	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.6
CATIONS														
Sodium	mg/L	23	13	24	10	17	23	18	23	20	23	23	15	24
Potassium	mg/L	1.4	1.6	1.2	1.3	1.2	1	1.4	1.1	1.4	1.1	1.1	1.4	1
Calcium	mg/L	7.9	4.1	8	4.3	5.5	7.9	7.4	7.8	8.4	7.9	7.7	5.2	8
Magnesium	mg/L	3.3	2.1	3.5	1.8	2.2	3.3	2.3	3.3	2.3	3.3	2.6	2.7	3.3
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	2	0	0
ANIONS														
Bicarbonate	mg/L	57	35	55	26	38	64	45	56	49	56	50	48	54
Carbonate	mg/L	0.1	0	0.1	0	0	0.1	0.1	0.1	0.2	0.1	0.1	0	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	16	12	16	12	16	16	18	16	17	15	20	14	19
Fluoride	mg/L	0.56	0.61	0.27	0.08	0.31	<0.05	0.3	0.43	0.29	0.52	0.21	0.1	0.06
Nitrate as NO3	mg/L	13	1.3	14	3.2	6	15	8.5	15	10	14	11	2.1	14
Sulphate	mg/L	5	2	4	2	3	4	3	4	4	5	3	2	4
OTHER DISSOLVED ELEMENTS														
Iron	mg/L	0.05	0.02	<0.01	0.02	0.02	<0.01	0.02	<0.01	0.01	0.02	0.01	<0.01	0.03
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.08	0.12	0.01	0.01	0.09	<0.01	0.01	0.01	<0.01	0.01	0.02	<0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.02	<0.02	0.02	0.02	<0.02	0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY TREATED WATER		QLD Government HIN1315 **SWA** 2018/19 06-March-2019	QLD Government HIN1323 **SWA** 2018/2019 18-March-2019	QLD Government HIN1336 **SWA** 2018/19 29-May-2019	QLD Government HIN1343 **SWA** 2018/2019 11-June-2019	QLD Government HIN1336 SWA 2018/19 29-May-19	QLD Government HIN1403 SWA 2020/2021 21-Jul-20	QLD Government HIN1405 **SWA** 2020/2021 21-July-2020
Scheme Component:	WTP	**SP25 - Ingham PS High Lift**	**SP23 - Ingham Depot Hi Lift**	**SP25 - Ingham PS High Lift**	**SP23 - Ingham Depot Hi Lift**	**SP25 - Ingham PS High Lift**	**SP25 - Ingham PS High Lift**	**SP23 - Ingham Depot Hi Lift**
PARAMETER	**UNITS**							
Conductivity @ 25° C	us/cm	164	175	176	171	176	180	174
pH @ 21° C		6.95	7.5	7.24	7.42	7.24	7.64	7.49
Total Hardness CaCO3/L	mg	32	33	33	32	33	34	34
Temp Hardness CaCO3/L	mg	32	33	33	32	33	34	34
Alkalinity CaCO3/L	mg	42	43	42	43	42	44	43
Residual Alkalinity	meq/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Silica	mg/L	41	43	43	44	43	44	44
Total Dissolved Ions	mg/L	114	121	122	120	122	127	123
Total Dissolved Solids	mg/L	129	138	139	138	139	143	141
Colour	HAZEN	<1	1	3	1	3	<1	<1
Turbidity	NTU	<1	<1	<1	<1	<1	<1	<1
pH SAT* (calc for CaCO3)		8.9	8.9	8.9	8.9	8.9	8.9	8.9
Saturation Index		-2	-1.4	-1.6	-1.5	-1.6	-1.2	-1.4
Mole Ratio		3.1	2.5	2.9	2.6	2.9	2.4	2.5
Sodium Adsorption Ratio		1.5	1.7	1.7	1.6	1.7	1.7	1.6
Figure Of Merit Ratio		0.7	0.7	0.7	0.7	0.7	0.7	0.7
CATIONS								
Sodium	mg/L	20	22	22	21	22	22	22
Potassium	mg/L	1	1	1	1	1	1	1
Calcium	mg/L	7.9	7.7	8.6	7.6	8.6	8.7	8
Magnesium	mg/L	2.9	3.2	2.8	3.2	2.8	3.1	3.4
Hydrogen	mg/L	0	0	0	0	0	0	0
ANIONS								
Bicarbonate	mg/L	51	52	52	52	52	54	52
Carbonate	mg/L	0	0.1	0	0.1	0	0.1	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0
Chloride	mg/L	18	17	19	17	19	19	17
Fluoride	mg/L	0.08	0.06	0.05	0.06	0.05	0.06	0.06
Nitrate as NO3	mg/L	9.8	13	13	14	13	13	14
Sulphate	mg/L	3	4	4	4	4	5.7	5.8
OTHER DISSOLVED ELEMENTS								
Iron	mg/L	<0.01	<0.01	0.01	0.04	0.01	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001
Zinc	mg/L	0.04	<0.01	<0.01	<0.01	<0.01	<0.06	<0.06
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<0.03
Boron	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	0.008	<0.003

HINCHINBROOK SHIRE COUNCIL

SCHEME 1
INGHAM WATER SUPPLY RETICULATION
Scheme Component: R

METHOD	PARAMETER	UNITS	HEALTH	AESTHETIC	LABORATORY NAME	ID_HIN043	ID_HIN066	ID_HIN080	ID_HIN100	ID-HIN134	ID-HIN135	ID-HIN132	ID-HIN138	ID-HIN164	ID-HIN165	ID-HIN166	ID-HIN62	ID-HIN179	ID-HIN176	ID-HIN177	ID-HIN191	ID-HIN222	ID-HIN221	ID-HIN231
					REPORT #																			
					SAMPLE TYPE	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
					FINANCIAL YEAR	1999/2000	2000/2001	2000/2001	2001/2002	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2003/2004	2003/2004	2002/2003
					DATE SAMPLE TAKEN	21-Jun-00	02-Feb-01	20-Jun-01	06-Mar-02	13-Aug-02	13-Aug-02	13-Aug-02	13-Aug-02	08-Jan-03	08-Jan-03	08-Jan-03	08-Jan-03	25-Feb-03	26-Feb-03	26-Feb-03	14-Mar-03	14-Jul-03	14-Jul-03	06-Aug-03
					SAMPLE LOCATION	SP21 - Ingham Water Tower	SP21 - Ingham Water Tower	SP21 - Ingham Water Tower	SP21 - Ingham Water Tower	SP21 - Ingham Water Tower	SP37 - Kehls Road	SP22 - Tokalon Tower	SP21 - Ingham Water Tower	SP37 - Kehls Road	SP21 - Ingham Water Tower	SP22 - Tokalon Tower	SP21 - Ingham Water Tower	SP21 - Ingham Water Tower	SP05 - Jabiru Street, Toobanna	SP22 - Tokalon Tower	SP21 - Ingham Water Tower	Hunter Street	Hunter Street	SP06 - Trebonne State School
18320	Conductivity @ 25' C	us/cm				171	180	171	180	110	110	165	105	170	165	200	160	175	180	165	165	145	125	105
18226	pH @ 21' C			6.5-8.5		6.92	6.7	7.15	7.2	6.95	7.05	7.25	6.85	7.55	7.5	7.55	7.45	7.6	7.6	7.35	7.25	7.3	7.2	7.4
18209	Total Hardness CaCO3/L	mg			200	29.8	33.3	29	35	25.5	24	32	20.5	32	31	34	29.5	38	40	32	32	24.5	21.5	19.5
18209	Temp Hardness CaCO3/L	mg																						
18208	Alkalinity CaCO3/L	mg				45	44	44	44.5	36	37	43	34	51	52	42	48.5	48.5	49.5	43.5	42.5	32	28	28
18209	Residual Alkalinity	meq/L				0.5	0.4	0.5	0.2	0.2	0.3	0.2	0.3	0.4	0.4	0.2	0.4	0.2	0.2	0.2	0.2	0.2	0.1	0.2
18195	Silica	mg/L				47	30	40	36	27	27	39	27	39	39	42	40	41	42	43	41	32	28	21
18209	Total Dissolved Ions	mg/L			500				130	83	84	120	78	120	120	140	110	130	130	120	120	94	83	72
18209	Total Dissolved Solids	mg/L				84	94	83	140	88	88	140	84	120	120	150	120	140	150	140	130	110	94	75
18206	Colour	HAZEN			15	0.1		1	<1	1	1	<1	<1	5	3	1	4	1	2	1	<1	<1	<1	<1
18212	Turbidity	NTU			5	0		0.2	<1	2	1	<1	2	1	2	<1	2	<1	<1	3	<1	<1	8	2
18209	pH SAT* (calc for CaCO3)																							
18209	Saturation Index								-1.7	-2	-1.9	-1.7	-2.4	-1.2	-1.3	-1.3	-1.5	-1.1	-1	-1.6	-1.7	-1.8	-2	-1.7
18209	Mole Ratio								2.7	3	2.9	2.8	3.1	2.4	2.5	2.5	2.6	2.3	2.3	2.6	2.7	2.9	3	2.7
18209	Sodium Adsorption Ratio					1.6	1.5	1.6	1.7	1.1	1.1	1.6	1.2	1.6	1.6	1.9	1.7	1.6	1.5	1.7	1.6	1.6	1.5	1.2
18209	Figure Of Merit Ratio								0.7	1	0.9	0.7	0.7	0.7	0.7	0.6	0.7	0.8	0.8	0.7	0.7	0.6	0.6	0.8
	CATIONS																							
18195	Sodium	mg/L			180	20.6	20.5	19.8	23	12.5	12	20.5	13	20.5	20.5	26	21	22	22	22.5	20.5	17.5	16	11.5
18195	Potassium	mg/L				1	1.2	1	0.9	1.1	1.1	1.1	1.1	1.2	1.2	1.6	1.2	1.1	1	1	1.1	1	1	1
18195	Calcium	mg/L				7.3	8.4	7	8.2	8	7.7	8.1	4.7	10	9.2	8.9	7	12	13.5	8	7.8	7	5.7	6.5
18195	Magnesium	mg/L				2.8	3	2.8	3.5	1.4	1.2	2.9	2.1	1.6	1.9	2.9	2.9	2.1	1.6	3	3	1.7	1.7	0.8
18209	Hydrogen	mg/L							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ANIONS																							
18209	Bicarbonate	mg/L				54.6	53.3	53.3	54	44	45	52	41.5	61	63	51	59	59	60	53	51	39	34	34.5
18209	Carbonate	mg/L				0	0	0	0.1	0	0	0.1	0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0.1
18209	Hydroxide	mg/L				0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18204	Chloride	mg/L			250	12	15	13	14	11.5	12	15	12	17.5	17.5	20	17	16	15	15.5	13.5	17	16.5	14
18204	Fluoride	mg/L	1.5			0.08	0.31	0.11	<0.1	0.1	0.1	<0.1	0.1	0.2	0.2	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
18204	Nitrate as NO3	mg/L	50						18.5	2.5	2.5	19	2.6	0.6	0.5	21	0.6	15	16	13.5	16.5	8.7	6.1	2.1
18204	Sulphate	mg/L	500	250		4	13	3	5.5	<2	<2	4.4	<2	2.3	2.3	5.1	2	4.9	4.8	6	4.7	2.4	<2	<2
	OTHER DISSOLVED ELEMENTS																							
18195	Iron	mg/L			0.3	0.01	0	0.01	<0.01	0.02	0.02	0.01	0.01	0.05	0.04	0.01	0.06	0.01	<0.01	0.01	<0.01	0.03	0.02	0.05
18195	Manganese	mg/L	0.5	0.1		0	0	0	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
18195	Zinc	mg/L		3		0.04	0.05	0.04	0.11	0.04	0.04	0.01	0.12	0.02	0.02	0.03	0.01	0.01	0.02	0.02	0.14	<0.01	<0.01	0.01
18195	Aluminium	mg/L		0.2		0.08	0	0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18195	Boron	mg/L	4			0.01	0.02	0	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
18195	Copper	mg/L	2	1					<0.02	0.03	0.03	0.03	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.03	0.05

SCHEME 1 INGHAM WATER SUPPLY RETICULATION Scheme Component:	R	ID-HIN230 SWA 2003/2004 14-Aug-03 SP24 - Trebonne Water Tower	ID-HIN229 SWA 2003/2004 14-Aug-03 SP05 - Jabiru Street, Toobanna	ID-HIN229 SWA 2003/2004 14-Aug-03 SP05 - Jabiru Street, Toobanna	ID-HIN262 SWA 2003/2004 16-Dec-03 SP21 - Ingham Water Tower	ID-HIN272 SWA 2003/2004 17-Feb-04 SP21 - Ingham Water Tower	ID-HIN287 SWA 2003/2004 20-May-04 SP21 - Ingham Water Tower	ID-HIN294 SWA 2003/2004 15-Jun-04 SP21 - Ingham Water Tower	ID-HIN306 SWA 2004/2005 07-Jul-04 SP21 - Ingham Water Tower	ID-HIN306 SWA 2004/2005 20-Oct-04 SP21 - Ingham Water Tower	ID-HIN333 SWA 2004/2005 09-Dec-04 SP21 - Ingham Water Tower	ID-HIN377 SWA 2004/2005 14-Apr-05 SP21 - Ingham Water Tower	ID-384 SWA 2004/2005 09-Jun-05 SP21 - Ingham Water Tower	ID-HIN393 SWA 2005/2006 03-Aug-05 SP22 - Tokalon Tower	ID-394 SWA 2005/2006 03-Aug-05 SP21 - Ingham Water Tower	ID-432 SWA 2005/2006 26-May-06 SP21 - Ingham Water Tower	ID-HIN447 SWA 2006/2007 13-Sep-06 SP18 - 32 Halifax Road	ID-444 SWA 2006/2007 13-Sep-06 SP21 - Ingham Water Tower	ID-475 SWA 2007/2008 30-Jul-07 SP21 - Ingham Water Tower	ID-HIN4 SWA 2007/2008 06-Aug-07 SP05 - Jabiru Street, Toobanna
PARAMETER	**UNITS**																			
Conductivity @ 25' C	us/cm	105	185	185	140	170	180	125	95	125	132	170		170	166	177	177	176	165	190
pH @ 21' C		7.35	7.75	7.75	7.7	7.45	7.35	7.1	7	7.25	7.48	7.2	7.01	7.35	7.41	7.33	7.31	7.26	7.06	7.67
Total Hardness CaCO3/L	mg	19	39	39	22.5	27.5	27.5	17	14.5	19	19	28	13	26	26	31	31	30	30	37
Temp Hardness CaCO3/L	mg																			
Alkalinity CaCO3/L	mg	27.5	50	50	43	40	42.5	26.5	20.5	33.5	37	44	22	45	42	44	43	42	42	46
Residual Alkalinity	meq/L	0.2	0.2	0.2	0.4	0.3	0.3	0.2	0.1	0.3	0.4	0.3	0.2	0.4	0.3	0.3	0.2	0.2	0.2	0.2
Silica	mg/L	22	42	42	38	44	45	31	26	35	32	45	24	45	45	45	43	43	41	44
Total Dissolved Ions	mg/L	70	140	140	97	110	120	83	60	82	90	116	61	113	110	122	118	117	115	129
Total Dissolved Solids	mg/L	74	150	150	110	130	140	97	73	96	98	134	71	131	129	140	134	134	131	145
Colour	HAZEN	2	<1	<1	2	1	1	5	2	4	5	<1	2	7	6	3	1	1	<1	1
Turbidity	NTU	1	<1	<1	1	<1	<1	2	2	2	3	1	4	1	1	1	<1	1	2	1
pH SAT* (calc for CaCO3)																				
Saturation Index		-1.9	-0.9	-0.9	-1.4	-1.6	-1.6	-2.3	-2.6	-2.1	-1.8	-1.8	-2.6	-1.6	-1.6	-1.6	-1.6	-1.7	-1.9	-1
Mole Ratio		2.8	2.2	2.2	2.3	2.5	2.6	3.2	3.3	2.8	2.6	2.7	3.2	2.3	2.5	2.7	2.7	2.8	3	2.4
Sodium Adsorption Ratio		1.2	1.6	1.6	1.6	1.7	1.9	1.7	1.3	1.5	1.7	1.7	1.4	1.7	1.7	1.6	1.7	1.7	1.6	1.6
Figure Of Merit Ratio		0.8	0.8	0.8	0.6	0.6	0.6	0.5	0.6	0.6	0.5	0.6	0.5	0.6	0.6	0.7	0.7	0.7	0.7	0.8
CATIONS																				
Sodium	mg/L	11.5	22.5	22.5	17.5	20.5	22.5	16.5	11.5	15	17	21	11	20	20	21	21	21	20	23
Potassium	mg/L	1.1	1.1	1.1	1.2	1	1.1	1.2	1.1	1.3	1.4	1	1	1	1	1.2	1	0.9	1	1
Calcium	mg/L	5.9	13	13	4.9	6.7	6.5	4	3.3	4	4.1	6.6	2.9	6.3	6.2	7.5	7.6	7.2	7.2	13
Magnesium	mg/L	1	1.5	1.5	2.5	2.7	2.7	1.7	1.6	2.2	2.1	2.7	1.4	2.5	2.5	3	2.8	2.9	2.9	1.4
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																				
Bicarbonate	mg/L	33	61	61	52	48.5	52	32.5	25	41	46	53	27	54	51	54	52	52	51	56
Carbonate	mg/L	0	0.2	0.2	0.1	0.1	0.1	0	0	0	0.1	0	0	0.1	0.1	0.1	0.1	0	0	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	14	15	15	17	13.5	15	19.5	13.5	14.5	17	14	13	14	14	17	16	17	17	18
Fluoride	mg/L	0.1	0.1	0.1	0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.06	0.06
Nitrate as NO3	mg/L	2	20	20	<0.5	15.5	15	5.6	3	2.5	1.2	12	2.5	10	10	14	11	11	12	13
Sulphate	mg/L	<2	5.3	5.3	<2	4.6	4.6	<2	<2	<2	<2.0	4.6	1.2	5.4	5.5	4.4	5.3	5.4	4	4.6
OTHER DISSOLVED ELEMENTS																				
Iron	mg/L	0.06	<0.01	<0.01	0.03	0.01	<0.01	0.08	0.09	0.04	0.05	<0.01	0.06	<0.01	<0.01	<0.01	0.02	0.01	0.01	<0.01
Manganese	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.01	<0.01
Zinc	mg/L	0.01	<0.01	<0.01	0.01	0.01	0.01	0.04	0.02	0.01	<0.01	<0.01	0.01	2	0.01	0.02	0.05	0.05	0.07	0.04
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.01	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Copper	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.04	0.02	0.02	0.02	0.02	<0.03	0.01	0.01	0.02	0.01	0.01	0.02	0.02

SCHEME 1 INGHAM WATER SUPPLY RETICULATION Scheme Component:	R	ID-510 SWA 2007/2008 ~~29-Feb-08~~ SP21 - Ingham Water Tower	ID-521 SWA 2007/2008 ~~22-Apr-08~~ SP21 - Ingham Water Tower	ID-600 SWA 2008/2009 ~~10-Sep-08~~ SP21 - Ingham Water Tower	ID-HIN615 SWA 2008/2009 ~~13-Oct-08~~ SP21 - Ingham Water Tower	ID-HIN612 SWA 2008/2009 ~~13-Oct-08~~ SP19 -10 Victoria Mill Road	ID-HIN616 SWA 2008/2009 ~~13-Oct-08~~ SP22 - Tokalon Tower	ID-HIN613 SWA 2008/2009 ~~13-Oct-08~~ Berwick Street Hydrant	ID-624 SWA 2008/2009 ~~01-Dec-08~~ SP21 - Ingham Water Tower	ID-631 SWA 2008/2009 ~~29-Jan-09~~ SP21 - Ingham Water Tower	ID-HIN639 SWA 2008/2009 ~~25-Feb-09~~ SP21 - Ingham Water Tower	ID-HIN640 SWA 2008/2009 ~~02-Mar-09~~ SP22 - Tokalon Tower	ID-641 SWA 2008/2009 ~~30-Mar-09~~ SP21 - Ingham Water Tower	ID-HIN662 SWA 2008/2009 ~~17-Jun-09~~ SP21 - Ingham Water Tower	ID-HIN666 SWA 2008/2009 ~~29-Jun-09~~ SP19 - 10 Victoria Mill Road	ID-HIN667 SWA 2008/2009 ~~29-Jun-09~~ Berwick Street Hydrant	ID-HIN672 SWA 2009/2010 ~~01-Jul-09~~ SP37 - Kehls Road	ID-HIN673 SWA 2009/2010 ~~01-Jul-09~~ SP10 - 44 Gorton Street, Trebonne	ID-HIN704 SWA 2009/2010 ~~30-Oct-09~~ SP19 -10 Victoria Mill Road	ID-HIN707 SWA 2009/2010 ~~27-Nov-09~~ SP21 - Ingham Water Tower	ID-HIN715 SWA 2009/2010 ~~04-Dec-09~~ SP22 - Tokalon Tower
PARAMETER	**UNITS**																			
Conductivity @ 25' C	us/cm	186	191	110	119	118	222	114	121	191	195	194	190	197	194	193	191	181	153	154	200
pH @ 21' C		7.38	7.34	7.27	7.38	7.31	7.73	7.19	7.15	7.01	7.47	7.3	7.3	7.53	7.29	7.2	7.42	7.26	7.23	7.3	7.53
Total Hardness CaCO3/L	mg	32	34	19	18	16	30	17	16	33	36	36	32	34	32	32	36	32	30	30	33
Temp Hardness CaCO3/L	mg																				
Alkalinity CaCO3/L	mg	39	41	28	31	27	45	30		40	47	48	46	43	43	41	46	46	44	44	41
Residual Alkalinity	meq/L	0.1	0.1	0.2	0.3	0.2	0.3	0.3	0.3	0.1	0.2	0.2	0.3	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2
Silica	mg/L	43	43	24	26	24	42	24	24	41	43	44	45	44	43	37	39	37	33	34	45
Total Dissolved Ions	mg/L	123	123	76	78	71	141	74	79	127	138	138	131	130	128	125	131	125	101	106	127
Total Dissolved Solids	mg/L	142	140	82	84	78	155	80	85	143	151	152	148	147	145	136	141	133	107	113	146
Colour	HAZEN	3	5	<1	3	3	2	4	6	<1	<1	<1	<1	1	1	3	4	5	<1	<1	1
Turbidity	NTU	2	1	2	4	3	1	3	4	1	<1	<1	<1	1	1	4	1	1	1	1	<1
pH SAT* (calc for CaCO3)																					
Saturation Index		-1.6	-1.6	-2.1	-1.8	-2.1	-1.1	-2.1		-1.9	-1.3	-1.5	-1.6	-1.3	-1.6	-1.7	-1.3	-1.6	-1.8	-1.7	-1.4
Mole Ratio		2.8	2.8	2.7	2.7	2.8	2.5	2.9		3.1	2.6	2.8	2.7	2.5	2.8	3	2.7	2.9	2.8	2.7	2.7
Sodium Adsorption Ratio		1.7	1.7	1.3	1.4	1.4	2.3	1.4	1.6	1.7	1.7	1.6	1.8	1.8	1.8	1.9	1.7	1.8	1.3	1.4	1.8
Figure Of Merit Ratio		0.7	0.7	0.7	0.6	0.6	0.5	0.6	0.5	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.7	0.6	0.8	0.8	0.6
CATIONS																					
Sodium	mg/L	22	22	13	14	13	29	13	15	23	23	23	23	24	23	25	23	23	17	18	24
Potassium	mg/L	1.2	1.1	1.2	1.2	1.3	1.1	1.3	1.5	1	1.1	1	1.1	1.1	1.1	1.3	1.1	1.2	1.4	1.4	1.1
Calcium	mg/L	7.5	7.9	4.1	5.3	3.8	7.6	3.9	3.4	8	11	9.4	7.6	9.3	8.1	8.2	10	8.8	6.5	6.5	8
Magnesium	mg/L	3.2	3.3	2.2	1.2	1.7	2.7	1.6	2	3.2	2.3	3.1	3.2	2.6	2.9	2.8	2.5	2.4	3.2	3.2	3.1
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																					
Bicarbonate	mg/L	48	50	34	38	33	55	36	37	48	58	59	55	53	53	50	56	56	54	53	50
Carbonate	mg/L	0.1	0.1	0	0	0	0.2	0	0	0	0.1	0.1	0.1	0.1	0.1	0	0.1	0.1	0.1	0.1	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	20	18	15	15	15	31	15	17	20	21	21	20	20	21	25	24	23	15	17	23
Fluoride	mg/L	0.05	<0.1	0.07	0.06	0.07	0.05	0.06	0.07	<0.1	0.05	0.05	0.05	<0.1	0.05	0.06	0.07	0.06	0.1	0.09	0.05
Nitrate as NO3	mg/L	16	16	2	1.6	1.5	11	1.5	1	20	17	17	16	17	15	9.6	10	7.6	2.3	4.1	13
Sulphate	mg/L	4.6	4.1	2	1.5	1.5	4.4	1.5	1.5	4.3	4.5	4.3	4.3	4.1	4.1	3.1	3.4	2.8	2	2.3	4.2
OTHER DISSOLVED ELEMENTS																					
Iron	mg/L	0.01	<0.01	0.04	0.08	0.09	<0.01	0.12	0.15	<0.01	<0.01	<0.01	<0.01	0.05	0.03	0.1	0.03	0.03	0.03	0.02	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	0.02	0.06	0.01	0.04	<0.01	0.01	0.01	0.05	0.03	0.32	0.03	<0.01	0.09	0.03	0.03	<0.01	0.1	0.24	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	0.05	0.05	<0.05	0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Copper	mg/L	0.02	<0.02	<0.02	0.03	0.02	<0.02	0.02	0.04	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	0.02	0.02	0.02	<0.02	<0.02

SCHEME 1 INGHAM WATER SUPPLY RETICULATION Scheme Component:	R	ID-HIN722 SWA 2009/2010 07-Jan-10 SP19 - 10 Victoria Mill Road	ID-HIN723 SWA 2009/2010 07-Jan-10 SP33 - Sewerage Plant Kitchen Tap	ID-HIN754 SWA 2010/2011 01-Sep-10 SP33 - Sewerage Plant Kitchen Tap	ID-HIN819 SWA 2011/2012 09-Mar-12 SP21 - Ingham Water Tower	ID-HIN818 SWA 2011/2012 09-Mar-12 SP44 - Townsend Street	ID-HIN828 SWA 2011/2012 14-Jun-12 SP25 - Hi Lift at River	ID-HIN827 SWA 2011/2012 14-Jun-12 SP24 - Trebonne Water Tower	ID-HIN826 SWA 2011/2012 14-Jun-12 SP22 - Tokalon Tower	ID-HIN839 SWA 2012/2013 11-Sep-12 SP22 - Tokalon Tower	ID-HIN840 SWA 2012/2013 11-Sep-12 SP24 - Trebonne Water Tower	ID-HIN841 SWA 2012/2013 12-Sep-12 SP33 - Sewerage Plant Kitchen Tap	ID-HIN846 SWA 2012/2013 10-Oct-12 Toobanna	ID-HIN845 SWA 2012/2013 10-Oct-12 SP22 - Tokalon Tower	ID-HIN864 SWA 2012/2013 11-Jan-13 SP47 - McDonaghs Road, Blackrock	ID-HIN863 SWA 2012/2013 11-Jan-13 SP10 - 44 Gorton Street, Trebonne	QLD Government HIN874 SWA 2013/2014 12-Jul-13 SP24 - Trebonne Water Tower	QLD Government HIN873 SWA 2013/2014 12-Jul-13	QLD Government HIN877 SWA 2013/2014 12-Jul-13
PARAMETER	**UNITS**																			
Conductivity @ 25' C	us/cm	183	184	184	183	184	123	171	165	213	116	108	174	189	170	146	114	190	98
pH @ 21' C		7.35	7.28	7.44	7.54	7.5	7.19	7.57	7.33	7.85	7.43	7.15	7.86	7.87	7.52	7.66	7.26	7.87	7
Total Hardness CaCO3/L	mg	32	32	33	33	33	22	34	31	33	23	21	33	36	33	28	26	33	16
Temp Hardness CaCO3/L	mg																26	33	16
Alkalinity CaCO3/L	mg	41	41	41	43	43	31	47	45	44	32	29	48	48	46	40	29	40	23
Residual Alkalinity	meq/L	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.2	0.2	0.2	0.3	0.2	0.3	0.2	0.1	0.1	0.1
Silica	mg/L	43	42	43	41	41	28	41	42	42	27	26	37	42	43	34	28	44	26
Total Dissolved Ions	mg/L	118	119	122	122	123	82	124	120	131	75	69	117	130	121	105	72	118	59
Total Dissolved Solids	mg/L	137	136	140	136	137	91	136	134	145	82	77	124	143	135	114	82	137	71
Colour	HAZEN	<1	<1	4	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	1	<1	<1	<1	<1
Turbidity	NTU	<1	1	<1	<1	6	1	<1	<1	<1	2	1	2	<1	1	1	1	<1	2
pH SAT* (calc for CaCO3)																	9	8.9	9.5
Saturation Index		-1.6	-1.6	-1.4	-1.3	-1.3	-2	-1.2	-1.6	-1	-1.6	-2.1	-0.8	-0.8	-1.3	-1.3	-1.8	-1.1	-2.5
Mole Ratio		2.7	2.8	2.6	2.4	2.5	2.9	2.4	2.7	2.2	2.5	2.9	2.1	2.1	2.4	2.3	2.7	2.2	3.1
Sodium Adsorption Ratio		1.6	1.6	1.6	1.7	1.6	1.5	1.6	1.6	1.8	1	1.1	1.4	1.6	1.6	1.4	0.9	1.7	1.2
Figure Of Merit Ratio		0.7	0.7	0.7	0.7	0.7	0.6	0.8	0.7	0.6	0.9	0.9	0.8	0.7	0.7	0.8	1.1	0.7	0.7
CATIONS																			
Sodium	mg/L	21	21	21	22	22	16	21	21	24	11	11	19	23	20	17	11	22	11
Potassium	mg/L	1.1	1.2	1	1.1	1.1	1.1	1	1	1.1	1.1	1.2	1.1	1.1	1	1.4	1	1	1
Calcium	mg/L	7.4	7.5	8.6	7.8	8.8	5.1	10	7.7	8.6	6.8	4.9	12	13	8.4	7.5	8.5	8.2	3.7
Magnesium	mg/L	3.2	3.2	2.9	3.2	2.8	2.2	2.1	3	2.9	1.5	2	0.8	1.1	2.8	2.3	1.3	3	1.7
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																			
Bicarbonate	mg/L	50	50	50	52	53	37	57	54	54	39	35	58	58	56	48	36	4.8	28
Carbonate	mg/L	0.1	0.1	0.1	0.1	0.1	0	0.1	0.1	0.2	0.1	0.2	0.2	0.2	0.1	0.1	0	0.2	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	19	19	18	16	16	14	15	15	20	12	11	15	18	16	16	11	18	11
Fluoride	mg/L	<0.1	<0.1	0.05	<0.1	<0.1	0.05	<0.1	<0.1	<0.1	0.07	0.07	<0.1	<0.1	<0.05	0.08	0.06	<0.05	0.07
Nitrate as NO3	mg/L	13	13	15	15	15	4.5	13	14	15	2.1	2	7.6	12	12	4.3	2.9	14	2.8
Sulphate	mg/L	3.8	4.1	4.6	4.3	4.3	1.6	4.2	4.2	4.1	1.4	1.3	2.9	4.1	4.1	7.7	1.4	3.9	1.3
OTHER DISSOLVED ELEMENTS																			
Iron	mg/L	0.02	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.01	<0.1	0.02	<0.01	<0.01	0.03
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.04	<0.01	<0.01	<0.01	0.01	0.02	0.03	0.03	<0.01	0.03	0.02	<0.01	<0.01	0.01	0.01	0.02	0.02	0.08
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	0.03	<0.02	<0.02	<0.02
Copper	mg/L	<0.02	<0.02	<0.02	0.02	0.02	<0.02	<0.02	<0.02	0.02	0.02	0.02	0.02	0.02	<0.02	<0.02	<0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY RETICULATION		QLD Government HIN880 Pest/Herb 2013/2014 23-Jul-13	QLD Government HIN883 Pest/Herb 2013/2014 23-Jul-13	QLD Government HIN884 Pest/Herb 2013/2014 23-Jul-13	QLD Government HIN891 SWA 2013/2014 09-Oct-13	QLD Government HIN893 SWA 2013/2014 10-Oct-13	QLD Government HIN914 SWA 2013/2014 16-Jan-14	QLD Government HIN915 SWA 2013/2014 16-Jan-14	QLD Government HIN925 SWA 2013/2014 12-Mar-14	QLD Government HIN930 SWA 2013/2014 13-Mar-14	QLD Government HIN927 SWA 2013/2014 12-Mar-14	QLD Government HIN926 SWA 2013/2014 12-Mar-14	Townsville Laboratory Services HIN944 SWA 2013/2014 05-Jun-14	QLD Government HIN950 SWA 2013/2014 05-Jun-14	Townsville Laboratory Services HIN945 SWA 2013/2014 05-Jun-14	QLD Government HIN945 SWA 2013/2014 05-Jun-14	Townsville Laboratory Services HIN946 SWA 2013/2014 05-Jun-14	QLD Government HIN952 SWA 2013/2014 05-Jun-14
Scheme Component:	R	SP21 - Ingham Water Tower	SP22 - Tokalon Tower	SP24 - Trebonne Water Tower	SP42 - Bruce Highway, Toobanna	SP05 - Jabiru Street, Toobanna	iP47 - McDonaghs Road, Blackroc	SP10 - 44 Gorton Street, Trebonne	SP44 - Townsend Street	SP43 - 4 Marina Parade	SP10 - 44 Gorton Street, Trebonne	SP37 - Kehls Road	SP21 - Ingham Water Tower	SP21 - Ingham Water Tower	SP22 - Tokalon Tower	SP22 - Tokalon Tower	SP08 - 46 Orient Road, Blackrock	SP08 - 46 Orient Road, Blackrock
PARAMETER	**UNITS**																	
Conductivity @ 25' C	us/cm				179	189	172	132	182	187	169	169	173	172	175	174	174	173
pH @ 21' C					7.59	7.65	7.13	6.91	7.37	7.39	7.61	7.65	7.23	6.49	7.57	6.53	7.14	6.59
Total Hardness CaCO3/L	mg				34	35	33	26	35	34	29	30	31.6	31	31.4	31	31.9	32
Temp Hardness CaCO3/L	mg				34	35	33	26	35	34	29	30		31		31		32
Alkalinity CaCO3/L	mg				43	43	43	36	42	43	38	39	44	46	43.8	44	45.8	47
Residual Alkalinity	meq/L				0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	<0.1	0.3	<0.1	0.3	<0.1	0.3
Silica	mg/L				43	44	44	31	43	44	35	35	64.4	43	56.4	44	71.9	43
Total Dissolved Ions	mg/L				120	122	121	89	120	121	108	109		119		119		121
Total Dissolved Solids	mg/L				136	139	138	97	137	138	119	119	111	134	112	135	111	135
Colour	HAZEN				<1	<1	3	1	3	<1	3	3	<1	<1	<1	1	<1	1
Turbidity	NTU				1	5	<1	1	<1	<1	1	<1	0.1	<1	0.3	<1	0.1	<1
pH SAT* (calc for CaCO3)					8.8	8.7	8.8	9	8.8	8.8	8.9	8.9		8.9		8.9		8.9
Saturation Index					-1.2	-1.1	-1.7	-2.1	-1.4	-1.4	-1.3	-1.2	-1.61	-2.4	-1.27	-2.4	-1.66	-2.3
Mole Ratio					2.4	2.4	2.9	3.1	2.5	2.6	2.5	2.4		3.5		3.5		3.3
Sodium Adsorption Ratio					1.6	1.6	1.6	1.3	1.6	1.6	1.6	1.6	1.5	1.6	1.6	1.6	1.5	1.6
Figure Of Merit Ratio					0.7	0.7	0.7	0.8	0.8	0.7	0.7	0.7		0.7		0.7		0.7
CATIONS																		
Sodium	mg/L				21	22	21	15	21	21	20	20	20	20	20.3	21	19.7	20
Potassium	mg/L				1.1	1.1	1	1.5	1	1	1.4	1.4	1	1	1	1	1	1
Calcium	mg/L				10	11	8.6	6.8	9.5	10	8.3	9.2	7.8	7.4	8	7.6	8.3	7.9
Magnesium	mg/L				2	1.6	2.7	2.2	2.7	2.2	2	1.7	2.9	3.1	2.8	2.9	2.7	2.9
Hydrogen	mg/L				0	0	0	0	0	0	0	0		0		0		0
ANIONS																		
Bicarbonate	mg/L				52	53	53	44	52	53	46	47	26.8	56	26.7	54	27.9	57
Carbonate	mg/L				0.1	0.1	0	0	0.1	0.1	0.1	0.1	<5	0	<5	0	<5	0
Hydroxide	mg/L				0	0	0	0	0	0	0	0	<5	0	<5	0	<5	0
Chloride	mg/L				17	18	17	15	16	16	19	18	16.3	15	17.6	16	16.6	15
Fluoride	mg/L				0.06	<0.05	0.55	0.46	0.38	0.37	0.44	0.46	0.28	0.25	0.43	0.39	0.29	0.26
Nitrate as NO3	mg/L				11	12	12	2	13	13	6.9	7		12		12		12
Sulphate	mg/L				4	4.2	4.6	1.8	4.2	4.4	3	3.1	3.9	4.3	4	4.3	4	4.3
OTHER DISSOLVED ELEMENTS																		
Iron	mg/L				<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.007	<0.01	0.04	0.02	<0.005	<0.01
Manganese	mg/L				<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.01	0.004	<0.01	<0.001	<0.01
Zinc	mg/L				<0.01	0.02	0.03	0.03	<0.01	<0.01	<0.01	0.04	0.035	0.05	0.054	0.04	0.011	0.01
Aluminium	mg/L				<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.005	<0.05	<0.005	<0.05	<0.005	<0.05
Boron	mg/L				<0.02	0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	0.002	<0.02	0.001	<0.02	0.008	<0.02
Copper	mg/L				<0.03	<0.03	0.03	0.1	<0.03	<0.03	<0.03	<0.03	0.012	<0.03	0.012	<0.03	0.011	<0.03

SCHEME 1 INGHAM WATER SUPPLY RETICULATION		Townsville Laboratory Services HIN947 SWA 2013/2014 05-Jun-14	QLD Government HIN953 SWA 2013/2014 05-Jun-14	Townsville Laboratory Services HIN948 SWA 2013/2014 05-Jun-14	QLD Government HIN954 SWA 2013/2014 05-Jun-14	Townsville Laboratory Services HIN949 SWA 2013/2014 05-Jun-14	QLD Government HIN955 SWA 2013/2014 05-Jun-14	QLD Government HIN1029 SWA 2015/2016 15-Jul-15	QLD Government HIN1025 SWA 2015/2016 15-Jul-15	QLD Government HIN1028 SWA 2015/2016 15-Jul-15	QLD Government HIN1046 SWA 2015/2016 06-Oct-15	QLD Government HIN1093 SWA 2015/2016 14-Apr-16	QLD Government HIN1113 SWA 2016/2017 08-Sep-16	QLD Government HIN1162 SWA 2016/2017 05-Apr-17	QLD Government HIN1205 SWA 2017/2018 26-Oct-17	QLD Government HIN1028 SWA 2017/2018 26-Oct-17	QLD Government HIN1207 SWA 2017/2018 26-Oct-17	QLD Government HIN1217 SWA 2017/2018 31-Jan-18
Scheme Component:	R	SP10 - 44 Gorton Street, Trebonne	SP10 - 44 Gorton Street, Trebonne	SP19 - 10 Victoria Mill Road	SP19 - 10 Victoria Mill Road	SP33 - Sewerage Plant Kitchen Tap	SP33 - Sewerage Plant Kitchen Tap	SP21 - Ingham Water Tower	SP24 - Trebonne Water Tower	SP22 - Tokalon Tower	SP42 - Bruce Highway, Toobanna	SP33 - Sewerage Plant Kitchen Tap	SP44 - Townsend Street	SP44 - Townsend Street	SP24 - Trebonne Water Tower	SP22 - Tokalon Tower	SP21 - Ingham Water Tower	SP05 - Jabiru Street, Toobanna
PARAMETER	**UNITS**																	
Conductivity @ 25' C	us/cm	185	184	172	172	181	182	175	99	177	191	187	101	170	133	182	175	194
pH @ 21' C		7.68	6.77	7.39	6.67	7.37	6.65	7.38	7.29	7.33	7.71	7.3	7.1	7.49	7.23	7.85	7.46	7.58
Total Hardness CaCO3/L	mg	32.7	33	31.7	31	37.3	37	33	18	33	34	38	15	30	33	36	35	38
Temp Hardness CaCO3/L	mg		33		31		37	33	18	33	34	38	15	30	33	36	35	38
Alkalinity CaCO3/L	mg	45.9	46	42.9	45	48.9	51	46	21	48	46	47	21	40	39	46	45	51
Residual Alkalinity	meq/L	<0.1	0.3	<0.1	0.3	<0.1	0.3	0.3	0.1	0.3	0.3	0.2	0.1	0.2	0.1	0.2	0.2	0.2
Silica	mg/L	47.6	40	65.9	43	51.5	42	44	22	43	43	42	24	38	34	44	44	37
Total Dissolved Ions	mg/L		125		118		128	123	61	126	129	128	60	116	96	130	125	136
Total Dissolved Solids	mg/L	118	136	110	133	116	138	138	70	139	143	141	72	129	106	146	141	141
Colour	HAZEN	<1	<1	1	<1	2	<1	2	4	2	2	<1	1	<1	<1	<1	<1	<1
Turbidity	NTU	0.3	<1	<0.1	<1	0.1	<1	<1	4	<1	2	<1	3	2	1	<1	<1	<1
pH SAT* (calc for CaCO3)			8.8		8.9		8.7	8.9	9.4	8.9	8.8	8.7	9.5	8.9	8.8	8.8	8.8	8.6
Saturation Index		-1.04	-2	-1.45	-2.2	-1.26	-2	-1.5	-2.1	-1.5	-1.1	-1.4	-2.4	-1.4	-1.6	-0.9	-1.4	-1
Mole Ratio			3.3		3.3		3.2	2.6	2.9	2.6	2.3	2.6	3.1	2.6	2.7	2.2	2.5	2.4
Sodium Adsorption Ratio		1.6	1.7	1.5	1.6	1.4	1.4	1.7	1.2	1.7	1.8	1.5	1.3	1.7	1.2	1.9	1.8	1.6
Figure Of Merit Ratio			0.7		0.7		0.8	0.7	0.7	0.7	0.6	0.8	0.6	0.6	1	0.6	0.7	0.8
CATIONS																		
Sodium	mg/L	20.8	22	20	20	19.5	20	22	12	22	24	22	12	22	15	26	24	23
Potassium	mg/L	1.1	1.1	1	1	0.9	0.9	1.1	1.1	1	1.1	1.1	1.1	1.1	1.4	1.2	1.2	1
Calcium	mg/L	9.9	9.7	8.1	7.7	11.6	11	7.8	5.5	8	10	11	4	9	9.9	9	8.5	13
Magnesium	mg/L	1.9	2	2.8	3	2	2.2	3.2	1	3.2	2.2	2.6	1.3	1.9	2	3.3	3.3	1.6
Hydrogen	mg/L		0		0		0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																		
Bicarbonate	mg/L	28	56	26.1	55	29.8	62	56	26	59	56	57	26	49	48	55	55	62
Carbonate	mg/L	<5	0	<5	0	<5	0	0.1	0	0.1	0.2	0.1	0	0.1	0	0.2	0.1	0.1
Hydroxide	mg/L	<5	0	<5	0	<5	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	19.7	19	16.3	15	17.1	15	16	12	16	18	16	12	18	14	19	17	18
Fluoride	mg/L	0.44	0.42	0.31	0.28	0.38	0.33	0.44	0.47	0.44	0.44	0.55	0.52	0.27	0.1	0.06	0.07	0.1
Nitrate as NO3	mg/L		11		12		11	12	1.7	12	12	14	2.1	10	4	11	10	13
Sulphate	mg/L	3.6	4.2	3.9	4.2	4.2	4.5	4.3	1.4	4.2	4.5	4.5	1.3	4	2	4	4	4
OTHER DISSOLVED ELEMENTS																		
Iron	mg/L	0.02	<0.01	0.007	<0.01	0.02	0.01	<0.01	0.02	<0.01	0.01	<0.01	0.03	0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	0.001	<0.01	<0.001	<0.01	<0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.014	0.02	0.052	0.05	<0.005	<0.01	0.05	0.01	0.03	<0.01	0.04	0.02	0.01	0.01	0.04	0.06	<0.01
Aluminium	mg/L	0.014	<0.05	<0.005	<0.05	<0.005	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.021	<0.02	0.011	<0.02	0.007	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/L	0.013	0.04	0.012	<0.03	0.012	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 1 INGHAM WATER SUPPLY RETICULATION		QLD Government HIN1218 SWA 2017/2018 31-Jan-18	QLD Government HIN1215 SWA 2017/2018 17-Jan-18	QLD Government HIN1216 SWA 2017/2018 17-Jan-18	QLD Government HIN1226 SWA 2017/18 03-May-18	QLD Government HIN1230 SWA 2017/18 03-May-18	QLD Government HIN1271 SWA 2018/19 24-Oct-18	QLD Government HIN1272 SWA 2018/2019 24-Oct-18	QLD Government HIN1275 SWA 2018/2019 24-Oct-18	QLD Government HIN1308 SWA 2018/2019 18-Feb-19	QLD Government HIN1363 SWA 2019/2020 30-Jan-20	QLD Government HIN1364 SWA 2019/2020 30-Jan-20	QLD Government HIN1365 SWA 2019/2020 30-Jan-20	QLD Government HIN1371 SWA 2019/2020 10-Mar-20	QLD Government HIN1376 SWA 2019/2020 25-Mar-20	QLD Government HIN1377 SWA 2019/2020 25-Mar-20	QLD Government HIN1387 SWA 2019/2020 15-Apr-20
Scheme Component:	R	SP42 - Bruce Highway, Toobanna	SP - Hardy St, Ingham	SP - Stone St, Ingham	SP10 - 44 Gorton Street, Trebonne	SP47 - McDonaghs Road, Blackrock	SP24 - Trebonne Water Tower	SP21 - Ingham Water Tower	SP22 - Tokalon Tower	SP33 - Sewerage Plant Kitchen Tap	SP47 - McDonaghs Road, Blackrock	SP46 - Masters Road, Toobanna	SP33 - Sewerage Plant Kitchen Tap	SP44 - Townsend Street	SP22 - Tokalon Tower	SP21 - Ingham Water Tower	SP43 - 4 Marina Parade
PARAMETER	**UNITS**																
Conductivity @ 25' C	us/cm	198	186	181	180	182	127	128	176	179	190	192	179	183	183	180	181
pH @ 21' C		7.46	7.01	6.89	7.2	7.47	6.78	6.8	7.03	7.5	7.5	7.39	7.11	7.01	7.15	7.32	7.48
Total Hardness CaCO3/L	mg	40	34	33	36	35	28	24	33	34	41	42	36	36	35	35	37
Temp Hardness CaCO3/L	mg	40	34	33	36	35	28	24	33	34	41	42	36	36	35	35	37
Alkalinity CaCO3/L	mg	52	46	45	45	46	42	40	47	44	50	52	45	46	44	44	46
Residual Alkalinity	meq/L	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Silica	mg/L	36	44	43	41	44	32	32	43	41	44	44	43	45	44	44	44
Total Dissolved Ions	mg/L	139	130	126	124	127	94	93	126	125	136	139	127	130	129	126	129
Total Dissolved Solids	mg/L	143	46	141	137	143	99	100	140	139	150	151	142	147	144	143	144
Colour	HAZEN	<1	1	4	<1	<1	3	2	3	1	2	<1	<1	<1	1	<1	10
Turbidity	NTU	1	<1	4	<1	<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1
pH SAT* (calc for CaCO3)		8.5	8.8	8.8	8.8	8.8	8.9	9.1	8.8	8.9	8.6	8.6	8.8	8.8	8.9	8.9	8.7
Saturation Index		-1.1	-1.8	-1.9	-1.6	-1.3	-2.1	-2.3	-1.8	-1.4	-1.1	-1.2	-1.7	-1.8	-1.7	-1.6	-1.2
Mole Ratio		2.5	3	3.1	2.8	2.5	3	3.2	3	2.5	2.5	2.6	2.9	3	2.9	2.7	2.5
Sodium Adsorption Ratio		1.6	1.8	1.7	1.5	1.6	1.1	1.3	1.6	1.6	1.5	1.5	1.6	1.6	1.6	1.6	1.5
Figure Of Merit Ratio		0.8	0.7	0.7	0.8	0.7	0.9	0.8	0.7	0.7	0.9	0.9	0.8	0.8	0.7	0.7	0.8
CATIONS																	
Sodium	mg/L	23	24	23	21	22	14	15	22	22	22	22	22	22	22	22	21
Potassium	mg/L	1	1.7	1.7	1	1	1.4	1.4	1	1	1	1	1	1	1	1	1
Calcium	mg/L	14	8.6	8.4	11	9.6	8.8	5.5	8.1	8.5	13	14	8.9	9.6	9	8.4	11
Magnesium	mg/L	1.2	3.1	3	2.4	2.8	1.5	2.6	3.2	3.1	2.1	1.8	3.2	3	3.2	3.4	2.3
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																	
Bicarbonate	mg/L	63	56	55	55	57	51	49	57	53	60	63	55	56	54	53	56
Carbonate	mg/L	0.1	0	0	0	0.1	0	0	0	0.1	0.1	0.1	0	0	0	0.1	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	18	19	19	19	18	14	14	19	18	18	18	18	18	19	18	17
Fluoride	mg/L	0.06	0.05	0.06	0.08	0.07	0.1	0.09	0.05	0.06	0.07	0.07	0.07	0.07	0.06	0.06	0.05
Nitrate as NO3	mg/L	14	13	12	11	12	2.1	3.1	12	14	14	15	14	15	15	14	14
Sulphate	mg/L	5	5	4	4	5	2	2	4	4	5.1	5.1	5.1	5.9	5.5	6.1	5.8
OTHER DISSOLVED ELEMENTS																	
Iron	mg/L	0.01	0.04	0.13	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.03	0.02	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001
Zinc	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03	0.01	<0.01	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Aluminium	mg/L	<0.05	0.07	0.06	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Boron	mg/L	<0.02	0.03	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.004	0.004	0.009	0.004	<0.003	<0.003	0.008

SCHEME 1 INGHAM WATER SUPPLY RETICULATION Scheme Component:	R	QLD Government HIN1394 SWA 2019/2020 23-Apr-20 SP46 - Masters Road, Toobanna	QLD Government HIN1395 SWA 2019/2020 23-Apr-20 SP47 - McDonaghs Road, Blackrock	QLD Government HIN1388 SWA 2019/2020 30-Apr-20 SP83 - Cemetery Road	QLD Government HIN1408 SWA 2020/2021 24-Sep-20 SP24 - Trebonne Water Tower	QLD Government HIN1409 SWA 2020/2021 24-Sep-20 SP22 - Tokalon Tower	QLD Government HIN1410 SWA 2020/2021 24-Sep-20 SP21 - Ingham Water Tower	QLD Government HIN1420 SWA 2020/2021 10-Nov-20 SP82 - Foresthome Road	QLD Government HIN1421 SWA 2020/2021 10-Nov-20 SP18 - 32 Halifax Road	QLD Government HIN1417 SWA 2020/2021 04-Nov-20 SP33 - Sewerage Plant Kitchen Tap
PARAMETER	UNITS									
Conductivity @ 25' C	us/cm	192	188	176	136	177	175	181	181	188
pH @ 21' C		7.5	7.56	7.3	6.71	6.69	6.68	6.67	6.79	6.5
Total Hardness CaCO3/L	mg	41	39	35	25	35	34	36	36	36
Temp Hardness CaCO3/L	mg	41	39	35	25	35	34	36	36	36
Alkalinity CaCO3/L	mg	50	49	46	36	45	44	45	45	45
Residual Alkalinity	meq/L	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Silica	mg/L	44	45	45	33	44	43	44	44	43
Total Dissolved Ions	mg/L	139	136	127	95	125	124	128	129	129
Total Dissolved Solids	mg/L	153	150	143	106	142	140	144	145	144
Colour	HAZEN	2	1	<1	7	<7	<7	<7	<7	<7
Turbidity	NTU	1	2	<1	1	<1	<1	1	<1	<1
pH SAT* (calc for CaCO3)		8.6	8.7	8.8	9	8.8	8.8	8.8	8.8	8.8
Saturation Index		-1.1	-1.1	-1.5	-2.3	-2.1	-2.2	-2.2	-2.1	-2.3
Mole Ratio		2.4	2.4	2.7	3.3	3.3	3.3	3.4	3.2	3.5
Sodium Adsorption Ratio		1.5	1.5	1.6	1.4	1.5	1.5	1.6	1.6	1.6
Figure Of Merit Ratio		0.9	0.8	0.8	0.7	0.8	0.8	0.7	0.7	0.8
CATIONS										
Sodium	mg/L	22	22	21	16	21	21	22	22	22
Potassium	mg/L	1	1	1	1.1	1	1	1.1	1.1	1.1
Calcium	mg/L	13	12	9.2	7.8	8.9	8.4	8.9	8.8	9
Magnesium	mg/L	1.9	2.5	2.9	1.5	3.2	3.3	3.3	3.3	3.3
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0
ANIONS										
Bicarbonate	mg/L	61	60	56	44	54	53	55	55	55
Carbonate	mg/L	0.1	0.1	0.1	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0
Chloride	mg/L	19	18	18	15	17	17	18	18	18
Fluoride	mg/L	0.07	0.07	0.06	0.06	0.06	0.06	0.05	0.05	0.05
Nitrate as NO3	mg/L	14	14	13	6.2	14	14	14	14	14
Sulphate	mg/L	7.1	6.9	5.4	3.1	5.7	5.8	6.1	6.2	6.2
OTHER DISSOLVED ELEMENTS										
Iron	mg/L	0.01	0.01	<0.01	0.01	<0.01	<0.01	0.01	0.01	0.01
Manganese	mg/L	<0.001	<0.001	<0.001	<0.01	<0.001	<0.001	<0.001	<0.001	<0.001
Zinc	mg/L	<0.06	<0.06	<0.06	0.01	<0.06	<0.06	<0.06	<0.06	<0.06
Aluminium	mg/L	<0.03	<0.03	<0.03	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03
Boron	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/L	<0.003	<0.003	0.004	<0.03	<0.003	<0.003	0.008	0.009	0.014

HINCHINBROOK SHIRE COUNCIL

SCHEME 2
LOWER HERBERT WATER SUPPLY
RAW WATER

Scheme Component: SW

METHOD	PARAMETER	UNITS	HEALTH	AESTHETIC	LABORATORY NAME	ID-HIN048	ID-HIN046	ID_HIN064	ID-061	ID_HIN076	ID-HIN079	ID_HIN106	ID_HIN105	ID-HIN212	2002/2003	ID-HIN142	ID-HIN153	ID-HIN152	ID-HIN154	ID-HIN156	ID-HIN148
					REPORT #	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
					SAMPLE TYPE	1999/2000	1999/2000	2000/2001	2000/2001	2000/2001	2000/2001	2001/2002	2001/2002	2002/2003	ID-HIN141	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003
					FINANCIAL YEAR	21-Jun-00	21-Jun-00	02-Feb-01	02-Feb-01	20-Jun-01	20-Jun-01	06-Mar-02	06-Mar-02	14-Jul-02	11-Sep-02	13-Sep-02	16-Oct-02	16-Oct-02	16-Oct-02	16-Oct-02	16-Oct-02
					SAMPLE DATE	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP71 - Halifax Bore 3	SP68 - Macknade Bore 5	SP73 - Halifax Bore 5	SP64 - Macknade Well 1	SP65 - Macknade Well 2	SP66 - Macknade Well 3	SP67 - Macknade Bore 4	SP69 - Halifax Well 1
18320	Conductivity @ 25° C	us/cm				137	411	136	336	130	319	135	330	480	135	930	140	210	130	135	220
18226	pH @ 21° C			6.5-8.5		5.9	6.3	6.21	7.29	6.63	7	6.2	6.55	6.7	6.25	6.9	6.25	6.2	6.3	6	7.4
18209	Total Hardness CaCO3/L	mg		200		25.4	55.5	25.8	48	24.7	46.9	27.5	56	72	27	96	26.5	24.5	23	31.5	48
18209	Temp Hardness CaCO3/L	mg																			
18208	Alkalinity CaCO3/L	mg				36	59	36	38	31	53	26	52	58	30	98	28	31	27	25	42
18209	Residual Alkalinity	meq/L				0.1	0.3	0.1	0	0.3	0.3	0	0	0	0.1	0	0	0.1	0.1	0	0
18195	Silica	mg/L				39	40	27	29	35	34	30	30	38	39	44	36	41	35	34	26
18209	Total Dissolved Ions	mg/L		500								87	200	290	91	550	90	130	86	88	140
18209	Total Dissolved Solids	mg/L				65	210	74	161	64	147	100	200	290	110	530	110	150	100	110	140
18206	Colour	HAZEN		15		3	8			6	8	<1	<1	1	8	5	2	2	1	2	2
18212	Turbidity	NTU		5		0.2	0.2			1.7	2.6	1	8	2	2	1	9	9	<1	1	<1
18209	pH SAT* (calc for CaCO3)																				
18209	Saturation Index											-3	-2.2	-1.9	-2.9	-1.4	-2.9	-3.1	-2.9	-3.1	-1.2
18209	Mole Ratio											3.8	3.9	3.9	3.7	3.8	3.7	4.1	3.7	4	2.8
18209	Sodium Adsorption Ratio					1.2	3.1	1.2	2.5	1.3	2.4	1.1	2.5	3.3	1.2	6.6	1.3	2.7	1.4	1	1.4
18209	Figure Of Merit Ratio											0.9	0.6	0.5	0.9	0.3	0.8	0.4	0.7	1.1	1
	CATIONS																				
18195	Sodium	mg/L		180		14.3	53.4	14.6	40.1	15.2	38.2	13.5	43	65	14	150	15.5	30.5	15	13	22.5
18195	Potassium	mg/L				1.3	3.9	1.4	3.4	0.2	3.3	1.1	3.3	5.4	1.1	7.4	1.6	2.7	1.3	1.3	2.4
18195	Calcium	mg/L				6.7	10.5	6.7	10	6.1	8.9	7	11	12	7.2	16.5	6.5	4.3	6	8.8	16
18195	Magnesium	mg/L				2.1	7.1	2.2	5.6	2.3	6	2.4	6.9	10	2.2	13.5	2.5	3.4	2	2.3	2.1
18209	Hydrogen	mg/L										0	0	0	0	0	0	0	0	0	0
	ANIONS																				
18209	Bicarbonate	mg/L				31.8	71.4	31.2	46.8	0	64.5	31.5	63	70	36.5	120	34	38	33	31	51
18209	Carbonate	mg/L				0	0	0	0	38.4	0	0	0	0	0	0.1	0	0	0	0	0.1
18209	Hydroxide	mg/L				0	0	0	0	0.09	0	0	0	0	0	0	0	0	0	0	0
18204	Chloride	mg/L		250		9	76	10	53	6	46	9.4	58	90	8.4	215	9.3	24.5	10	9.2	24.5
18204	Fluoride	mg/L	1.5			0.08	0.12	0.32	0.4	9	0.13	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	<0.1	0.2
18204	Nitrate as NO3	mg/L	50									10.5	7.1	9.8	7.7	5.6	3.8	9.2	8.7	11.5	11.5
18204	Sulphate	mg/L	500	250		9	13	19	19	1.9	3	11.5	12	27	13.5	27	17	15.5	9.5	11	12.5
	OTHER DISSOLVED ELEMENTS																				
18195	Iron	mg/L		0.3		0.1	0.39	0.05	0.17	0.15	0.35	<0.01	<0.01	<0.01	0.43	0.05	<0.01	0.01	<0.01	<0.01	<0.01
18195	Manganese	mg/L	0.5	0.1		0.01	0.05	0.01	0.04	0.02	0.05	<0.03	0.05	0.05	0.04	0.1	0.05	0.05	<0.03	<0.03	<0.03
18195	Zinc	mg/L		3		0	0.01	0.16	0.01	0.02	0	0.03	0.04	0.01	0.08	0.03	0.03	0.07	0.02	0.02	0.01
18195	Aluminium	mg/L		0.2		0.8	0.17	0	0	0	0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18195	Boron	mg/L	4									<0.02	0.04	0.02	0.02	0.12	<0.02	0.02	<0.02	<0.02	<0.02
18195	Copper	mg/L	2	1		0	0	0.02	0.01	0	0	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RAW WATER		ID-HIN149 SWA 2002/2003 16-Oct-02	ID-HIN151 SWA 2002/2003 16-Oct-02	ID-HIN150 SWA 2002/2003 16-Oct-02	ID-HIN157 SWA 2002/2003 16-Oct-02	ID-HIN155 SWA 2002/2003 16-Oct-02	ID-HIN158 SWA 2003/2004 29-Oct-02	2002/2003 SWA HIN-ID196 14-Mar-03	ID-HIN193 SWA 2002/2003 14-Mar-03	ID-HIN210 SWA 2002/2003 07-Jul-03	ID-HIN211 SWA 2002/2003 07-Jul-03	ID-HIN215 SWA 2003/2004 14-Jul-03	ID-HIN216 SWA 2002/2003 14-Jul-03	ID-HIN217 SWA 2003/2004 14-Jul-03	ID-HIN218 SWA 2003/2004 14-Jul-03	2003/2004 SWA ID-HIN219 14-Jul-03	ID-HIN213 SWA 2003/2004 14-Jul-03	ID-HIN214 SWA 2003/2004 14-Jul-03	ID-HIN220 SWA 2003/2004 14-Jul-03
Scheme Component:	SW	SP70 - Hillfax Well 2	SP71 - Halifax Bore 3	SP72 - Halifax Well 4	SP58 - Macknade Combined Bores	SP57 - Halifax Combinied Bores	SP73 - Halifax Bore 5	SP68 - Macknade Bore 5	SP58 - Macknade Combined Bores	SP69 - Halifax Well 1	SP70 - Halifax Well 2	SP64 - Macknade Well 1	SP65 - Macknade Well 2	SP66 - Macknade Well 3	SP67 - Macknade Bore 4	SP68 - Macknade Bore 5	SP72 - Halifax Well 4	SP73 - Halifax Bore 5	SP58 - Macknade Combined Bores
PARAMETER	UNITS																		
Conductivity @ 25° C	us/cm	190	405	265	140	360	475	130	145	300	305	180	190	190	130	140	305	400	155
pH @ 21° C		6.35	7.05	6.4	6.7	6.9	6.5	6.2	6.7	6.5	6.45	6.3	6.15	6.15	6.05	6.1	6.6	6.55	6.65
Total Hardness CaCO3/L	mg	40	59	50	25	56	67	29	30	59	59	27	26.5	29	25.5	32	63	68	30
Temp Hardness CaCO3/L	mg																		
Alkalinity CaCO3/L	mg	34	58	37.5	28.5	49	71	26.5	29	42	43	30	30.5	31	24.5	24	52	63	26
Residual Alkalinity	meq/L	0	0	0	0.1	0	0.1	0	0	0	0	0.1	0.1	0	0	0	0	0	0
Silica	mg/L	31	35	34	35	34	40	36	36	36	36	40	44	42	37	38	36	41	40
Total Dissolved Ions	mg/L	120	250	160	91	210	290	90	98	190	190	120	120	120	87	91	200	250	100
Total Dissolved Solids	mg/L	130	250	170	110	210	290	110	120	200	200	140	150	150	110	110	200	250	120
Colour	HAZEN	2	2	1	2	2	<1	<1	.1	1	1	1	1	<1	<1	<1	2	1	4
Turbidity	NTU	1	5	<1	1	3	<1	<1	6	<1	<1	1	3	2	<1	<1	2	2	1
pH SAT* (calc for CaCO3)																			
Saturation Index		-2.5	-1.7	-2.4	-2.5	-1.8	-2	-2.9	-2.4	-2.2	-2.2	-2.9	-3.1	-3	-3.2	-3	-1.9	-2	-2.5
Mole Ratio		3.8	3.5	4.1	3.3	3.6	4	3.7	3.3	3.9	4	4	4.1	4.1	4	3.9	3.7	3.9	3.5
Sodium Adsorption Ratio		1.3	3.2	1.9	1.4	2.6	3.6	1.1	1.3	2	2	2	2.1	2	1.2	1	1.9	2.7	1.3
Figure Of Merit Ratio		1	0.5	0.8	0.7	0.6	0.5	1	0.9	0.8	0.8	0.5	0.5	0.5	0.8	1.2	0.8	0.6	0.9
CATIONS																			
Sodium	mg/L	19	57	30	16	44.5	67	14	16	34.5	35.5	24	25	24.5	14	12.5	35	51	16.5
Potassium	mg/L	1.9	5.7	2.7	1.4	3.9	4.8	1.2	1.3	3	3.1	1.8	2.1	2	1.2	1	2.8	4.4	1.3
Calcium	mg/L	10.5	10.5	12	6.4	11.5	13.5	7.8	7.8	14	14	6.2	5.4	6.3	6.9	8.7	16.5	14	7.8
Magnesium	mg/L	3.3	8.1	4.9	2.2	6.6	8.2	2.4	2.5	5.9	6	2.8	3.2	3.2	2	2.5	5.4	8.2	2.6
Hydrogen	mg/L	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																			
Bicarbonate	mg/L	42	70	46	34.5	60	86	32.5	35.5	51	53	36.5	37	38	30	29.5	63	77	32
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	20.5	73	42.5	10.5	63	91	8.6	10.5	48.5	50	22.5	22	23	10.5	9.4	44.5	67	13
Fluoride	mg/L	<0.1	0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	12	7	11	8.8	8.5	4.3	7.5	8.5	20.5	19.5	9	6.9	7	11.5	12	14.5	7.2	11
Sulphate	mg/L	11	15.5	8.8	11	12.5	15.5	15.5	16	9.9	10	15	19	18.5	11	16.5	16	20.5	16
OTHER DISSOLVED ELEMENTS																			
Iron	mg/L	<0.01	0.02	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	0.03	0.05	0.04	<0.03	0.05	0.05	<0.03	<0.03	0.05	0.04	<0.03	0.05	0.04	<0.03	<0.03	<0.03	0.04	<0.03
Zinc	mg/L	0.04	0.04	0.01	0.01	0.04	0.06	0.02	0.04	0.04	0.01	0.02	0.01	0.01	<0.01	<0.01	<0.01	0.03	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	<0.02	0.03	<0.02	<0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.08	0.06	0.04	0.03	<0.02	0.02	0.04
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RAW WATER		ID-HIN250 SWA 2003/2004	ID-HIN249 SWA 2003/2004	ID-HIN258 SWA 2003/2004	ID-HIN268 SWA 2003/2004	ID-HIN267 SWA 2003/2004	ID-HIN276 SWA 2003/2004	ID-HIN282 SWA 2003/2004	ID-HIN284 SWA 2003/2004	ID-HIN297 SWA 2003/2004	ID-HIN303 SWA 2002/2003	ID-HIN304 SWA 2004/2005	ID-HIN311 SWA 2003/2004	ID-HIN319 SWA 2003/2004	ID-HIN318 SWA 2004/2005	ID-HIN338 SWA 2003/2004	ID-HIN339 SWA 2004/2005	ID-HIN342 SWA 2003/2004	ID-HIN341 SWA 2004/2005
Scheme Component:	SW	27-Oct-03	17-Oct-03	20-Nov-03	22-Dec-03	22-Dec-03	17-Feb-04	20-May-04	20-May-04	15-Jun-04	17-Jul-04	27-Jul-04	26-Oct-04	09-Nov-04	09-Nov-04	09-Dec-04	09-Dec-04	12-Jan-05	17-Jan-05
PARAMETER	UNITS	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores
Conductivity @ 25° C	us/cm	160	410	165	165	550	120	155	450	160	165	495	160	163	441	161	479	167	635
pH @ 21° C		6.3	7.05	6.2	6.45	6.85	6.1	6.15	7.05	6.2	6.2	6.85	6.7	6.22	6.85	6.3	6.86	6.57	4.31
Total Hardness CaCO3/L	mg	29.5	68	29	30.5	93	22	24.5	72	25.5	27.5	79	30.5	25	65	26	71	31	66
Temp Hardness CaCO3/L	mg																		
Alkalinity CaCO3/L	mg	28	50	26	27	70	17	23.5	60	22.5	22.5	58	25.5	25	58	26	59	22	52
Residual Alkalinity	meq/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silica	mg/L	35	38	37	40	42	28	38	39	40	38	41	41	37	38	37	39	37	39
Total Dissolved Ions	mg/L	100	240	110	100	340	73	98	280	97	110	300	100	103	262	104	282	103	254
Total Dissolved Solids	mg/L	120	250	130	130	330	91	120	280	22.5	130	310	130	124	265	126	285	126	260
Colour	HAZEN	<1	<1	<1	<1	<1	4	<1	<1	4	<1	<1	1	2	2	3	2	<1	<1
Turbidity	NTU	2	5	<1	<1	5	6	<1	1	1	1	2	<1	<1	3	1	2	1	2
pH SAT* (calc for CaCO3)																			
Saturation Index		-2.8	-1.6	-3	-2.6	-1.4	-3.3	-3.1	-1.5	-3.1	-3	-1.7	-2.4	-3	-1.8	-2.9	-1.7	-2.6	-2.3
Mole Ratio		3.8	3.5	4	3.6	3.7	4.2	4.1	3.5	4.1	4.1	3.8	3.4	3.9	3.7	3.8	3.7	3.6	4.2
Sodium Adsorption Ratio		1.3	2.7	1.5	1.4	3.3	1	1.6	3.1	1.5	1.8	3.2	1.3	1.7	3.1	1.5	3.2	1.3	2.9
Figure Of Merit Ratio		0.8	0.6	0.7	0.8	0.6	0.9	0.6	0.6	0	0.6	0.6	0.8	0.6	0.5	0.7	0.5	0.8	0.6
CATIONS																			
Sodium	mg/L	17	51	18.5	17.5	72	11	18	3.1	17	22	65	17	19	57	18	61	17	54
Potassium	mg/L	1.4	4.5	1.5	1.5	5.7	1.6	1.4	4.9	1.5	1.2	5	1.3	1.4	4.9	1.4	5.3	1.3	4.8
Calcium	mg/L	8	13.5	7.2	7.9	21.5	5.8	6.3	14.5	6.7	7.3	16	8.1	6.4	12	6.9	13	8.2	13
Magnesium	mg/L	2.4	8.5	2.6	2.6	9.7	1.9	2.1	8.9	2.1	2.2	9.6	2.5	2.1	8.2	2.2	9.1	2.5	8.2
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																			
Bicarbonate	mg/L	34	61	32	33	85	21	28.5	73	27	27.5	71	31	30	71	31	72	27	64
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	13	76	16	13.5	110	11	15	85	16.5	16.5	96	12.5	13	78	14	90	13	79
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1	<0.1	0.1
Nitrate as NO3	mg/L	14.5	12.5	12	14	13	12.5	17.5	15	16.5	20	20	19	13	18	11	21	15	
Sulphate	mg/L	13	17	15	13	21	8.3	15.5	17	11	12.5	21.5	12	12	18	12	20	14	17
OTHER DISSOLVED ELEMENTS																			
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	<0.03	<0.03	<0.03	0.04	0.05	<0.03	<0.03	0.05	<0.03	<0.03	0.07	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	0.06
Zinc	mg/L	0.01	<0.01	0.01	0.02	0.01	0.02	0.01	<0.01	0.02	0.01	0.03	0.02	0.01	0.01	<0.01	0.04	<0.01	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	0.03	0.07	0.04	0.13	0.08	0.03	0.03	0.07	0.02	0.08	0.03	0.06
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RAW WATER		ID-HIN370 SWA 2004/2005	ID-HIN371 SWA 2004/2005	ID-HIN372 SWA 2004/2005	ID-HIN373 SWA 2004/2005	ID-HIN374 SWA 2004/2005	ID-HIN376 SWA 2004/2005	ID-HIN386 SWA 2004/2005	ID-HIN387 SWA 2005/2006	ID-HIN400 SWA 2005/2006	ID-HIN398 SWA 2005/2006	ID-HIN424 SWA 2005/2006	ID-HIN430 SWA 2005/2006	ID-HIN429 SWA 2005/2006	ID-HIN435 SWA 2006/2007	ID-HIN437 SWA 2006/2007	ID-HIN434 SWA 2006/2007	ID-HIN436 SWA 2006/2007	ID-HIN473 SWA 2006/2007
Scheme Component:	SW	14-Apr-05	14-Apr-05	14-Apr-05	14-Apr-05	14-Apr-05	14-May-05	09-Jun-05	09-Jun-05	03-Aug-05	03-Aug-05	10-Apr-06	26-May-06	29-May-06	28-Jul-06	24-Jul-06	24-Jul-06	24-Jul-06	28-Jul-06
PARAMETER	UNITS	SP69 - Halifax Well 1	SP70 - Halifax Well 2	SP71 - Halifax Bore 3	SP72 - Halifax Well 4	SP73 - Halifax Bore 5	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP70 - Halifax Well 2	SP71 - Halifax Bore 3	SP72 - Halifax Well 4	SP73 - Halifax Bore 5	SP73 - Halifax Bore 5
Conductivity @ 25° C	us/cm	426	518	570	295	514	165	160	423	166	455	170	170	506	263	1290	270	847	1070
pH @ 21° C		7.66	7.66	6.56	6.55	6.57	9.2	6.8	7.09	6.66	6.82	6.65	6.67	7.14	6.39	6.23	6.42	6.6	6.91
Total Hardness CaCO3/L	mg	107	117	69	58	81	29	29	69	25	68	30	31	78	49	194	51	115	75
Temp Hardness CaCO3/L	mg																		
Alkalinity CaCO3/L	mg	86	85	69	38	59	25	24	52	23	55	24	22	60	40	64	42	67	75
Residual Alkalinity	meq/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silica	mg/L	40	26	38	36	41	38	37	38	38	40	39	38	39	36	39	36	42	40
Total Dissolved Ions	mg/L	284	326	341	185	305	103	107	254	101	271	104	108	308	161	677	164	477	605
Total Dissolved Solids	mg/L	271	300	336	198	309	126	127	260	125	276	128	132	311	171	677	174	477	598
Colour	HAZEN	<1	1	1	<1	1	<1	<1	1	7	9	6	3	3	3	1	<1	<1	2
Turbidity	NTU	<1	<1	4	<1	1	1	<1	1	2	3	2	2	1	<1	2	<1	3	1
pH SAT* (calc for CaCO3)																			
Saturation Index		-0.3	-0.2	-1.9	-2.2	-1.9	-2.6	-2.4	-1.5	-2.6	-1.8	-2.5	-2.5	-1.4	-2.4	-1.9	-2.3	-1.7	-1.3
Mole Ratio		2.5	2.7	4	3.9	4	3.6	3.4	3.5	3.6	3.8	3.5	3.6	3.5	4	4.8	3.9	4.2	4
Sodium Adsorption Ratio		1.6	2.1	3.4	1.7	3.1	1.4	1.4	2.6	1.5	3	1.4	1.4	3.2	1.7	5.1	1.7	4.4	6
Figure Of Merit Ratio		1.3	1	0.5	0.9	0.6	0.8	0.8	0.6	0.7	0.5	0.8	0.8	0.5	0.8	0.5	0.8	0.5	0.4
CATIONS																			
Sodium	mg/L	38	51	74	30	65	17	17	50	18	58	18	18	66	28	164	28	109	6
Potassium	mg/L	3.7	5	6.3	3.1	5.4	1.4	1.4	4.4	1.4	4.7	1.6	1.4	4.6	2.4	9.5	2.5	6.3	7.7
Calcium	mg/L	38	44	15	15	16	7.4	7.6	14	6.4	13	7.9	8.1	15	12	33	12	21	25
Magnesium	mg/L	2.7	1.6	12	5.2	10	2.5	2.5	8.2	2.3	8.6	2.6	2.6	9.7	4.9	27	4.9	15	16
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																			
Bicarbonate	mg/L	105	103	84	46	72	30	30	63	28	68	30	27	73	49	78	51	82	92
Carbonate	mg/L	0.3	0.3	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	56	90	105	42	95	14	14	75	14	85	14	16	98	37	313	38	178	253
Fluoride	mg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2
Nitrate as NO3	mg/L	28	26	10	34	16	17	22	22	17	15	15	22	23	13	3.9	13	36	21
Sulphate	mg/L	12.1	5	35	9.9	26	12.6	11.3	17.6	13.5	19.6	15.4	13.4	18.1	14.9	49	14.4	29	33
OTHER DISSOLVED ELEMENTS																			
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01
Manganese	mg/L	<0.03	<0.03	0.07	0.3	<0.03	<0.03	<0.03	0.05	<0.03	<0.03	<0.03	<0.03	0.05	0.04	0.22	0.03	<0.03	0.13
Zinc	mg/L	0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.03	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.04	<0.01	0.03	0.01	0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.04	0.02	0.08	0.04	0.06	0.03	0.03	0.05	0.02	0.06	0.03	0.02	0.07	0.08	0.12	0.05	0.1	0.12
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2
LOWER HERBERT WATER SUPPLY
RAW WATER

Scheme Component:		ID-HIN438 SWA 2006/2007 23-Aug-06 SP57 - Halifax Combinied Bores	ID-HIN457 SWA 2006/2007 04-May-07 SP67 - Macknade Bore 4	2006/2007 SWA ID-HIN456 04-May-07 SP68 - Macknade Bore 5	ID-HIN SWA 2006/2007 04-May-07 SP72 - Halifax Well 4	ID-HIN455 SWA 2006/2007 10-May-07 SP70 - Halifax Well 2	HIN468 SWA 2007/2008 28-Jul-07 SP58 - Macknade Combined Bores	ID-HIN472 SWA 2006/2007 28-Jul-07 SP57 - Halifax Combinied Bores	ID-HIN SWA 2007/2008 06-Sep-07 SP67 - Macknade Bore 4	ID-HIN486 SWA 2007/2008 04-Sep-07 SP64 - Macknade Well 1	2007/2008 SWA ID-HIN488 12-Sep-07 SP68 - Macknade Bore 5	ID-HIN485 SWA 2007/2008 12-Sep-07 SP66 - Macknade Well 3	ID-HIN503 SWA 2007/2008 03/12/07 SP67 - Macknade Bore 4	2007/2008 SWA ID-HIN500 03-Dec-07 SP68 - Macknade Bore 5	ID-HIN499 SWA 2007/2008 03-Dec-07 SP66 - Macknade Well 3	ID-HIN502 SWA 2007/2008 03-Dec-07 SP64 - Macknade Well 1	HIN501 SWA 2007/2008 03-Dec-07 SP58 - Macknade Combined Bores	HIN518 SWA 2007/2008 22-Apr-08 SP58 - Macknade Combined Bores	ID-HIN610 SWA 2008/2009 29-Sep-08 SP66 - Macknade Well 3
PARAMETER	UNITS																		
Conductivity @ 25° C	us/cm	296	161	148	104	166	159	187	165	168	158	145	170	157	147	153	153	160	153
pH @ 21° C		7.1	6.16	6.13	6.11	6.44	6.68	7.03	6.07	6.23	6.1	6.24	6.41	6.36	6.47	6.48	6.83	6.66	6.26
Total Hardness CaCO3/L	mg	53	30	33	25	35	25	44	31	31	21	21	31	33	23	25	28	29	24
Temp Hardness CaCO3/L	mg																		
Alkalinity CaCO3/L	mg	43	27	22	18	39	25	45	23	24	21	26	24	21	26	27	24	24	30
Residual Alkalinity	meq/L	0	0	0	0	0.1	0	0	0	0	0	0.1	0	0	0.1	0	0	0	0.1
Silica	mg/L	35	36	37	36	31	38	36	34	37	36	37	35	35	37	37	37	36	37
Total Dissolved Ions	mg/L	185	108	97	68	112	101	127	103	103	100	92	104	99	91	93	115	98	94
Total Dissolved Solids	mg/L	194	127	120	92	119	123	135	123	125	123	113	124	121	112	114	94	120	113
Colour	HAZEN	1	<1	<1	3	3	<1	1	2	2	2	2	<1	<1	<1	<1	<1	1	1
Turbidity	NTU	1	1	1	1	3	1	1	1	4	1	2	2	1	1	1	2	3	2
pH SAT* (calc for CaCO3)																			
Saturation Index		-1.6	-3	4	-3.2	-2.5	-2.5	-1.7	-3.1	-2.9	-3	-3	-2.7	-2.8	-2.7	-2.7	-2.3	-2.6	-2.9
Mole Ratio		2.7	3.9	4.1	3.8	3.7	3.5	3	4.2	3.9	4.1	3.9	3.8	3.8	3.7	3.7	3.3	3.6	3.8
Sodium Absorption Ratio		2	1.4	1.1	0.7	1.2	1.4	1.1	1.3	1.4	1.1	1.6	1.3	1.1	1.5	1.5	1.3	1.3	1.5
Figure Of Merit Ratio		0.7	0.8	1.1	1.5	1	0.7	1.2	0.9	0.8	1.1	0.6	0.8	1.1	0.6		0.8	0.8	0.6
CATIONS																			
Sodium	mg/L	34	18	14	8	17	17	17	16	18	14	18	17	14	17	17	16	16	17
Potassium	mg/L	2.7	1.6	1.2	1.2	2.3	1.3	2.3	1.6	1.4	1.2	1.3	1.6	1.2	1.3	1.4	1.3	1.3	1.4
Calcium	mg/L	12	7.7	8.8	6.7	8.8	7.2	12	8	7.7	8.9	5.5	8.1	8.8	6	6.2	7.3	7.5	6.2
Magnesium	mg/L	5.6	2.5	2.6	2.1	3.2	2.3	3.7	2.6	2.8	2.6	1.9	2.7	2.6	2.1	2.2	2.3	2.4	2.2
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																			
Bicarbonate	mg/L	52	33	27	22	48	31	55	28	30	25	32	29	26	32	33	30	30	36
Carbonate	mg/L	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	45	12	11	6.7	18	15	19	17	14	11	15	16	12	15	15	13	15	14
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	0.07	0.1	0.1	0.05	0.06	<0.1	0.06	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	18	23	22	14	10	15	11	19	10	25	8.9	18	22	6.8	6.5	13	14	4.7
Sulphate	mg/L	15.5	11.7	11.1	7.2	4.2	11.9	8	10.9	19.6	11.7	9.9	12.5	12.7	10.6	11.9	11.9	11.7	12.3
OTHER DISSOLVED ELEMENTS																			
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	0.04	0.01	0.01	<0.01	0.03	<0.03	<0.01	0.01	0.03	0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01
Zinc	mg/L	0.03	0.05	0.01	0.05	0.03	0.02	0.03	0.05	<0.01	<0.01	0.03	<0.01	0.01	0.03	<0.01	0.01	0.02	0.05
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.07	0.02	0.02	0.03	0.03	0.02	0.03	0.02	0.02	<0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.02
Copper	mg/L	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RAW WATER		ID-HIN606 SWA 2008/2009	ID-HIN607 SWA 2008/2009	ID-HIN6221 SWA 2008/2009	ID-HIN658 SWA 2008/2009	ID-HIN681 SWA 2009/2010	ID-HIN680 SWA 2009/2010	ID-HIN692 SWA 2009/2010	ID-HIN693 SWA 2009/2010	ID-HIN691 SWA 2009/2010	ID-HIN690 SWA 2009/2010	ID-HIN696 SWA 2009/2010	ID-HIN697 SWA 2009/2010	ID-HIN 806 SWA 2011/2012	ID-HIN 804 SWA 2011/2012	ID-HIN805 SWA 2011/2012	ID-HIN 833 SWA 2012/2013	ID-HIN832 SWA 2012/2013	ID-HIN850 SWA 2012/2013
		29-Sep-08	29-Sep-08	24-Oct-08	17-Jun-09	31-Jul-09	31-Jul-09	18-Sep-09	18-Sep-09	18-Sep-09	18-Sep-09	22-Oct-09	22-Oct-09	19-Jan-12	19-Jan-12	19-Jan-12	30-Aug-12	30-Aug-12	14-Nov-12
Scheme Component:	SW	SP70 - Halifax Well 2	SP72 - Halifax Well 4	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP64 - Macknade Well 1	SP65 - Macknade Well 2	SP70 - Halifax Well 2	SP72 - Halifax Well 4	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP70 - Halifax Well 2	SP72 - Halifax Well 4	SP58 - Macknade Combined Bores	SP72 - Halifax Well 4	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores
PARAMETER	UNITS																		
Conductivity @ 25° C	us/cm	257	258	151	204	142	198	140	150	226	176	144	227	162	133	140	209	125	119
pH @ 21° C		6.49	6.52	6.72	7.1	6.54	6.48	616	6.18	6.34	6.29	6.47	6.45	7.05	6.13	6.51	6.44	6.6	6.89
Total Hardness CaCO3/L	mg	45	46	31	34	27	37	22	25	42	33	26	39	53	32	28	42	26	24
Temp Hardness CaCO3/L	mg																		
Alkalinity CaCO3/L	mg	42	41	24	35	28	38	27	30	42	32	25	34	66	30	28	49	24	27
Residual Alkalinity	meq/L	0	0	0	0	0	0	0.1	0.1	0	0	0	0	0.3	0	0	0.1	0	0
Silica	mg/L	34	34	35	36	38	36	39	39	35	35	38	38	23	33	35	34	35	35
Total Dissolved Ions	mg/L	153	153	97	124	95	127	90	96	140	110	89	133	129	89	95	137	79	79
Total Dissolved Solids	mg/L	161	162	117	138	116	141	112	117	150	125	111	150	112	104	113	141	99	98
Colour	HAZEN	1	1	<1	1	3	5	1	1	1	1	<1	<1	3	5	7	<1	<1	2
Turbidity	NTU	1	1	1	4	<1	2	<1	1	6	1	<1	1	<1	1	1	1	2	1
pH SAT* (calc for CaCO3)																			
Saturation Index		-2.3	-2.2	-2.4	-1.9	-2.6	-2.4	-3.1	-3	-2.5	-2.7	-2.7	-2.5	-1.3	-2.9	-2.6	-2.3	-2.6	-2.3
Mole Ratio		3.9	3.8	3.4	3.2	3.6	3.8	4	3.9	3.9	4	3.6	4	2.3	3.9	3.5	3.7	3.3	3
Sodium Adsorption Ratio		1.8	1.8	1.1	1.7	1.3	1.6	1.6	1.5	1.7	1.4	1.3	1.7	0.6	0.9	1.2	1.5	1.1	1
Figure Of Merit Ratio		0.8	0.8	1	0.7	0.8	0.7		0.6	0.8	0.8	0.8	0.7	2.3	1.3	0.9	0.9	1	1
CATIONS																			
Sodium	mg/L	27	27	14	22	16	23	17	18	25	19	15	24	11	12	15	22	12	12
Potassium	mg/L	2.7	2.7	1.2	2.6	1.4	2.7	1.4	1.4	2.9	2.4	1.2	2.8	2.2	1.6	1.3	2.7	1.3	1.2
Calcium	mg/L	11	12	8.2	8	7.2	8.6	5.6	6.4	9.8	7.7	6.8	8.8	19	8.6	7.5	10	6.6	6.4
Magnesium	mg/L	4.1	4.1	2.5	3.6	2.3	3.7	1.9	2.1	4.3	3.4	2.2	4.2	1.1	2.6	2.2	4	2.2	2
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																			
Bicarbonate	mg/L	51	50	29	42	34	46	34	36	51	39	31	41	80	37	34	60	30	32
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	35	35	12	27	14	27	14	14	30	22	12	32	6.1	13	12	26	9.1	7.9
Fluoride	mg/L	0.05	0.05	<0.1	0.06	<0.1	0.06	<0.1	<0.1	0.05	0.06	<0.1	0.06	0.08	0.05	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	12	12	15	8.2	8.3	7.1	7	5.2	6.3	9	8.3	9.8	6.3	11	12	5.2	7.5	7.3
Sulphate	mg/L	8.8	8.9	14.2	9.2	12.4	9.5	9.9	13.1	10.6	7.3	12.9	9.8	3.9	4.4	11.2	7.4	9.9	10.6
OTHER DISSOLVED ELEMENTS																			
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	0.02	0.02	0.01	0.03	0.01	0.03	<0.01	0.02	0.05	0.03	0.01	0.03	<0.01	<0.01	0.01	0.05	0.01	0.01
Zinc	mg/L	0.1	0.03	0.01	<0.01	0.01	0.01	0.02	0.01	0.06	0.04	0.01	<0.01	<0.01	0.01	0.01	0.03	0.03	0.02
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.04	0.04	0.02	0.03	0.02	0.03	0.02	0.02	0.04	0.03	0.03	0.04	<0.02	0.02	0.02	0.03	0.02	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	0.04	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RAW WATER		ID-HIN 856 SWA 2012/2013 27-Nov-12	HIN858 Pest/Herb 2012/2013 29-Nov-12	HIN859 Pest/Herb 2012/2013 29-Nov-13	QLD Government ID-HIN871 SWA 2012/2013 21-May-13	QLD Government HIN905 SWA 2013/2014 21-Nov-13	QLD Government HIN899 SWA 2013/2014 20-Nov-13	QLD Government HIN991 SWA 2014/2015 13-Jan-15	QLD Government HIN1139 SWA 2016/2017 08-Feb-17	QLD Government HIN1164 SWA 2016/2017 16-May-17	QLD Government HIN1195 SWA 2016/2017 03-Aug-17	QLD Government HIN1236 SWA 2017/2018 06-Jun-18	QLD Government HIN1268 SWA 2018/2019 27-Sep-18	QLD Government HIN1269 SWA 2018/2019 27-Sep-18	QLD Government HIN1284 SWA 2018/2019 29-Nov-18	QLD Government ID-HIN1289 SWA 2018/19 05-Dec-18	QLD Government HIN1316 SWA 2018/2019 06-Mar-19	QLD Government HIN1337 SWA 2018/2019 29-May-19
Scheme Component:	SW	SP72 - Halifax Well 4	SP58 - Macknade Combined Bores	SP72 - Halifax Well 4	SP58 - Macknade Combined Bores	SP72 - Halifax Well 4	SP58 - Macknade Combined Bores	SP71 - Halifax Bore 3	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP72 - Halifax Well 4	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores	SP57 - Halifax Combined Bores	SP58 - Macknade Combined Bores	SP58 - Macknade Combined Bores
PARAMETER	UNITS																	
Conductivity @ 25° C	us/cm	223			140	231	128	2190	192	227	217	188	160	254	172	275	279	141
pH @ 21° C		7.07			6.96	6.22	6.45	6.58	6.87	6.91	6.91	6.81	6.39	6.47	6.82	6.65	6.81	6.74
Total Hardness CaCO3/L	mg	43			22	47	25	292	30	34	33	30	44	50	33	45	34	27
Temp Hardness CaCO3/L	mg					41	25	58	30	28	33	29	44	50	22	45	32	18
Alkalinity CaCO3/L	mg	45			26	41	25	58	30	28	33	29	47	66	22	53	32	18
Residual Alkalinity	meq/L	0			0.1	0	0	0	0	0	0	0	0.1	0.3	0	0.2	0	0
Silica	mg/L	34			37	37	36	39	40	39	39	38	9	39	36	37	41	36
Total Dissolved Ions	mg/L	140			87	142	83	1190	123	139	137	121	113	176	110	172	167	91
Total Dissolved Solids	mg/L	146			107	153	104	1190	144	160	155	141	93	175	132	176	189	115
Colour	HAZEN	1			2	1	6	<1	<1	<1	<1	1	<1	3	<1	3	1	2
Turbidity	NTU	1			2	2	1	<1	1	1	2	1	<1	9	<1	<1	<1	<1
pH SAT* (calc for CaCO3)						8.7	9.2	8.1	9.1	9.1	9	9.1	8.6	8.4	9.1	8.7	9.1	9.4
Saturation Index		-1.7			-2.3	-2.5	-2.8	-1.5	-2.2	-2.2	-2.1	-2.3	-2.2	-2	-2.3	-2	-2.3	-2.6
Mole Ratio		3.2			3.2	4.1	3.6	4.8	3.4	3.5	3.5	3.5	3.6	3.4	3.5	3.7	3.8	3.6
Sodium Adsorption Ratio		1.6			1.5	1.5	1.2	8.2	2	2.3	2.2	1.8	0.8	1.9	1.3	2.3	3	1.3
Figure Of Merit Ratio		0.8			0.6	0.9	0.8	0.4	0.5	0.5	0.5	0.6	1.7	0.8	0.9	0.6	0.4	0.8
CATIONS																		
Sodium	mg/L	24			16	24	14	321	26	30	28	23	12	30	18	36	40	15
Potassium	mg/L	2.5			1.5	2.7	1.2	13	1.8	2	1.9	1.7	3.1	3	1.5	2.7	2.6	1.5
Calcium	mg/L	11			5.6	12	6.5	43	7.2	8	7.8	7.4	14	16	8.8	12	7	7
Magnesium	mg/L	4.1			1.9	4.2	2	45	3	3.4	3.2	2.8	2.2	2.7	2.8	3.9	3.9	2.2
Hydrogen	mg/L	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																		
Bicarbonate	mg/L	55			32	50	31	71	37	35	40	35	58	80	27	65	39	22
Carbonate	mg/L	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	28			13	33	11	590	23	31	27	22	17	27	18	47	45	15
Fluoride	mg/L	<0.1			<0.05	<0.05	<0.05	<.25	0.08	<0.05	<0.05	0.06	0.7	0.09	<0.05	0.09	0.06	<0.05
Nitrate as NO3	mg/L	6.8			6.8	9	8.8	22	14	17	18	16	4.3	0.9	24	1.7	14	19
Sulphate	mg/L	8.8			9.8	7.4	9.3	79	12	12	11	13	3	17	10	5	16	10
OTHER DISSOLVED ELEMENTS																		
Iron	mg/L	<0.01			0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	0.01			0.01	0.04	0.01	0.38	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	0.06	0.03	<0.01
Zinc	mg/L	<0.01			0.03	<0.01	<0.01	0.03	0.02	0.04	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01
Aluminium	mg/L	<0.05			<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.04			0.02	0.03	0.02	0.15	0.04	0.04	0.04	0.03	0.07	0.04	<0.02	0.04	0.06	<0.02
Copper	mg/L	<0.03			<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RAW WATER		QLD Government HIN1398 SWA 2020/2021	QLD Government HIN1437 SWA 2020/2021
Scheme Component:	SW	18-Jul-20	20-Jan-21
PARAMETER	UNITS	SPS8 - Macknade Combined Bores	SPS8 - Macknade Combined Bores
Conductivity @ 25° C	us/cm	201	253
pH @ 21° C		6.89	6.25
Total Hardness CaCO3/L	mg	30	33
Temp Hardness CaCO3/L	mg	26	26
Alkalinity CaCO3/L	mg	26	26
Residual Alkalinity	meq/L	0	0
Silica	mg/L	38	38
Total Dissolved Ions	mg/L	128	153
Total Dissolved Solids	mg/L	150	175
Colour	HAZEN	<1	<7
Turbidity	NTU	2	13
pH SAT^ (calc for CaCO3)		9.2	9.2
Saturation Index		-2.3	-2.9
Mole Ratio		3.5	4.4
Sodium Adsorption Ratio		2.1	2.6
Figure Of Merit Ratio		0.5	0.4
CATIONS			
Sodium	mg/L	26	35
Potassium	mg/L	1.9	2.3
Calcium	mg/L	7	7.4
Magnesium	mg/L	3.1	3.6
Hydrogen	mg/L	0	0
ANIONS			
Bicarbonate	mg/L	32	31
Carbonate	mg/L	0	0
Hydroxide	mg/L	0	0
Chloride	mg/L	26	39
Fluoride	mg/L	0.05	0.05
Nitrate as NO3	mg/L	15	18
Sulphate	mg/L	17	17
OTHER DISSOLVED ELEMENTS			
Iron	mg/L	0.01	<0.01
Manganese	mg/L	0.02	0.015
Zinc	mg/L	<0.06	<0.06
Aluminium	mg/L	<0.03	<0.03
Boron	mg/L	0.04	0.05
Copper	mg/L	<0.003	<0.003

	SCHEME 2		LABORATORY NAME												
			REPORT #		ID-HIN274	ID-HIN317	ID:HIN610	ID-HIN617	ID-HIN627	ID-HIN628	ID:HIN633	ID-HIN630	ID:HIN646	ID-HIN669	ID:HIN689
			SAMPLE TYPE	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
			FINANCIAL YEAR	2002/2003	2003/2004	2004/2005	2008/2009	2008/2009	2008/2009	2008/2009	2008/2009	2008/2009	2008/2009	2008/2009	2009/2010
	Scheme Component:	WTP	SAMPLE DATE	25-Feb-03	17-Feb-04	09-Nov-04	29-Sep-08	27-Oct-08	27-Nov-08	27-Nov-08	29-Jan-09	02-Feb-09	30-Mar-09	29-Jun-09	18-Sep-09
			SAMPLE LOCATION	SP29 - Halifax Treatment Plant	SP29 - Halifax Treatment Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant
METHOD	PARAMETER	UNITS	HEALTH	AESTHETIC											
18320	Conductivity @ 25' C	us/cm			375	175	467	163	145	150	157	156	155	182	214	149
18226	pH @ 21' C			6.5-8.5	7.4	7.4	7.5	7.01	7.33	7.27	6.97	6.72	6.86	7.16	7.26	7
18209	Total Hardness CaCO3/L	mg		200	61	30.5	64	27	26	24	25	27	26	30	33	26
18209	Temp Hardness CaCO3/L	mg														
18208	Alkalinity CaCO3/L	mg			59	36	58	29	0	29	28	27	28	31	37	27
18209	Residual Alkalinity	meq/L			0	0.1	0	0	0.1	0.1	0.1	0	0	0	0.1	0
18195	Silica	mg/L			38	40	38	34	32	33	35	33	33	38	36	37
18209	Total Dissolved Ions	mg/L		500	240	110	276	100	95	97	102	99	99	118	131	95
18209	Total Dissolved Solids	mg/L			240	130	278	116	109	112	119	115	114	136	144	116
18206	Colour	HAZEN		15	1	2	2	1	1	<1	<1	<1	<1	<1	1	1
18212	Turbidity	NTU		5	<1	<1	<1	2	1	2	2	2	2	2	4	1
18209	pH SAT* (calc for CaCO3)															
18209	Saturation Index				-1.2	-1.6	-1.1	-2.1	-1.8	-1.9	-2.2	-2.4	-2.2	-1.9	-1.7	-2.1
18209	Mole Ratio				3.1	2.6	3	3	2.8	2.9	3.2	3.4	3.3	3.1	3.1	3.1
18209	Sodium Adsorption Ratio				3	1.5	3.4	1.5	1.4	1.6	1.6	1.5	1.5	1.7	1.8	1.4
18209	Figure Of Merit Ratio				0.5	0.7	0.5	0.7	0.7	0.6	0.6	0.7	0.7	0.7	0.6	0.7
	CATIONS															
18195	Sodium	mg/L		180	53	19.5	62	18	16	18	18	18	17	21	24	17
18195	Potassium	mg/L			4	1.1	4.8	1.3	1.2	1.2	1.2	1.2	1.2	1.4	2.4	1.2
18195	Calcium	mg/L			12.5	8.5	12	6.9	6.8	6.1	6.3	7	7.1	7.9	7.9	6.9
18195	Magnesium	mg/L			7.2	2.2	8.1	2.3	2.1	2	2.2	2.2	2.1	2.4	3.3	2.2
18209	Hydrogen	mg/L			0	0	0	0	0	0	0	0	0	0	0	0
	ANIONS															
18209	Bicarbonate	mg/L			72	44	71	35	35	35	34	33	34	38	45	33
18209	Carbonate	mg/L			0.1	0.1	0.1	0	0	0	0	0	0	0	0	0
18209	Hydroxide	mg/L			0	0	0	0	0	0	0	0	0	0	0	0
18204	Chloride	mg/L		250	71	13.5	85	15	16	16	15	15	15	20	31	14
18204	Fluoride	mg/L	1.5		0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.06	<0.1
18204	Nitrate as NO3	mg/L	50		7.3	16	14	9.7	8.3	8.5	11	11	9.8	13	8	8
18204	Sulphate	mg/L	500	250	13.5	7.7	18	11.8	9.5	10.3	12.6	12.2	11.4	14	9	12.4
	OTHER DISSOLVED ELEMENTS															
18195	Iron	mg/L		0.3	<0.01	0.02	<0.01	0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
18195	Manganese	mg/L	0.5	0.1	<0.03	<0.03	<0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
18195	Zinc	mg/L		3	0.01	0.01	<0.01	0.34	0.06	<0.01	0.02	0.02	0.04	0.01	0.01	0.07
18195	Aluminium	mg/L		0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18195	Boron	mg/L	4		0.04	<0.02	0.07	0.04	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.02
18195	Copper	mg/L	2	1	<0.03	<0.03	<0.03	0.07	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03

SCHEME 2		ID-HIN716 SWA 2009/2010	ID-HIN728 SWA 2009/2010	ID:HIN689 SWA 2009/2010	ID-HIN747 SWA 2010/2011	ID:HIN760 SWA 2010/2011	ID-HIN799 SWA 2011/2012	ID-HIN851 SWA 2012/2013	ID-HIN857 SWA 2012/2013	QLD Government ID:HIN872 SWA 2012/2013	QLD Government HIN890 SWA 2013/2014	QLD Government HIN889 SWA 2013/2014	QLD Government HIN888 SWA 2013/2014	QLD Government HIN907 SWA 2013/2014
Scheme Component:	WTP	04-Dec-09 Plant	26-Feb-10 Plant	26-Feb-10 Plant	06-Aug-10 Plant	17-Nov-10 Plant	17-Nov-11 Plant	14-Nov-12 Plant	27-Nov-12 Plant	21-May-13 Plant	29-Aug-13 Plant	29-Aug-13 Plant	29-Aug-13 Plant	21-Nov-13 Plant
PARAMETER	**UNITS**													
Conductivity @ 25' C	us/cm	154	200	137	206	138	155	139	237	135	140	140	236	137
pH @ 21' C		7.39	7.46	6.86	7.52	6.79	7.32	7.23	7.63	7.17	6.79	7.06	7.63	6.88
Total Hardness CaCO3/L	mg	26	31	24	35	24	32	23	43	23	25	25	43	24
Temp Hardness CaCO3/L	mg										25	25	43	24
Alkalinity CaCO3/L	mg	28	32	28	38	26	28	30	47	26	25	26	44	27
Residual Alkalinity	meq/L	0	0	0.1	0.1	0	0	0.1	0.1	0.1	0	0	0	0
Silica	mg/L	38	35	37	38	36	35	36	34	36	36	36	36	36
Total Dissolved Ions	mg/L	97	121	91	130	88	104	92	149	86	88	89	146	90
Total Dissolved Solids	mg/L	117	137	111	144	108	122	109	154	106	109	109	155	109
Colour	HAZEN	<1	4	3	<1	1	1	2	1	<1	6	3	11	<1
Turbidity	NTU	1	3	3	1	1	1	1	1	1	<1	<1	<1	<1
pH SAT* (calc for CaCO3)											9.2	9.2	8.8	9.2
Saturation Index		-1.7	-1.6	-2.3	-1.4	-2.4	-1.7	-1.9	-1.1	-2.1	-2.4	-2.1	-1.1	-2.3
Mole Ratio		2.8	3	3.1	2.8	3.4	2.8	2.8	2.6	2.9	3.3	3	2.7	3.2
Sodium Adsorption Ratio		1.4	1.9	1.4	1.8	1.4	1.2	1.4	1.8	1.3	1.4	1.4	1.7	1.4
Figure Of Merit Ratio		0.7	0.6	0.7	0.6	0.7	0.9	0.7	0.7	0.7	0.7	0.7	0.8	0.7
CATIONS														
Sodium	mg/L	17	25	16	25	16	16	16	26	15	16	16	26	16
Potassium	mg/L	1.3	2	1.3	2.4	1.3	1.3	1.2	2.5	1.3	1.5	1.5	2.9	1.3
Calcium	mg/L	7.2	7.6	6.4	8.2	6.2	9	6.1	11	6.2	6.6	6.6	11	6.5
Magnesium	mg/L	1.9	2.8	2	3.5	2	2.4	2	4	1.9	2	2	4	2
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS														
Bicarbonate	mg/L	34	38	34	46	32	34	37	57	32	31	32	53	33
Carbonate	mg/L	0	0.1	0	0.1	0	0	0	0.1	0	0	0	0.1	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	15	33	14	31	14	13	12	32	12	12	13	32	12
Fluoride	mg/L	<0.1	0.06	<0.1	0.06	<0.1	<0.1	<0.1	<0.1	<0.05	0.62	0.51	0.64	0.57
Nitrate as NO3	mg/L	7.4	5.7	6.3	6.2	8	18	7.6	7	8.8	9.4	9.4	8.7	9.2
Sulphate	mg/L	12.4	6.9	11.1	7.9	9.6	5.6	10	9	9.1	9	8.9	7	9
OTHER DISSOLVED ELEMENTS														
Iron	mg/L	<0.01	0.03	0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.01	<0.01	<0.01	0.02	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	<0.01	0.02	<0.01	0.02	<0.01	0.01	<0.01	0.02	0.03	0.07	<0.01	0.03
Aluminium	mg/L	<0.05	0.08	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	<0.02	0.03	0.02	0.03	0.02	<0.02	0.02	0.04	0.02	0.02	0.02	0.03	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	0.03

SCHEME 2		QLD Government HIN906 SWA 2013/2014	QLD Government HIN900 SWA 2013/2014	QLD Government HIN911 SWA 2013/2014	QLD Government HIN911 SWA 2013/2104	QLD Government HIN913 SWA 2013/2014	QLD Government HIN920 SWA 2013/2014	QLD Government HIN921 SWA 2013/2014	QLD Government HIN934 SWA 2013/2014	QLD Government HIN934 SWA 2013/2014	QLD Government HIN934 SWA 2013/2014	QLD Government HIN939 SWA 2013/2014	QLD Government HIN940 SWA 2013/2014	QLD Government HIN959 SWA 2013/2014
Scheme Component:	WTP	21-Nov-13 Plant	20-Nov-13 Plant	09-Jan-14 Plant	09-Jan-14 Plant	09-Jan-14 Plant	19-Feb-14 Plant	19-Feb-14 Plant	09-Apr-14 Plant	09-Apr-14 Plant	09-Apr-14 Plant	13-May-14 Plant	13-May-14 Plant	26-Jun-14 Plant
PARAMETER	**UNITS**													
Conductivity @ 25' C	us/cm	250	138	185	145	143	140	141	156	156	184	155	149	147
pH @ 21' C		7.49	6.71	7.39	7.16	6.98	7.06	6.98	7.17	7.16	7.3	7.28	7.2	7.21
Total Hardness CaCO3/L	mg	46	24	33	25	24	25	25	25	25	28	28	25	23
Temp Hardness CaCO3/L	mg	44	24	33	25	24	20	19	25	25	28	28	25	23
Alkalinity CaCO3/L	mg	44	27	33	28	24	20	19	27	27	32	31	30	26
Residual Alkalinity	meq/L	0	0.1	0	0.1	0	0	0	0	0	0.1	0.1	0.1	0
Silica	mg/L	36	36	36	36	36	32	32	35	35	35	36	36	36
Total Dissolved Ions	mg/L	156	90	114	93	88	85	85	96	97	111	101	96	89
Total Dissolved Solids	mg/L	165	110	129	111	109	104	105	115	115	127	117	113	109
Colour	HAZEN	1	2	<1	<1	<1	<1	<1				<1	<1	2
Turbidity	NTU	<1	<1	1	<1	1	2	1				<1	<1	5
pH SAT* (calc for CaCO3)		8.7	9.2	9	9.2	9.2	9.3	9.3	9.2	9.2	9	9	9.1	9.2
Saturation Index		-1.2	-2.5	-1.6	-2	-2.2	-2.2	-2.3	-2	-2	-1.7	-1.8	-1.9	-2
Mole Ratio		2.9	3.4	2.8	2.9	3.2	3.2	3.4	3.1	3.1	3	2.8	2.9	2.9
Sodium Adsorption Ratio		1.8	1.4	1.6	1.5	1.4	1.3	1.3	1.6	1.6	1.8	1.4	1.5	1.5
Figure Of Merit Ratio		0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.6	0.6	0.6	0.7	0.7	0.7
CATIONS														
Sodium	mg/L	29	16	21	17	16	15	15	19	19	22	17	17	16
Potassium	mg/L	2.7	1.4	1.9	1.4	1.4	1.3	1.4	1.3	1.3	1.5	1.5	1.5	1.3
Calcium	mg/L	12	6.3	8.5	6.4	6.4	7.2	6.8	6.6	6.6	7.8	7.6	6.6	6.2
Magnesium	mg/L	4.2	2	2.8	2.1	2.1	1.8	2	2.1	2.1	2.1	2.1	2	1.9
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS														
Bicarbonate	mg/L	53	32	40	34	30	25	23	33	33	39	38	36	31
Carbonate	mg/L	0.1	0	0.1	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	38	13	22	13	13	15	16	17	17	22	17	14	13
Fluoride	mg/L	0.72	0.66	0.62	0.52	0.56	0.59	0.6	0.55	0.55	0.62	0.4	0.66	0.62
Nitrate as NO3	mg/L	9.3	9.1	8.8	9.2	9.2	12	12	8.5	8.5	7.9	8.3	8.9	8.4
Sulphate	mg/L	7.4	9.1	7.7	9.4	9.4	7.7	8	9	9	8.5	9	9.5	9.7
OTHER DISSOLVED ELEMENTS														
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	0.02	0.04	0.03	0.02	0.03	0.04	0.02	0.03	0.04	0.04	0.03	0.04
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02
Copper	mg/L	<0.03	0.03	<0.03	0.03	<0.03	<0.03	0.04	<0.03	0.03	<0.03	<0.03	<0.03	0.03

SCHEME 2		QLD Government HIN958 SWA 2013/2014	QLD Government HIN964 SWA 2014/2015	QLD Government HIN963 SWA 2014/2015	QLD Government HIN968 SWA 2014/2015	QLD Government HIN969 SWA 2014/2015	QLD Government HIN973 SWA 2014/2015	QLD Government HIN974 SWA 2014/2015	QLD Government HIN975 SWA 2014/2015	QLD Government HIN980 SWA 2014/2015	QLD Government HIN981 SWA 2014/2015	QLD Government SWA 2014/2015	QLD Government HIN982 SWA 2014/2015	QLD Government HIN983 SWA 2014/2015
Scheme Component:	WTP	26-Jun-14 Plant	24-Jul-14 Plant	24-Jul-14 Plant	14-Aug-14 Plant	14-Aug-14 Plant	15-Oct-14 Plant	15-Oct-14 Plant	15-Oct-14 Plant	25-Nov-14 Plant	25-Nov-14 Plant	25-Nov-14 Plant	11-Dec-14 Plant	11-Dec-14 Plant
PARAMETER	**UNITS**													
Conductivity @ 25' C	us/cm	188	238	146	194	145	726	151	149	584	148	148	941	148
pH @ 21' C		7.51	7.58	7	7.4	7.14	7.59	7.14	6.84	7.56	7.03	7.25	7.47	7.21
Total Hardness CaCO3/L	mg	31	40	24	33	24	102	24	24	87	25	25	131	25
Temp Hardness CaCO3/L	mg	31	37	24	33	24	51	24	24	46	25	25	51	25
Alkalinity CaCO3/L	mg	33	37	25	34	26	51	27	25	46	26	26	51	27
Residual Alkalinity	meq/L	0	0	0	0	0	0	0.1	0	0	0	0	0	0
Silica	mg/L	35	36	36	36	36	37	36	36	36	36	36	35	36
Total Dissolved Ions	mg/L	112	138	90	118	90	378	93	92	314	92	92	488	91
Total Dissolved Solids	mg/L	127	151	110	133	110	384	112	112	322	112	112	491	111
Colour	HAZEN	1	<1	<1	1	1	<1	<1	<1	<1	<1	<1	1	1
Turbidity	NTU	<1	3	<1	1	<1	<1	<1	<1	<1	<1	1	1	2
pH SAT* (calc for CaCO3)		9	8.9	9.2	9	9.2	8.5	9.2	9.2	8.6	9.2	9.2	8.4	9.2
Saturation Index		-1.5	-1.3	-2.2	-1.6	-2	-0.9	-2	-2.4	-1	-2.2	-1.9	-0.9	-2
Mole Ratio		2.7	2.8	2.9	2.8	3	3.2	2.9	3.3	3.3	3.1	2.9	3.6	2.8
Sodium Adsorption Ratio		1.6	1.8	1.5	1.6	1.4	3.9	1.5	1.5	3.4	1.5	1.5	4.6	1.5
Figure Of Merit Ratio		0.7	0.7	0.7	0.7	0.7	0.5	0.6	0.6	0.5	0.7	0.7	0.5	0.7
CATIONS														
Sodium	mg/L	20	26	17	21	16	90	17	17	73	17	17	121	17
Potassium	mg/L	1.8	2.5	1.5	1.9	1.3	5.7	1.4	1.9	4.4	1.4	1.3	6.3	1.4
Calcium	mg/L	8.2	9.9	6.2	8.7	6.4	19	6.2	6.2	16	6.5	6.5	23	6.5
Magnesium	mg/L	2.5	3.7	2	2.8	2	13	2	2	12	2.2	2.2	18	2.1
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS														
Bicarbonate	mg/L	40	45	30	42	32	62	32	31	55	31	32	62	33
Carbonate	mg/L	0.1	0.1	0	0.1	0	0.2	0	0	0.1	0	0	0.1	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	23	35	14	24	13	160	14	14	130	14	14	220	14
Fluoride	mg/L	0.4	0.25	0.6	0.36	0.58	0.61	0.52	0.64	0.21	0.57	0.48	0.58	0.52
Nitrate as NO3	mg/L	7.9	9.3	9	9.2	9	4.9	9.6	9.7	5.2	9	9.2	5.6	8.5
Sulphate	mg/L	8.5	6.6	9.7	7.8	9.7	27	8.7	8.7	21	9.5	9.6	33	9.2
OTHER DISSOLVED ELEMENTS														
Iron	mg/L	0.03	0.03	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.02	0.03	0.05	0.02	0.03	0.03	0.05	0.04	0.04	0.04	0.03	0.03	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.03	0.03	0.03	0.02	0.06	0.03	0.02	0.05	0.03	0.02	0.07	0.02
Copper	mg/L	<0.03	<0.03	0.04	<0.03	0.03	<0.03	0.03	0.03	<0.03	0.03	0.03	<0.03	0.03

SCHEME 2		QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government
		HIN983	HIN987	HIN988	HIN998	HIN999	HIN1000	HIN1007	HIN1008	HIN1010	HIN1016	HIN1020	HIN1034	HIN1033
		SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA		SWA	SWA	SWA
		2014/2015	2014/2015	2014/2015	2014/2015	2014/2015	2014/2015	2014/2015	2014/2015	2014/2015	2014/2015	2014/2015	2015/2016	2015/2016
Scheme Component:	WTP	11-Dec-14	13-Jan-15	13-Jan-15	11-Feb-15	11-Feb-15	11-Feb-15	09-Mar-15	09-Mar-15	22-Apr-15	21-May-15	19-Jun-15	30-Jul-15	30-Jul-15
		Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant
PARAMETER	**UNITS**													
Conductivity @ 25' C	us/cm	147	498	150	155	157	161	156	162	157	152	156	160	160
pH @ 21' C		7.02	7.48	7.06	6.97	6.73	6.94	7.14	7.17	7.24	7.25	7.23	6.95	7.17
Total Hardness CaCO3/L	mg	25	73	25	25	25	27	26	27	26	26	26	26	26
Temp Hardness CaCO3/L	mg	25	43	25	25	25	27	25	27	25	26	26	26	26
Alkalinity CaCO3/L	mg	26	43	27	25	26	33	25	27	25	28	26	27	27
Residual Alkalinity	meq/L	0	0	0	0	0	0.1	0	0	0	0	0	0	0
Silica	mg/L	36	37	37	35	36	36	36	36	36	37	36	36	36
Total Dissolved Ions	mg/L	90	270	94	91	93	102	94	98	97	100	95	96	96
Total Dissolved Solids	mg/L	110	280	113	111	112	118	114	117	117	120	115	115	115
Colour	HAZEN	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Turbidity	NTU	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
pH SAT* (calc for CaCO3)		9.2	8.7	9.1	9.2	9.2	9	9.2	9.1	9.2	9.2	9.2	9.2	9.2
Saturation Index		-2.2	-1.2	-2.1	-2.2	-2.5	-2.1	-2.1	-2	-2	-1.9	-2	-2.3	-2
Mole Ratio		3.1	3.3	3	3.2	3.5	3.1	3.1	3.1	3	3	3	3.2	3
Sodium Adsorption Ratio		1.5	3.2	1.4	1.5	1.5	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6
Figure Of Merit Ratio		0.7	0.5	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.6	0.6	0.6
CATIONS														
Sodium	mg/L	17	62	17	17	17	17	18	18	19	18	19	19	19
Potassium	mg/L	1.5	3.8	1.4	1.3	2	1.4	1.3	1.4	1.3	1.2	1.3	1.5	1.3
Calcium	mg/L	6.4	14	6.7	6.4	6.4	7.6	6.7	7.5	6.8	6.8	6.7	6.7	6.7
Magnesium	mg/L	2.1	9.4	2.1	2.1	2.1	2	2.2	2.1	2.2	2.2	2.2	2.2	2.2
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS														
Bicarbonate	mg/L	32	53	33	31	31	40	31	33	30	34	32	32	33
Carbonate	mg/L	0	0.1	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	14	100	15	15	16	15	16	17	17	17	16	15	15
Fluoride	mg/L	0.58	0.63	0.64	0.66	0.71	0.39	0.56	0.54	0.59	0.61	0.65	0.58	0.58
Nitrate as NO3	mg/L	8.6	5.9	8.8	9.1	9	8.9	9.2	9.2	10	9.8	9.9	9.5	9.5
Sulphate	mg/L	9.3	18.9	9.2	8.6	8.7	8.7	9	8.9	9.4	9.7	8.9	8.9	8.8
OTHER DISSOLVED ELEMENTS														
Iron	mg/L	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.02	0.03	0.04	0.02	0.03	0.04	0.02	0.04	0.03	0.05	0.04	0.03	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.03	0.02
Copper	mg/L	0.03	<0.03	0.04	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2		QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government
		HIN1038	HIN1037	HIN1041	HIN1042	HIN1053	HIN1061	HIN1062	HIN1065	HIN1066	HIN1070	HIN1071	HIN1078	HIN1079
		SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
		2015/2016	2015/2016	2015/2016	2015/2016	2015/2016	2015/2016	2015/2016	2015/2016	2015/2016	2015/2016	2015/2016	2015/2016	2015/2016
Scheme Component:	WTP	20-Aug-15	20-Aug-15	24-Sep-15	24-Sep-15	29-Oct-15	19-Nov-15	19-Nov-15	10-Dec-15	10-Dec-15	19-Jan-16	19-Jan-16	28-Feb-16	28-Feb-16
		Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant
PARAMETER	**UNITS**													
Conductivity @ 25' C	us/cm	154	154	184	184	209	208	206	232	231	234	232	234	234
pH @ 21' C		7.29	7.02	7.09	6.86	7.21	7.26	7.09	7.33	7.21	7.34	7.19	7.13	6.93
Total Hardness CaCO3/L	mg	27	27	27	27	26	27	27	28	28	28	28	29	29
Temp Hardness CaCO3/L	mg	27	27	27	27	26	27	27	28	28	28	28	29	29
Alkalinity CaCO3/L	mg	29	29	33	34	33	34	34	33	33	33	33	38	36
Residual Alkalinity	meq/L	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.1
Silica	mg/L	36	36	38	38	38	39	39	40	40	40	40	39	39
Total Dissolved Ions	mg/L	100	99	120	120	124	129	129	137	137	136	135	144	142
Total Dissolved Solids	mg/L	118	118	137	137	141	147	146	157	157	156	155	159	158
Colour	HAZEN	<1	<1	<1	<1	<1	3	<1	1	<1	<1	<1	<1	<1
Turbidity	NTU	<1	<1	1	1	1	<1	1	1	1	<1	<1	<1	<1
pH SAT* (calc for CaCO3)		9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9	9
Saturation Index		-1.8	-2.1	-2	-2.3	-1.9	-1.8	-2	-1.8	-1.9	-1.8	-1.9	-1.9	-2.1
Mole Ratio		2.9	3.1	3.2	3.4	3.1	3.1	3.2	3.1	3.2	3.1	3.2	3.2	3.4
Sodium Adsorption Ratio		1.6	1.6	2	2	2.3	2.3	2.3	2.6	2.6	2.6	2.6	2.5	2.5
Figure Of Merit Ratio		0.7	0.7	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
CATIONS														
Sodium	mg/L	19	18	24	24	27	28	28	31	32	32	32	31	32
Potassium	mg/L	1.3	1.4	1.7	1.8	1.9	2	1.9	2.3	2.1	2.2	2.1	2.1	2
Calcium	mg/L	7	7	6.3	6.3	6.2	6.3	6.3	6.4	6.3	6.4	6.4	6.7	6.8
Magnesium	mg/L	2.2	2.2	2.7	2.7	2.7	2.8	2.8	3	3	3	3	3	3
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	2
ANIONS														
Bicarbonate	mg/L	36	36	41	41	40	42	41	41	40	40	40	46	40
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	15	15	22	22	25	28	27	32	32	32	32	33	33
Fluoride	mg/L	0.59	0.53	0.72	0.66	0.48	0.59	0.54	0.59	0.7	0.57	0.52	0.41	0.46
Nitrate as NO3	mg/L	9.9	9.8	10	10	9	8.8	8.8	8.5	8.5	8.2	8.3	8.5	8.4
Sulphate	mg/L	9.3	9.2	10.8	10.7	10.8	11.3	11.4	12.5	12.7	11.6	11.8	12.7	12.7
OTHER DISSOLVED ELEMENTS														
Iron	mg/L	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.02	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.02	0.02	0.03	0.02	0.06	0.02	0.01	0.02	0.02	0.03	0.02	0.02	0.02
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.02	0.04	0.04	0.04	0.04	0.04	0.05	0.05	0.05	0.05	0.04	0.04
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2		QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government
		HIN1084	HIN1085	HIN1086	HIN1094	HIN1101	HIN1105	HIN1105	HIN1121	HIN1127	HIN1129	HIN1138	HIN1140	HIN1151
		SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
		2015/2016	2015/2016	2015/2016	2015/2016	2015/2016	2016/2017	2016/2017	2016/2017	2016/2017	2016/2017	2016/2017	2016/2017	2016/2017
Scheme Component:	WTP	31-Mar-16	31-Mar-16	14-Apr-16	28-Apr-16	26-May-16	28-Jul-16	25-Aug-16	29-Sep-16	27-Oct-16	30-Nov-16	25-Jan-17	08-Feb-17	23-Feb-17
		Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant	Plant
PARAMETER	**UNITS**													
Conductivity @ 25' C	us/cm	224	223	223	216	221	216	218	231	229	234	221	205	214
pH @ 21' C		7.18	6.99	6.99	6.89	7.27	7.37	7.25	7.15	7.18	7.14	7.28	7.29	7.3
Total Hardness CaCO3/L	mg	30	30	30	31	30	30	31	30	30	31	31	31	31
Temp Hardness CaCO3/L	mg	30	30	30	31	35	30	31	29	30	31	31	30	30
Alkalinity CaCO3/L	mg	36	35	35	38	0.1	33	38	29	38	40	37	30	30
Residual Alkalinity	meq/L	0.1	0.1	0.1	0.1	39	0.1	0.1	0	0.2	0.2	0.1	0	0
Silica	mg/L	39	39	39	39	138	38	39	38	39	40	40	40	39
Total Dissolved Ions	mg/L	135	135	135	139	156	132	141	135	146	151	142	130	133
Total Dissolved Solids	mg/L	153	153	153	154	154	151	157	155	162	167	159	150	153
Colour	HAZEN	<1	<1	<1	1	<1	<1	1	1	<1	1	<1	<1	1
Turbidity	NTU	<1	<1	<1	<1	<1	1	1	<1	<1	1	1	1	2
pH SAT* (calc for CaCO3)		9	9	9	9	9	9.1	9	9.1	9	9	9	9.1	9.1
Saturation Index		-1.8	-2	-2	-2.1	-1.8	-1.7	-1.7	-2	-1.8	-1.8	-1.7	-1.8	-1.8
Mole Ratio		3.1	3.3	3.3	3.5	3	3	3	3.3	3.2	3.2	3	3.1	3.1
Sodium Adsorption Ratio		2.3	2.3	2.3	2.2	2.4	2.2	2.3	2.4	2.5	2.5	2.3	2.2	2.1
Figure Of Merit Ratio		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.5
CATIONS														
Sodium	mg/L	29	29	29	28	30	28	29	30	31	32	30	28	27
Potassium	mg/L	2	1.9	1.9	2	2.2	2	2	2	2	2.1	1.9	1.8	1.9
Calcium	mg/L	7.1	7.1	7.1	7.3	6.8	7.1	7.3	7.1	7.1	7.2	7.2	7.3	7.4
Magnesium	mg/L	3	3	3	3	3.1	2.9	3	3	3.1	3.2	3.1	3.1	3.1
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS														
Bicarbonate	mg/L	43	43	43	46	43	40	46	36	46	48	45	37	37
Carbonate	mg/L	0	0	0	0	0.1	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	28	29	29	29	29	28	28	30	31	32	28	26	28
Fluoride	mg/L	0.53	0.58	0.58	0.42	0.49	0.46	0.52	0.52	0.52	0.51	0.6	<0.05	0.61
Nitrate as NO3	mg/L	10	10	10	12	12	12	13	13	13	14	14	14	15
Sulphate	mg/L	12	12.1	12.1	10.6	11.6	11.6	12.3	12.5	13	12	12	12	12
OTHER DISSOLVED ELEMENTS														
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.01	0.01	0.01	<0.01	0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.02	0.02	0.02	0.09	0.03	0.02	0.03	0.02	0.02	0.09	0.01	0.01	0.02
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.04	0.04	0.04	0.03	0.04	0.03	0.04	0.03	0.04	0.05	0.03	0.03	0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2		QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government	QLD Government
		HIN1155	HIN1165	HIN1190	HIN1220	HIN1220	HIN1235	HIN1285	HIN1290	HIN1317	HIN1338	HIN1399	HIN1438
		SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
		2016/2017	2016/2017	2016/2018	2017/2018	2017/2018	2017/2018	2017/2018	2018/2019	2018/2019	2018/2019	2020/2021	2020/2021
		16-Mar-17	11-May-17	08-Aug-17	31-Jan-18	31-Jan-18	06-Jun-18	28-Nov-18	05-Dec-18	06-Mar-19	29-May-19	16-Jul-20	20-Jan-21
Scheme Component:	WTP	Plant	Plant	Plant	Parade	SP40 - Cordelia School Road	Plant	Plant	Plant	Plant	Plant	Plant	Plant
PARAMETER	UNITS												
Conductivity @ 25' C	us/cm	240	225	162	228	182	204	323	282	279	228	197	303
pH @ 21' C		7.58	7.03	7.34	7.77	7.21	7.02	6.97	7.86	7.07	6.94	7.16	6.59
Total Hardness CaCO3/L	mg	34	34	30	37	34	31	36	46	33	28	30	34
Temp Hardness CaCO3/L	mg	32	30	27	37	34	28	33	46	33	26	26	30
Alkalinity CaCO3/L	mg	32	30	27	38	47	28	33	52	33	26	26	30
Residual Alkalinity	meq/L	0	0	0	0	0.3	0	0	0.1	0	0	0	0
Silica	mg/L	40	39	37	31	35	39	40	36	41	40	38	39
Total Dissolved Ions	mg/L	146	140	105	146	126	130	192	175	168	140	127	180
Total Dissolved Solids	mg/L	166	162	125	153	132	151	212	179	189	164	148	201
Colour	HAZEN	<1	<1	<1	<1	1	<1	<1	3	<1	1	<1	<7
Turbidity	NTU	<1	1	<1	1	4	1	<1	<1	1	2	1	1
pH SAT* (calc for CaCO3)		9	9.1	9.1	8.7	8.7	9.1	9.1	8.6	9.1	9.2	9.2	9.2
Saturation Index		-1.4	-2	-1.7	-1	-1.5	-2.1	-2.1	-0.8	-2	-2.3	-2	-2.6
Mole Ratio		2.8	3.4	2.9	2.5	2.8	3.4	3.7	2.5	3.5	3.6	3.2	4.1
Sodium Adsorption Ratio		2.4	2.3	1.4	2	1.6	2	3.5	2.4	3	2.7	2	3.3
Figure Of Merit Ratio		0.5	0.5	0.8	0.6	0.7	0.5	0.3	0.6	0.4	0.4	0.5	0.3
CATIONS													
Sodium	mg/L	32	30	18	28	22	26	48	37	40	32	26	44
Potassium	mg/L	2.2	2	1.3	1.8	1.1	1.9	2.8	2.9	2.5	2.2	1.9	2.7
Calcium	mg/L	7.6	8.1	8.5	12	11	7.5	7.3	12	7.1	6.1	7.1	6.8
Magnesium	mg/L	3.5	3.3	2.2	1.5	1.8	2.9	4.3	3.6	3.8	3.2	3	4.1
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS													
Bicarbonate	mg/L	39	36	32	47	57	35	40	63	40	32	32	37
Carbonate	mg/L	0.1	0	0	0.2	0.1	0	0	0.2	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	33	32	17	30	18	26	57	49	45	34	25	52
Fluoride	mg/L	0.53	<0.05	<0.05	0.08	0.06	0.08	0.06	0.09	0.06	<0.05	0.05	0.06
Nitrate as NO3	mg/L	16	17	17	14	11	17	14	2.6	14	14	15	15
Sulphate	mg/L	13	12	9	11	4	13	19	5	15	17	17	19
OTHER DISSOLVED ELEMENTS													
Iron	mg/L	<0.1	<0.01	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	<0.001
Zinc	mg/L	0.02	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.06	<0.06
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<0.03
Boron	mg/L	0.04	0.03	0.02	0.03	<0.02	0.03	0.06	0.04	0.05	0.04	0.04	0.06
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.003	0.004

HINCHINBROOK SHIRE COUNCIL

SCHEME 2
LOWER HERBERT WATER SUPPLY RETICULATION

Scheme Component: R

			LABORATORY NAME		ID_HIN047	ID-HIN049	ID_HIN060	ID_HIN078	ID_HIN104	IdNo:Hin124	ID-HIN125	ID-HIN147		ID-HIN170	ID-HIN171	ID-HIN173	ID-HIN172	ID-HIN185	ID-HIN182	ID-HIN186	ID-HIN195	ID-HIN253	ID-HIN263	ID-HIN271
			REPORT #		SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
			SAMPLE TYPE		1999/2000	2000/2001	2000/2001	2000/2001	2001/2002	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2002/2003	2003/2004	2003/2004	2003/2004
			FINANCIAL YEAR		21-Jun-00	21-Jun-00	02-Feb-01	20-Jun-01	06-Mar-02	16-Jul-02	16-Jul-02	16-Oct-02	16-Oct-02	08-Jan-03	08-Jan-03	08-Jan-03	08-Jan-03	25-Feb-03	25-Feb-03	26-Feb-03	14-Mar-03	27-Oct-03	22-Dec-03	17-Feb-04
			SAMPLE DATE		SP30 - Halifax Water Tower	ner of Bruce Parade and V	SP17 - 2 Sardine Street	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	SP01 - Bemerside Hurley's	SP17 - 2 Sardine Street	SP30 - Halifax Water Tower	SP54 - Lucinda Booster Pump	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	12 - End of Patterson Par	P11 - Lucinda Water Towe	P54 - Lucinda Booster Pur	16 - End of John Dory Stre	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower
METHOD	PARAMETER	UNITS	HEALTH	AESTHETIC	SAMPLE LOCATION																			
18320	Conductivity @ 25' C	us/cm			158	367	175	141	150	175	150	150	330	145	385	350	150	355	165	150	155	150	140	175
18226	pH @ 21' C			6.5-8.5	7.06	7.3	7.35	7.09	7.3	7.7	7.45	7.25	7.5	7.05	7.2	7.05	7.1	7.7	7.8	7.2	7.3	7.5	7.7	7.4
18209	Total Hardness CaCO3/L	mg		200	23.5	46.1	31.7	23.4	26.5	37	29	26	54	27.5	55	51	31.5	58	39.5	31.5	31	25.5	23	29.5
18209	Temp Hardness CaCO3/L	mg																						
18208	Alkalinity CaCO3/L	mg			30	54	36	31	26.5	41.5	31	30	47	27	59	57	30	57	36	29.5	29.5	33.5	40	29.5
18209	Residual Alkalinity	meq/L			0.3	0.4	0.2	0.3	0	0.1	0	0.1	0	0	0.1	0.1	0	0	0	0	0	0	0.2	0.3	0
18195	Silica	mg/L			40	41	28	35	30	37	37	35	34	37	38	38	37	38	36	37	36	32	37	36
18209	Total Dissolved Ions	mg/L		500					95	120	100	98	200	93	240	220	98	230	120	100	110	99	94	110
18209	Total Dissolved Solids	mg/L			76	173	88	69	110	130	120	110	200	110	240	220	120	230	130	120	120	110	110	130
18206	Colour	HAZEN		15	8	2		3	<1	2	<1	1	1	1	1	2	12	1	1	1	<1	<1	2	1
18212	Turbidity	NTU		5	0.2	0.2		1	2	<1	1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	1	1	<1
18209	pH SAT* (calc for CaCO3)																							
18209	Saturation Index								-1.9	-1	-1.5	-1.9	-1.2	-2.1	-1.4	-1.6	-1.9	-0.09	-0.9	-1.8	-1.8	-1.6	-1.3	-1.6
18209	Mole Ratio								2.8	2.3	2.6	2.8	3	3	3.3	3.4	2.9	2.8	2.2	2.9	2.8	2.6	2.3	1.5
18209	Sodium Adsorption Ratio				1.7	2.7	1.4	1.4	1.5	1.2	1.4	1.5	2.5	1.3	3.1	2.8	1.2	2.9	1.3	1.4	1.4	1.6	1.6	1.5
18209	Figure Of Merit Ratio								0.7	1	0.8	0.7	0.6	0.8	0.5	0.5	0.9	0.5	1	0.8	0.8	0.6	0.6	0.7
	CATIONS																							
18195	Sodium	mg/L		180	18.5	42.9	17.7	15.3	17.5	17	16.5	18	41.5	15	52	46	15.5	50	18.5	18.5	18.5	18	17.5	18.5
18195	Potassium	mg/L			1.4	3.1	1.3	1.3	1.1	1.4	1.4	1.5	3.5	1.1	3.8	3.6	1.1	3.7	1.3	1.3	1.4	1.3	1.2	1.2
18195	Calcium	mg/L			6.1	10.4	10.9	5.9	7	14	9.3	6.7	12	7.5	11	11.5	9.8	13	14	8.7	8.3	6.6	5.3	8.3
18195	Magnesium	mg/L			2	4.9	1.1	2.1	2.2	0.6	1.4	2.2	5.8	2.1	6.7	5.6	1.7	6.2	1.2	2.4	2.5	2.2	2.4	2.2
18209	Hydrogen	mg/L							0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	ANIONS																							
18209	Bicarbonate	mg/L			36.8	66	44.4	38	32.5	50	37.5	36.5	57	33	71	70	36.5	69	44	36	36	41	48.5	36
18209	Carbonate	mg/L			0	0	0	0	0	0.1	0.1	0	0.1	0	0.1	0	0	0.2	0.2	0	0	0.1	0.1	0.1
18209	Hydroxide	mg/L			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18204	Chloride	mg/L		250	13	56	15	14	13	15	14	13	57	11.5	70	60	11.5	65	13.5	13.5	13.5	15	16.5	14
18204	Fluoride	mg/L	1.5		0.06	0.08	0.41	0.11	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1
18204	Nitrate as NO3	mg/L	50			9.6			9.6	9.8	9.9	8.8	9	9.4	7.3	7.6	9.5	7.8	9.5	9.2	9.1	7.2	<0.5	16.5
18204	Sulphate	mg/L	500	250	10	14	14	5	12.5	11.5	11	11.5	13	13	13	13	13	13	15	15.5	17	7.3	<2	14
	OTHER DISSOLVED ELEMENTS																							
18195	Iron	mg/L		0.3	0.02	0.05	0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.01	0.1	0.01	0.01	0.02	0.01	0.02	<0.01	<0.01	0.03	0.03	0.01
18195	Manganese	mg/L	0.5	0.1	0	0	0	0	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
18195	Zinc	mg/L		3	0.04	0.03	0.01	0.05	0.09	0.01	0.02	0.02	0.01	0.01	0.01	0.03	0.01	<0.01	<0.01	0.01	0.03	<0.01	0.01	<0.01
18195	Aluminium	mg/L		0.2	0.08	0.07	0	0	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18195	Boron	mg/L	4						<0.02	0.03	0.03	<0.02	<0.02	<0.02	0.05	0.04	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
18195	Copper	mg/L	2	1	0.01	0.02	0.02	0	<0.03	<0.03	<0.03	<0.03	<0.3	0.03	0.03	0.03	0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RETICULATION		ID-HIN289	ID-HIN295	ID-HIN308	ID-HIN305	ID-HIN308	ID-HIN320	ID-HIN332	ID-HIN348	ID-HIN352	ID-HIN351	ID-HIN363	ID-HIN375	ID-HIN369	ID-HIN368	ID-HIN385	ID-HIN396	ID-HIN402	ID-HIN404	ID-HIN431	ID-HIN440	ID-HIN479	ID-HIN484
		SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
		2003/2004	2003/2004	2004/2005	2004/2005	2004/2005	2004/2005	2004/2005	2004/2005	2004/2005	2004/2005	2004/2005	2004/2005	2004/2005	2004/2005	2004/2005	2005/2006	2005/2006	2005/2006	2005/2006	2006/2007	2006/2007	2007/2008
		20-May-04	15-Jun-04	07-Jul-04	07-Jul-04	21-Oct-04	09-Nov-04	09-Dec-04	12-Jan-05	12-Jan-05	17-Jan-05	24-Feb-05	14-Apr-05	14-Apr-05	14-Apr-05	09-Jun-05	03-Aug-05	03-Aug-05	03-Aug-05	26-May-06	28-Aug-06	30-Jul-07	06-Sep-07
Scheme Component:	R	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	SP31 - Halifax Depot	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	SP31 - Halifax Depot	>54 - Lucinda Booster Pun	SP52 - Neames Inlet Road	SP30 - Halifax Water Tower	12 - End of Patterson Parı	>54 - Lucinda Booster Punner of Bruce Parade and V		SP30 - Halifax Water Tower	SP39 - Mona Road	ner of Bruce Parade and V	SP30 - Halifax Water Tower	>54 - Lucinda Booster Pun	SP31 - Halifax Depot	SP30 - Halifax Water Tower
PARAMETER	**UNITS**																						
Conductivity @ 25' C	us/cm	170	175	180	99	170	174	173	177	170	270	174	172	319	293	301	171	175	291	179	231	154	162
pH @ 21' C		7.25	7.25	7.35	7	7.2	7.26	7.34	7.13	7.28	9.61	7.37	7.41	9.09	7.82	7.69	7.34	7.16	7.51	7.21	7.58	6.98	7.24
Total Hardness CaC03/L	mg	28.5	29.5	30.5	16	32	30	30	31	29	36	33	29	64	49	50	28	29	44	32	41	29	26
Temp Hardness CaC03/L	mg																						
Alkalinity CaC03/L	mg	30	0	28	22	27	25	28	25	45	32	29	29	58	41	45	25	25	38	27	36	34	0
Residual Alkalinity	meq/L	0	0	0	0	0	0	0	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Silica	mg/L	37	39	39	27	40	37	36	37	42	37	37	36	37	37	37	38	38	38	38	36	39	36
Total Dissolved Ions	mg/L	110	110	110	63	110	109	114	111	118	154	116	114	207	184	192	107	109	175	116	148	101	102
Total Dissolved Solids	mg/L	130	130	140	76	130	130	133	133	133	178	135	132	213	197	201	129	131	189	138	162	119	122
Colour	HAZEN	1	3	<1	2	2	2	<1	6	<1	1	1	<1	1	2	<1	7	7	8	2	<1	<1	2
Turbidity	NTU	<1	<1	2	2	<1	<1	<1	1	<1	1	3	1	1	1	1	1	9	2	2	1	2	2
pH SAT* (calc for CaC03)																							
Saturation Index		-1.8	-1.9	-1.7	-2.5	-1.9	-1.9	-1.7	-2	-1.6	0.8	-1.6	-1.7	0.7	-1	-1	-1.8	-2	-1.3	-1.9	-1.3	-2.1	-1.9
Mole Ratio		2.9	3	2.8	3.2	2.9	2.9	2.8	3.1	2.6	1.1	2.8	2.7	1.3	2.7	2.8	2.8	3.1	3	3	2.7	3.1	2.9
Sodium Adsorption Ratio		1.5	1.5	1.6	1.3	1.4	1.5	1.5	1.5	1.7	2.3	1.4	1.5	1.9	2.2	2.2	1.5	1.5	2.2	1.5	1.7	1.5	1.5
Figure Of Merit Ratio		0.7	0.7	0.7	0.6	0.8	0.7	0.7	0.8	0.6	0.5	0.9	0.7	0.8	0.6	0.6	0.7	0.7	0.6	0.8	0.8	0.7	0.7
CATONS																							
Sodium	mg/L	18.5	18	20.5	12	18	19	19	19	21	32	18	19	35	36	35	18	18	34	19	25	19	18
Potassium	mg/L	1.3	1.3	1.3	1.1	1.3	1.3	1.3	1.3	1.2	2.6	1.2	1.4	2.7	2.8	2.7	1.4	1.3	2.6	1.3	1.9	1	1.2
Calcium	mg/L	7.8	8.1	8.4	3.8	8.7	8.1	8.2	8.4	7.1	14	9.7	8	22	12	13	7.4	8	11	8.5	11	7	7.2
Magnesium	mg/L	2.2	2.2	2.3	1.6	2.5	2.3	2.3	2.4	2.6	0.2	2.2	2.3	2	4.7	4.4	2.3	2.2	4.2	2.5	3.5	2.7	<0.01
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																							
Bicarbonate	mg/L	36.5	33	34	26.5	33	31	34	30	54	26	35	35	4.1	49	54	31	31	46	33	44	41	31
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	5.6	0	0.1		0.2	0.1	0	0	0.1	0	0.1	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0.6	0	0	61	0	0	0	0	0	0	0	0	0
Chloride	mg/L	15.5	16.5	17	14	14.5	14	16	16	14	40	15	17	44	45	47	15	15	43	17	29	16	16
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.06	0.05
Nitrate as NO3	mg/L	17.5	17.5	18.5	3.1	20.5	22	21	21	13	18	20	18	18	18	19	19	19	18	21	20	11	16
Sulphate	mg/L	11	11.5	12.5	<2	12.5	12	12	13	4.7	14	13.9	12.7	16.4	16.5	17	13.4	13.8	15.6	14	13.8	3.4	11.4
OTHER DISSOLVED ELEMENTS																							
Iron	mg/L	0.02	0.01	0.02	0.1	0.01	<0.01	<0.01	<0.01	0.01	0.02	0.01	<0.01	0.01	<0.01	<0.01	0.01	0.02	0.07	<0.01	0.01	0.02	<0.01
Manganese	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	4.7	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.01	<0.01
Zinc	mg/L	0.01	0.01	0.01	0.01	0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.01	0.01	<0.01	<0.01	0.01	<0.01	0.03	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.05	0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.04	0.02	0.03	0.02	0.03	0.02	0.02	0.01	0.03	0.02	0.02	0.04	0.05	0.03	0.02	0.02	0.03	0	0.04	0.02	<0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RETICULATION		ID-HIN512 SWA 2007/2008 29-Feb-08	ID-HIN604 SWA 2008/2009 10-Sep-08	ID-HIN609 SWA 2008/2009 29-Sep-08	ID-HIN614 SWA 2008/2009 13-Oct-08	ID-HIN618 SWA 2008/2009 27-Oct-08	ID-HIN645 SWA 2008/2009 30-Mar-09	ID-HIN668 SWA 2008/2009 29-Jun-09	ID-HIN687 SWA 2009/2010 14-Aug-09	ID-HIN703 SWA 2009/2010 30-Oct-09	ID-HIN702 SWA 2009/2010 04-Nov-09	ID-HIN710 SWA 2009/2010 27-Nov-09	ID:HIN711 SWA 2009/2010 27-Nov-09	ID-HIN 709 SWA 2008/2009 27-Nov-09	ID-HIN717 SWA 2009/2010 04-Dec-09	ID_HIN721 SWA 2009-2010 07-Jan-10	ID-HIN746 SWA 2009/2010 26-Feb-10
Scheme Component:	R	12 - End of Patterson Para	SP30 - Halifax Water Tower	12 - End of Patterson Para	SP41 - Mill Road	SP54 - Lucinda Booster Pump	SP30 - Halifax Water Tower	SP41 - Mill Road	SP30 - Halifax Water Tower	SP30 - Halifax Water Tower	*28 - Washaway Booster Pump Stat*	SP30 - Halifax Water Tower	SP41 - Mill Road	SP13 - Corner of Bruce Parade and Vass Street	SP31 - Halifax Depot	*SP40 - Cordelia School Road*	28 - Washaway Booster Pump Stat
PARAMETER	**UNITS**																
Conductivity @ 25' C	us/cm	200	154	194	168	161	188	173	151	156	167	148	157	186	149	177	149
pH @ 21' C		9.41	7.3	9.25	7.17	7.41	7	7.11	7.2	7.36	7.19	7.39	7.36	7.67	7.26	7.62	7.22
Total Hardness CaCO3/L	mg	39	28	37	30	29	28	38	27	26	30	27	32	35	27	33	27
Temp Hardness CaCO3/L	mg																
Alkalinity CaCO3/L	mg	40	30	43	32	28	34	37	27	27	45	31	35	36	40	40	31
Residual Alkalinity	meq/L	0	0.1	0.1	0	0	0.1	0	0	0	0.3	0.1	0.1	0	0.3	0.1	0.1
Silica	mg/L	35	36	36	36	31	37	38	37	37	33	38	38	37	33	38	39
Total Dissolved Ions	mg/L	126	104	121	108	102	123	116	96	95	108	99	107	122	98	114	99
Total Dissolved Solids	mg/L	142	121	136	125	116	139	132	116	115	113	118	124	137	106	128	119
Colour	HAZEN	1	<1	1	1	1	<1	1	1	<1	1	<1	2	<1	<1	<1	3
Turbidity	NTU	1	5	2	2	2	1	1	2	1	1	<1	1	1	1	1	1
pH SAT* (calc for CaCO3)																	
Saturation Index		0.7	-1.8	0.6	-1.7	-1.7	-2	-1.7	-1.9	-1.8	-1.8	-1.7	-1.5	-1.2	-1.8	-1.2	-1.8
Mole Ratio		0.9	2.8	0.9	2.9	2.9	3.2	2.9	2.9	2.8	2.8	2.7	2.7	2.6	2.8	2.4	2.9
Sodium Adsorption Ratio		1.4	1.4	1.4	1.4	1.5	1.9	1.4	1.4	1.4	1.5	1.4	1.3	1.5	1.4	1.4	1.4
Figure Of Merit Ratio		0.9	0.7	0.9	0.8	0.7	0.6	0.9	0.7	0.7	0.7	0.7	0.9	0.8	0.7	0.8	0.7
CATIONS																	
Sodium	mg/L	20	17	20	18	18	23	20	17	17	19	17	17	20	17	19	17
Potassium	mg/L	1.6	1.4	1.5	1.3	1.3	1.5	1.5	1.4	1.3	1.4	1.4	1.4	2	1.4	1.3	1.4
Calcium	mg/L	15	7.4	14	9.3	8.1	7.3	12	7.2	7.1	6.5	7.4	10	10	6	10	7.6
Magnesium	mg/L	0.3	2.3	0.3	1.5	2.1	2.4	1.8	2.2	2.1	3.3	2.1	1.4	2.2	2.9	1.7	2
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																	
Bicarbonate	mg/L	37	37	43	39	35	41	44	33	33	55	37	43	43	49	49	38
Carbonate	mg/L	5.1	0	4.1	0	0	0	0	0	0	0	0	0.1	0.1	0	0.1	0
Hydroxide	mg/L	0.4	0	0.3	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	22	15	19	16	20	20	16	15	15	18	14	14	23	17	17	15
Fluoride	mg/L	0.05	<0.1	<0.1	<0.1	0.05	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.09	0.06	<0.1
Nitrate as NO3	mg/L	11	11	10	11	8.9	13	8.7	8.2	7.7	2.1	7.7	7.6	8.2	3.1	7.7	6.7
Sulphate	mg/L	11.6	12.2	9.4	12.8	8.8	14.2	12.8	11.9	12.2	2	12.5	12.7	12.7	2.1	8.2	11.9
OTHER DISSOLVED ELEMENTS																	
Iron	mg/L	0.03	<0.01	0.01	0.01	0.03	<0.01	0.01	0.02	<0.01	0.01	<0.01	<0.01	0.03	<0.01	0.02	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	0.01	<0.01	<0.01	0.02	0.01	0.05	0.02	0.01	0.01	0.01	<0.01	0.01	<0.01	<0.01	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	<0.02	0.02	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RETICULATION		ID-HIN743 SWA 2010/2011 05-Aug-10	ID-HIN744 SWA 2010/2011 06-Aug-10	ID-HIN727 SWA 2010/2011 06-Aug-10	ID-HIN 752 SWA 2010/2011 01-Sep-10	ID-HIN 753 SWA 2010/2011 01-Sep-10	ID-HIN759 SWA 2010/2011 17-Nov-10	ID-HIN758 SWA 2010/2011 17-Nov-10	ID-HIN797 SWA 2011/2012 17-Oct-11	ID-HIN796 SWA 2011/2012 17-Nov-11	ID:HIN794 SWA 2011/2012 17-Nov-11	ID:HIN795 SWA 2011/2012 17-Nov-11	ID-HIN 798 SWA 2011/2012 17-Nov-11	ID:HIN817 SWA 2011/2012 08-Mar-12	ID-HIN 816 SWA 2011/2012 08-Mar-12	ID-HIN815 SWA 2011/2012 08-Mar-12
Scheme Component:	R	*SP16 - End of John Dory Street*	SP54 - Lucinda Booster Pump	P28 - Washaway Booster Pump Statio	SP14 - Dungeness	- Corner of Bruce Parade and Vass	SP31 - Halifax Depot	*28 - Washaway Booster Pump Stat*	*SP16 - End of John Dory Street*	SP39 - Mona Road	SP52 - Neames Inlet Road	SP41 - Mill Road	SP14 - Dungeness	SP41 - Mill Road	SP14 - Dungeness	SP28 - Washaway Booster Pump Station
PARAMETER	**UNITS**															
Conductivity @ 25' C	us/cm	166	169	163	174	179	192	149	148	156	158	166	196	179	171	171
pH @ 21' C		7.48	7.49	7.39	7.46	7.58	7.31	7.15	7.62	7.27	7.06	7.2	7.52	7.33	7.45	7.41
Total Hardness CaC03/L	mg	31	30	29	30	32	35	26	33	33	36	38	39	39	33	32
Temp Hardness CaC03/L	mg															
Alkalinity CaC03/L	mg	39	34	36	32	34	43	30	45	30	30	33	34	34	30	32
Residual Alkalinity	meq/L	0.2	0.1	0.1	0	0	0.2	0.1	0.2	0	0	0	0	0	0	0
Silica	mg/L	41	39	41	38	38	45	38	31	36	38	37	35	35	34	36
Total Dissolved Ions	mg/L	115	110	110	108	112	129	97	105	108	109	114	126	116	109	112
Total Dissolved Solids	mg/L	131	128	129	126	129	147	116	109	125	127	130	141	130	125	129
Colour	HAZEN	<1	4	5	3	3	1	1	4	1	1	<1	3	<1	<1	<1
Turbidity	NTU	1	1	1	<1	<1	1	1	1	1	1	2	2	1	2	<1
pH SAT* (calc for CaC03)																
Saturation Index		-1.4	-1.5	-1.6	-1.6	-1.3	-1.6	-2	-1.1	-1.7	-1.9	-1.6	-1.3	-1.4	-1.5	-1.5
Mole Ratio		2.6	2.7	2.7	2.8	2.6	2.7	3	2.3	0.9	3	2.8	2.7	2.7	2.7	2.7
Sodium Adsorption Ratio		1.5	1.6	1.6	1.6	1.5	1.7	1.5	1.2	1.2	1.2	1.1	1.5	1.2	1.4	1.5
Figure Of Merit Ratio		0.7	0.7	0.7	0.7	0.8	0.7	0.7	1	0.9	1	1.1	0.8	1.1	0.8	0.8
CATIONS																
Sodium	mg/L	19	20	20	20	20	23	17	16	16	17	16	21	17	18	19
Potassium	mg/L	1.2	1.7	1.2	1.7	1.6	1.1	1.4	1.3	1.3	1.4	1.3	1.7	1.4	1.5	1.4
Calcium	mg/L	10	8.3	7.6	8.2	9.5	8.6	7.3	10	9.4	10	12	11	13	9.7	8.9
Magnesium	mg/L	1.4	2.3	2.3	2.3	2	3.3	1.9	1.7	2.3	2.4	2	2.9	1.7	2.2	2.5
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	48	42	44	39	42	53	36	54	37	37	40	42	41	36	39
Carbonate	mg/L	0.1	0.1	0.1	0.1	0.1	0.1	0	0.1	0	0	0	0.1	0	0.1	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	16	20	17	21	21	18	14	15	13	13	13	23	13	17	16
Fluoride	mg/L	<0.1	<0.1	<0.1	0	<0.1	<0.1	<0.1	0.08	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	10	7	11	7.5	7.5	16	8.5	4.3	19	18	18	15	19	14	18
Sulphate	mg/L	7.9	8.8	7.4	9.1	9	5.6	10.1	2.3	10.3	10.3	10.5	9.2	9.9	10.2	8
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.03	0.02
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	0.02	<0.01	<0.01	<0.01	0.02	0.02	<0.01	0.01	0.04	0.01	<0.01	0.02	0.02	0.04
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11
Boron	mg/L	<0.02	0.02	<0.02	0.02	0.02	<0.02	0.02	<0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RETICULATION		ID-HIN829 SWA 2011/2012	ID:HIN831 SWA 2011/2012	ID-HIN838 SWA 2012/2013	ID-HIN 842 SWA 2012/2013	ID-HIN843 SWA 2012/2013	ID-HIN866 SWA 2012/2013	ID:HIN867 SWA 2012/2013	QLD Government HIN875 SWA 2013/2014	QLD Government HIN882 Pest/Herb 2013/2014	QLD Government HIN894 SWA 2013/2014	QLD Government HIN895 SWA 2013/2014	QLD Government HIN896 SWA 2013/2014	QLD Government HIN917 SWA 2013/2014	QLD Government HIN918 SWA 2013/2014
Scheme Component:	R	14-Jun-12	19-Jun-12	11-Sep-12	11-Oct-12	11-Oct-12	11-Jan-13	15-Jan-13	12-Jul-13	23-Jul-13	10-Oct-13	10-Oct-13	10-Oct-13	16-Jan-14	16-Jan-14
PARAMETER	**UNITS**	**SP31 - Halifax Depot**	**SP41 - Mill Road**	**SP30 - Halifax Water Tower**	**SP12 - End of Patterson Parade**	***SP40 - Cordelia School Road***	***SP16 - End of John Dory Street***	**SP51 - Bullock Paddock Road**	**SP39 - Mona Road**	**SP30 - Halifax Water Tower**	**SP40 - Cordelia School Road**	**SP16 - End of John Dory Street**	**SP12 - End of Patterson Parade**	**SP17 - 2 Sardine Street**	**SP51 - Bullock Paddock Road**
Conductivity @ 25' C	us/cm	165	159	139	193	151	163	162	137		123	127	153	152	182
pH @ 21' C		7.39	7.42	7.35	7.59	7.43	7.76	7.92	7.41		7.25	7.51	7.43	7.15	8.2
Total Hardness CaCO3/L	mg	31	39	25	37	31	32	37	26		22	23	29	29	46
Temp Hardness CaCO3/L	mg								25		22	23	29	29	46
Alkalinity CaCO3/L	mg	0.3	39	28	40	39	42	44	25		31	32	31	33	55
Residual Alkalinity	meq/L	0.3	0	0.1	0.1	0.2	0.2	0.1	0		0.2	0.2	0	0.1	0.2
Silica	mg/L	42	35	35	36	32	38	39	36		29	30	36	36	42
Total Dissolved Ions	mg/L	119	113	87	122	98	114	116	85		78	80	96	101	134
Total Dissolved Solids	mg/L	133	124	105	133	107	126	127	105		88	90	113	116	143
Colour	HAZEN	<1	<1	1	<1	<1	1	<1	3		<1	<1	<1	2	1
Turbidity	NTU	<1	1	1	1	1	1	1	1		4	2	1	<1	<1
pH SAT* (calc for CaCO3)									9.2		9.1	9	9	8.9	8.4
Saturation Index		-1.5	-1.3	-1.8	-1.2	-1.4	-1.1	-0.7	-1.8		-1.8	-1.5	-1.5	-1.8	-0.2
Mole Ratio		2.6	2.5	2.7	2.5	2.5	2.2	2	2.7		2.8	2.6	2.6	2.9	1.6
Sodium Adsorption Ratio		1.6	1.1	1.3	1.5	1.2	1.5	1.1	1.3		1.3	1.2	1.3	1.4	1.1
Figure Of Merit Ratio		0.7	1.2	0.8	0.8	0.9	0.8	1.1	0.8		0.7	0.8	0.8	0.8	1.3
CATONS															
Sodium	mg/L	21	15	14	21	16	19	16	15		14	14	16	17	16
Potassium	mg/L	1	1.2	1.3	1.7	1.3	1.3	1.3	1.2		1.3	1.3	1.4	1.3	1.3
Calcium	mg/L	7.8	14	6.8	11	10	9.3	14	7.3		6.7	7.6	9.2	8.5	18
Magnesium	mg/L	2.9	1.1	2	2	1.2	2.1	0.3	1.9		1.3	1.1	1.5	2	0.1
Hydrogen	mg/L	0	0	0	0	0	0	0	0		0	0	0	0	0
ANIONS															
Bicarbonate	mg/L	54	47	34	48	47	51	53	31		37	39	38	41	66
Carbonate	mg/L	0.1	0.1	0	0.1	0.1	0.2	0.2	0		0	0.1	0.1	0	0.6
Hydroxide	mg/L	0	0	0	0	0	0	0	0		0	0	0	0	0
Chloride	mg/L	15	12	11	21	14	16	13	12		13	14	13	14	13
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05		0.46	0.48	0.29	0.45	0.21
Nitrate as NO3	mg/L	13	13	7.5	7	5.1	9.5	7.5	7.9		1.7	1.7	8.4	8.7	9.3
Sulphate	mg/L	4.1	9.3	9.6	9.1	4	5.8	10.5	8.4		1.7	1.6	8.5	7.7	9.5
OTHER DISSOLVED ELEMENTS															
Iron	mg/L	<0.01	<0.01	<0.01	0.01	0.01	0.01	<0.01	<0.01		0.02	0.01	0.01	<0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.01	0.01	0.02	0.01	0.02	<0.01	<0.01	<0.01		0.01	0.01	<0.01	<0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	<0.02	0.02	0.02	0.03	0.02	<0.02	0.02	0.02		0.02	0.02	0.02	0.02	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RETICULATION		QLD Government HIN928 SWA 2013/2014 13-Mar-14	QLD Government HIN1026 SWA 2015/2016 15-Jul-15	QLD Government HIN1047 SWA 2015/2016 06-Oct-15	QLD Government HIN1048 SWA 2015/2016 06-Oct-15	QLD Government HIN1049 SWA 2015/2016 06-Oct-15	QLD Government HIN1054 SWA 2015/2016 29-Oct-15	QLD Government HIN1090 SWA 2015/2016 14-Apr-16	QLD Government HIN1091 SWA 2015/2016 14-Apr-16	QLD Government HIN1092 SWA 2015/2016 14-Apr-16	QLD Government HIN1114 SWA 2016/2017 08-Sep-16	QLD Government HIN1116 SWA 2016/2017 08-Sep-16	QLD Government HIN1160 SWA 2016/2017 05-Apr-17	QLD Government HIN1161 SWA 2016/2017 05-Apr-17	QLD Government HIN1209 SWA 2017/2018 26-Oct-17
Scheme Component: R		SP39 - Mona Road	SP30 - Halifax Water Tower	SP02 - 26 Marbelli Street	SP16 - End of John Dory Street	SP14 - Dungeness	SP01 - Bemerside Hurley's	SP53 - Victoria Terrace	SP51 - Bullock Paddock Road	SP14 - Dungeness	SP41 - Mill Road	SP16 - End of John Dory Street	SP17 - 2 Sardine Street	SP51 - Bullock Paddock Road	SP30 - Halifax Water Tower
PARAMETER	**UNITS**														
Conductivity @ 25° C	us/cm	158	152	200	144	193	210	211	229	218	241	184	203	268	203
pH @ 21° C		7.02	7.17	7.16	7.39	7.36	7.43	7.19	7.31	7.27	7.43	7.23	7.4	8.21	7.37
								31							
Total Hardness CaCO3/L	mg	28	27	27	26	29	27	31	41	32	38	29	36	53	33
Temp Hardness CaCO3/L	mg	23	26	27	26	29	27	42	41	32	38	29	36	48	31
Alkalinity CaCO3/L	mg	23	26	33	34	33	32	0.2	51	42	46	39	47	48	31
Residual Alkalinity	meq/L	0	0	0.1	0.1	0.1	0.1	38	0.2	0.2	0.1	0.2	0.2	0	0
Silica	mg/L	35	36	39	30	39	38	141	39	38	39	35	42	41	38
Total Dissolved Ions	mg/L	93	95	124	94	121	123	154	158	144	154	121	140	175	132
Total Dissolved Solids	mg/L	113	115	143	103	139	142		166	156	165	132	153	186	151
Colour	HAZEN	<1	3	2	3	2	<1	<1	<1	<1	<1	<1	<1	<1	<1
Turbidity	NTU	<1	<1	<1	3	4	<1	<1	<1	1	1	2	<1	<1	<1
pH SAT* (calc for CaCO3)		9.2	9.2	9.1	9	9	9.1	8.9	8.5	8.9	8.6	8.8	8.7	8.4	9
Saturation Index		-2.1	-2	-2	-1.6	-1.6	-1.7	-1.7	-1.2	-1.6	-1.2	-1.6	-1.3	-0.02	-1.6
Mole Ratio		3.2	3.1	3.1	2.7	2.9	2.9	3	2.8	3	2.8	2.9	2.7	2	3
Sodium Adsorption Ratio		1.4	1.5	2.2	1.4	2	2.3	2.2	1.9	2.2	2	1.8	1.9	1.8	2.2
Figure Of Merit Ratio		0.8	0.7	0.5	0.7	0.5	0.5	0.5	0.7	0.5	0.6	0.6	0.6	0.8	0.5
CATIONS															
Sodium	mg/L	16	18	27	17	25	27	28	28	28	28	22	26	31	29
Potassium	mg/L	1.3	1.3	1.8	1.3	1.6	2.2	1.7	1.8	1.8	1.8	1.3	1.4	2	2
Calcium	mg/L	7.8	7.1	6.4	8.9	8.1	6.3	8	16	9	13	9.4	12	21	8.4
Magnesium	mg/L	2	2.2	2.7	0.9	2.2	2.7	2.6	0.4	2.4	1.3	1.5	1.6	0.2	3
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS															
Bicarbonate	mg/L	28	31	41	41	41	39	51	62	52	56	48	57	58	38
Carbonate	mg/L	0	0	0	0.1	0	0.1	0	0.1	0.1	0.1	0	0.1	0.5	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	16	16	25	16	22	26	27	28	28	28	22	21	33	28
Fluoride	mg/L	0.57	<0.05	0.53	0.26	0.56	0.47	0.59	0.14	0.56	0.05	0.53	0.33	<0.05	0.06
Nitrate as NO3	mg/L	12	10	9.7	4.1	9.9	9.1	11	11	10	13	9.4	15	17	13
Sulphate	mg/L	9	9	11.1	4.4	10.6	10.9	10.9	11.2	11.6	12.5	7.6	6	12	11
OTHER DISSOLVED ELEMENTS															
Iron	mg/L	0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.01	0.01	<0.01	0.02	0.01	0.03
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.01	0.02	0.02	<0.01	<0.01	0.06	0.03	0.03	0.04	<0.01	<0.01	<0.01	<0.01	0.05
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.02	0.03	<0.02	0.02	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.04	0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 2 LOWER HERBERT WATER SUPPLY RETICULATION		QLD Government HIN1227 SWA 2017/2018 03-May-18	QLD Government HIN1228 SWA 2017/2018 03-May-18	ID-HIN1273 SWA 2018/2019 24-Oct-18	QLD Government HIN1306 SWA 2018/2019 18-Feb-19	QLD Government HIN1092 SWA 2018/2019 13-Mar-19	QLD Government HIN1360 SWA 2019/2020 30-Jan-20	QLD Government HIN1361 SWA 2019/2020 30-Jan-20	QLD Government HIN1368 SWA 2019/2020 10-Mar-20	QLD Government HIN1369 SWA 2019/2020 10-Mar-20	QLD Government HIN1370 SWA 2019/2020 10-Mar-20	QLD Government ID-HIN1374 SWA 2019/2020 25-Mar-20	QLD Government ID:HIN1384 SWA 2019/2020 15-Apr-20	QLD Government ID:HIN1392 SWA 2019/2020 07-May-20	QLD Government HIN1390 SWA 2019/2020 30-Apr-20	QLD Government HIN1391 SWA 2019/2020 30-Apr-20
Scheme Component:	R	SP51 - Bullock Paddock Road	SP17 - 2 Sardine Street	SP30 - Halifax Water Tower	SP01 - Bemerside Hurley's	SP14 - Dungeness	SP12 - End of Patterson Parade	SP16 - End of John Dory Street	SP28 - Washaway Booster Pump Station	SP17 - 2 Sardine Street	SP14 - Dungeness	SP30 - Halifax Water Tower	SP52 - Neames Inlet Road	SP00 - Carr Crescent	SP12 - End of Patterson Parade	SP16 - End of John Dory Street
PARAMETER	**UNITS**															
Conductivity @ 25° C	us/cm	248	209	218	320	276	256	192	186	196	204	203	240	216	221	193
pH @ 21° C		7.62	7.52	6.65	7.38	7.58	7.31	7.55	7.11	7.26	7.07	7.08	6.74	7.11	8.5	7.41
Total Hardness CaCO3/L	mg	47	39	31	47	36	39	41	37	41	34	34	34	36	43	40
Temp Hardness CaCO3/L	mg	46	39	31	43	35	39	41	37	41	34	34	29	36	43	40
Alkalinity CaCO3/L	mg	46	44	35	43	35	39	49	46	54	37	37	29	39	46	50
Residual Alkalinity	meq/L	0	0.1	0.1	0	0	0	0.2	0.2	0.3	0.1	0.1	0	0.1	0.1	0.2
Silica	mg/L	39	42	36	38	39	38	42	44	44	41	41	38	41	41	44
Total Dissolved Ions	mg/L	163	139	137	196	167	163	137	132	145	135	136	151	142	150	138
Total Dissolved Solids	mg/L	174	155	151	208	185	176	148	148	155	153	154	171	159	163	151
Colour	HAZEN	<1	<1	4	3	1	1	<1	1	<1	2	2	10	<1	1	<1
Turbidity	NTU	<1	<1	<1	<1	<1	1	<1	<1	<1	1	1	1	2	<1	<1
pH SAT* (calc for CaCO3)		8.5	8.7	9	8.6	8.9	8.8	8.6	8.8	8.6	8.9	8.9	9	8.8	8.6	8.6
Saturation Index		-0.09	-1.2	-2.4	-1.2	-1.3	-1.5	-1.1	-1.7	-1.3	-1.8	-1.9	-2.3	-1.7	-0.1	-1.2
Mole Ratio		2.6	2.6	3.8	3.1	2.9	3	2.4	2.9	2.7	3.2	3.2	3.7	3.2	1.7	2.6
Sodium Adsorption Ratio		1.9	1.8	2.3	2.7	2.8	2.5	1.5	1.6	1.6	2	1.9	2.4	1.9	1.7	1.5
Figure Of Merit Ratio		0.7	0.7	0.5	0.5	0.4	0.5	0.8	0.8	0.8	0.6	0.6	0.5	0.6	0.8	0.8
CATIONS																
Sodium	mg/L	29	26	29	42	38	35	23	23	23	26	26	32	26	26	22
Potassium	mg/L	2	1.2	2	2.6	2.4	2	1.1	1.1	1.1	1.7	1.5	2.2	1.6	1.7	1
Calcium	mg/L	18	12	7.1	17	10	12	13	10	13	9.4	8.7	8.7	11	16	14
Magnesium	mg/L	0.2	2.1	3.2	1.1	2.6	2.3	2	2.9	2	2.5	3.1	3.1	2.1	0.82	1.4
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	56	53	43	53	42	48	60	59	65	45	46	36	47	55	61
Carbonate	mg/L	0.1	0.1	0	0.1	0.1	0.1	0.1	0	0.1	0	0	0	0	0.9	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	28	24	33	50	43	38	19	19	19	26	26	36	26	25	19
Fluoride	mg/L	0.07	0.07	0.07	0.07	0.07	0.06	0.08	0.06	0.08	0.06	0.06	0.06	0.07	0.06	0.06
Nitrate as NO3	mg/L	17	14	9.9	13	14	12	14	15	15	13	14	16	15	15	13
Sulphate	mg/L	12	7	10	13	15	14	5	5.8	6	12	11	17	12	11	6.2
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	0.01	0.02	<0.01	0.02	0.02	0.03	0.02	0.01	<0.01	<0.01	0.01	0.01	<0.01
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001
Zinc	mg/L	<0.01	<0.01	0.02	<0.01	<0.01	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Boron	mg/L	0.04	<0.02	0.04	0.07	0.06	0.03	<0.02	<0.02	<0.02	0.03	0.02	0.04	0.03	0.03	<0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	0.003	<0.003	<0.003	0.007	<0.003	<0.003	0.005	<0.003	<0.003	<0.003

SCHEME 2 LOWER HERBERT WATER SUPPLY RETICULATION		QLD Government ID-HIN1400 SWA 2020/2021 ~~16-Jul-20~~	QLD Government HIN1401 SWA 2020/2021 ~~16-Jul-20~~	QLD Government ID-HIN1412 SWA 2020/2021 ~~24-Sep-20~~	QLD Government ID-HIN1419 SWA 2020/2021 ~~10-Nov-20~~	QLD Government ID-HIN1414 SWA 2020/2021 ~~04-Nov-20~~
Scheme Component:	R	**SP52 - Neames Inlet Road**	**SP40 - Cordelia School Road**	**SP30 - Halifax Water Tower**	**SP31 - Halifax Depot**	**SP01 - Bemerside Hurley's**
PARAMETER	**UNITS**					
Conductivity @ 25' C	us/cm	199	182	202	183	270
pH @ 21' C		7.03	7.42	.6.78	6.68	6.58
Total Hardness CaC03/L	mg	31	38	33	36	39
Temp Hardness CaC03/L	mg	27	38	33	36	36
Alkalinity CaC03/L	mg	27	47	37	46	36
Residual Alkalinity	meq/L	0	0.2	0.1	0.2	0
Silica	mg/L	38	44	41	44	40
Total Dissolved Ions	mg/L	128	131	133	131	171
Total Dissolved Solids	mg/L	149	145	152	146	188
Colour	HAZEN	<1	<1	<7	<7	<7
Turbidity	NTU	1	<1	1	<1	1
pH SAT* (calc for CaC03)		9.1	8.7	8.9	8.8	8.7
Saturation Index		-2	-1.3	-2.2	-2.2	-2.2
Mole Ratio		3.4	2.6	3.5	3.3	3.8
Sodium Adsorption Ratio		2	1.5	1.9	1.7	2.6
Figure Of Merit Ratio		0.6	0.8	0.6	0.7	0.5
CATIONS						
Sodium	mg/L	25	21	25	23	37
Potassium	mg/L	1.8	1	1.5	1.1	2.3
Calcium	mg/L	8.4	12	8.2	8.8	14
Magnesium	mg/L	2.5	2	3.1	3.4	0.98
Hydrogen	mg/L	0	0	0	0	0
ANIONS						
Bicarbonate	mg/L	33	58	45	56	44
Carbonate	mg/L	0	0.1	0	0	0
Hydroxide	mg/L	0	0	0	0	0
Chloride	mg/L	25	17	24	19	40
Fluoride	mg/L	.0.05	0.06	0.05	0.05	0.06
Nitrate as NO3	mg/L	15	14	14	14	14
Sulphate	mg/L	16	5.8	11	6.1	18
OTHER DISSOLVED ELEMENTS						
Iron	mg/L	<0.01	<0.01	0.01	0.01	0.02
Manganese	mg/L	<0.001	<0.001	<0.001	<0.001	0.001
Zinc	mg/L	<0.06	<0.06	<0.06	<0.06	<0.06
Aluminium	mg/L	<0.06	<0.03	<0.03	<0.03	<0.03
Boron	mg/L	0.04	<0.02	0.03	<0.02	0.05
Copper	mg/L	<0.003	0.004	<0.003	0.11	0.004

HINCHINBROOK SHIRE COUNCIL

SCHEME 3
FORREST BEACH WATER SUPPLY
RAW WATER

Scheme Component: SW

METHOD	PARAMETER	UNITS	HEALTH	AESTHETIC													
				LABORATORY NAME	W2360	W2364	W985	W989	W990								
				REPORT #	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
				TYPE	1982/1983	1982/1983	1984/1985	1984/1985	1984/1985	1988/1989	1988/1989	1988/1989	1988/1989	1988/1989	1988/1989	1988/1989	1989/1990
				FINANCIAL YEAR	01-Jun-83	01-Jun-83	27-Nov-84	27-Nov-84	27-Nov-84	15-Sep-88	23-Feb-89	15-Mar-89	17-Mar-89	17-Apr-89	20-Apr-89	26-Apr-89	01-Nov-89
				SAMPLE DATE	SP75 - Well 1	SP76 - Well 2	SP75 - Well 1	SP76 - Well 2	SP77 - Well 3	SP59 - Combined Bores	SP59 - Combined Bores	SP59 - Combined Bores	SP59 - Combined Bores	SP59 - Combined Bores	SP59 - Combined Bores	SP59 - Combined Bores	SP78 - Bore 4
				SAMPLE LOCATION													
18320	Conductivity @ 25° C	us/cm			80	150	105	125	180	250	230	250	150	230	0.222	220	
18226	pH @ 21° C			6.5-8.5	6.6	6.5	6	5.9	5.75	5.3	4.2	4.7	6.1	5.3	5.58	5.3	
18209	Total Hardness CaCO3/L	mg		200	10	29	8	19	34	125	58	77	24.5	70		78	
18209	Temp Hardness CaCO3/L	mg															
18208	Alkalinity CaCO3/L	mg			20	18	23	18	18.5				15.5				
18209	Residual Alkalinity	meq/L											0				
18195	Silica	mg/L			30	36	29	33	34				31				
18209	Total Dissolved Ions	mg/L		500	56	89	66	77	110				87				
18209	Total Dissolved Solids	mg/L			73	110	81	98	130	175	160	175	110	160		150	
18206	Colour	HAZEN		15	<5	<5	5	<5	10				<1				
18212	Turbidity	NTU		5	5	15	20	10	50				10				
18209	pH SAT* (calc for CaCO3)																
18209	Saturation Index												-3.4				
18209	Mole Ratio												4.3				
18209	Sodium Adsorption Ratio				1.5	1.2	2.4	1.7	1.5				1.5				
18209	Figure Of Merit Ratio												0.7				
	CATIONS																
18195	Sodium	mg/L		180	11	15	16	16.5	19.5	24	22	20	17	18	21.7	20	
18195	Potassium	mg/L			1.8	1.9	1.7	1.9	2.4	3.5	3.5	3.4	2.3	2.9	2	3.1	
18195	Calcium	mg/L			2.3	6.2	1.8	4.3	7.3	29	13	13	5.2	11	3.5	11.7	
18195	Magnesium	mg/L			1.1	3.2	0.9	2	3.8	6.7	6	6	2.8	5.1	1.5	5.6	
18209	Hydrogen	mg/L			0	0	0	0	0				0				
	ANIONS																
18209	Bicarbonate	mg/L			24.5	22	28	22	22.5			10	19	13			
18209	Carbonate	mg/L			0	0	0	0	0	0		0	0				
18209	Hydroxide	mg/L			0	0	0	0	0	0		0	0				
18204	Chloride	mg/L		250	9	12	11	12.5	13.5				14		1.5		
18204	Fluoride	mg/L	1.5		0.1	0.1	0.1	<0.1	<0.1				<0.1				
18204	Nitrate as NO3	mg/L	50														
18204	Sulphate	mg/L	500	250	3	27		17.5	38				20.5		6		
	OTHER DISSOLVED ELEMENTS																
18195	Iron	mg/L		0.3	<0.05	<0.05	0.12	0.15	0.06	14.5	<0.05	10.3	<0.02	12.1	0.69	13.5	10.59
18195	Manganese	mg/L	0.5	0.1	0.33	0.04	0.08	0.03	0.05	0.37	0.36	0.24	0.04	0.25	3.3	0.27	1.05
18195	Zinc	mg/L		3	<0.01	0.03	0.01	0.03	0.22				0.07		0.33		1.03
18195	Aluminium	mg/L		0.2									<0.05				
18195	Boron	mg/L	4										<0.1				
18195	Copper	mg/L	2	1									<0.05		0.04		

SCHEME 3 FORREST BEACH WATER SUPPLY RAW WATER Scheme Component:		SWA 1989/1990 01-Nov-89 SW SP75 - Well 1	SWA 1989/1990 01-Nov-89 SP79 - Well 5	SWA 1989/1990 01-Nov-89 SP80 - Bore 6	SWA 1989/1990 01-Nov-89 SP76 - Well 2	ID_HIN43a SWA 1999/2000 05-Nov-99 SP59 - Combined Bores	ID-HIN43b SWA 1999/2000 05-Nov-99 SP59 - Combined Bores	SWA 1999/2000 23-Feb-00 SP59 - Combined Bores	ID-HIN044 SWA 1999/2000 21-Jun-00 SP59 - Combined Bores	ID-HIN063 SWA 2000/2001 02-Feb-01 SP59 - Combined Bores	ID-HIN077 SWA 2001/2002 20-Jun-01 SP59 - Combined Bores	SWA 2001/2001 23-Jan-02 SP80 - Bore 6	ID-HIN095 SWA 2001/2002 24-Jan-02 SP80 - Bore 6	ID-HIN096 SWA 2001/2002 13-Feb-02 SP59 - Combined Bores	SWA ID_HIN102 2001/2002 06-Mar-02 SP80 - Bore 6	ID_HIN103 SWA 2001/2002 06-Mar-02 SP59 - Combined Bores
PARAMETER	UNITS															
Conductivity @ 25' C	us/cm					147	147	124	161	132	132	6.12	6.12	138	6.05	110
pH @ 21' C						6.05	7.29	6.1	5.82	5.89	6.26			6.92		6.35
Total Hardness CaCO3/L	mg					17.1	25.5	18.7	17.3	19	13.4		12.7	19.5	12	12
Temp Hardness CaC03/L	mg															
Alkalinity CaCO3/L	mg					10	32	17	18	23	30	19.8	19.8	26.6	14	13.5
Residual Alkalinity	meq/L					-0.1	0.2	0	0.1	0.2	0.4		0.2	0.2	0	0
Silica	mg/L						0	36	44	27	35	29	29.2	0	31	30
Total Dissolved Ions	mg/L														67	67
Total Dissolved Solids	mg/L					88	79	77	91	73	67		73	74	89	89
Colour	HAZEN						15	46	60		42	45	45	15	<1	<1
Turbidity	NTU						5	17.6	1.2		16	17.1	17.1	5	24	26
pH SAT* (calc for CaCO3)																
Saturation Index															-3.8	-3.6
Mole Ratio															4.3	4
Sodium Adsorption Ratio						2.1	1.6	1.9	2.2	1.6	2		2.2	1.6	2	2
Figure Of Merit Ratio															0.4	0.4
CATIONS																
Sodium	mg/L					19.8	18	19	20.9	15.8	16.7		18.1	16.1	15.5	15.5
Potassium	mg/L					2.5	2.4	2.3	2.4	2.4	1.9		2.25	2.08	1.8	1.7
Calcium	mg/L					3.7	6.4	3.7	3.3	4.3	2.9		2.67	5.44	2.5	2.5
Magnesium	mg/L					1.9	2.3	2.3	2.2	2	1.5		1.46	1.43	1.4	1.4
Hydrogen	mg/L														0	0
ANIONS																
Bicarbonate	mg/L					12.4	38.6	20.7	22.3	27.8	36	24.2	24.1	32.5	17	16.5
Carbonate	mg/L					0	0	0	0	0	0		0	0	0	0
Hydroxide	mg/L					0	0	0	0	0	0		0	0	0	0
Chloride	mg/L					15.3	13.3	22	25	14	13		12.8	12.3	11	11
Fluoride	mg/L					0.08	0.07	0.04	0.07	0.35	0.14		0.15	0.07	<0.1	<0.1
Nitrate as NO3	mg/L														1.6	1.5
Sulphate	mg/L					35.2	12	13	20	17	7		18.4	15.5	16	16.5
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	1.92	1.86	0.42	2.88	1.5	0.18	1.2	2.2	0.11	1.21		2.29	0.38	<0.01	<0.01
Manganese	mg/L	0.38		0.91	0.65	0.02	0.01	0.02	0.02	0.02	0.03		0.03	0.01	0.03	0.03
Zinc	mg/L	0.16	0.46	0.22	0.5	0	0	0	0.01	0.01	0.02		0.03	0	0.09	0.08
Aluminium	mg/L					0.01	0.01	0.07	0.49	0	0		0	0	<0.05	<0.05
Boron	mg/L														0.03	0.03
Copper	mg/L		2.31			0	0	0	0	0.01	0		0	0	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RAW WATER Scheme Component:		ID_HIN118 SWA 2002/2003 16-Jul-02 SP80 - Bore 6	ID-HIN119 SWA 2002/2003 16-Jul-02 SP59 - Combined Bores	ID-HIN114 SWA 2002/2003 16-Jul-02 SP75 - Well 1	ID-HIN115 SWA 2002/2003 16-Jul-02 SP76 - Well 2	ID-HIN116 SWA 2002/2003 16-Jul-02 SP77 - Well 3	ID-HIN117 SWA 2002/2003 17-Jul-02 SP78 - Bore 4	ID-HIN140 SWA 2002/2003 11-Sep-02 SP81 - Bore 7	ID_HIN190 SWA 2002/2003 05-Mar-03 SP80 - Bore 6	ID-HIN189 SWA 2002/2003 05-Mar-03 SP59 - Combined Bores	ID-HIN188 SWA 2002/2003 05-Mar-03 SP81 - Bore 7	ID_HIN206 SWA 2002/2003 28-May-03 SP80 - Bore 6	ID-HIN201 SWA 2002/2003 28-May-03 SP81 - Bore 7	ID:HIN205 SWA 2002/2003 28-May-03 SP59 - Combined Bores	ID:HIN203 SWA 2002/2003 02-Jun-03 SP76 - Well 2	ID:HIN207 SWA 2002/2003 02-Jun-03 SP75 - Well 1
PARAMETER	**UNITS**															
Conductivity @ 25' C	us/cm	6.05	120	125	165	115	135	6.35	6.25	130	6	6.15	125	135	180	125
pH @ 21' C			6.4	6.35	6.15	6.4	6.35	165		6.15	125		6	6.25	6.2	6.55
Total Hardness CaCO3/L	mg	12	16.5	22.5	28.5	19.5	18.5	13.5	23	16	11.5	16	10.5	15.5	33	23.5
Temp Hardness CaC03/L	mg						18.5									
Alkalinity CaCO3/L	mg	15	20.5		22	24	20.5	26	28	20	16	22.5	14.5	20.5	23.5	32
Residual Alkalinity	meq/L	0.1	0.1	0.2	0	0.1	0	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0	0.2
Silica	mg/L	38	33	31	37	28	35	40	39	34	36	45	40	39	43	32
Total Dissolved Ions	mg/L	72	74	84	100	73	82	100	100	83	77	100	76	86	110	89
Total Dissolved Solids	mg/L	100	94	95	120	86	100	120	130	100	100	130	110	110	140	100
Colour	HAZEN	5	10	7	10	12	4	4	<1	<1	<1	<1	<1	<1	<1	<1
Turbidity	NTU	22	13	3	13	2	21	36	31	19	11	44	16	33	29	3
pH SAT* (calc for CaCO3)																
Saturation Index		-3.8	-3.1	-2.9	-3.2	-3	-3.2	-3.2	-3	-3.5	-3.9	-3.4	-3.9	-3.3	-3	-2.7
Mole Ratio		4.3	3.8	3.7	4.1	3.7	3.9	3.9	3.9	4.1	4.3	4.2	4.4	4	4.1	3.5
Sodium Adsorption Ratio		1.9	1.5	1.1	1.4	1.2	1.6	2.8	1.8	1.9	2.4	2.4	2.3	1.9	1.5	1.2
Figure Of Merit Ratio		0.4	0.6	0.8	0.8	0.7	0.5	0.3		0.4	0.3	0.3	0.3	0.4	0.8	0.8
CATIONS																
Sodium	mg/L	15	13.5	12.5	16.5	12	16	24	20	18	18.5	22	17	17	19.5	14
Potassium	mg/L	2.2	2.2	2.6	2.2	2.3	1.8	2.8	5.3	2.6	2.5	2.7	2.4	2.5	2.4	2.6
Calcium	mg/L	2.7	3.6	4.9	6	4.2	4	2.7	5.9	3.4	2.4	3.5	2.1	3.4	6.7	5.1
Magnesium	mg/L	1.3	1.8	2.5	3.3	2.2	2.1	1.7	2	1.8	1.3	1.7	1.3	1.8	4	2.7
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	18.5	25	38.5	27	29.5	25	32	34	24	19.5	27.5	17.5	25.5	28.5	39
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	12	11.5	13.5	14.5	10.5	14	17.5	16.5	13.5	13	17.5	13	14	18	12.5
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	<0.5	2.1	3.4	2	4.3	<0.5	<0.5	<0.5	1.4	<0.5	<0.5	<0.5	1.7	0.6	7
Sulphate	mg/L	20.5	14	6.4	28	8.5	19.5	19	21	18.5	19.5	26.5	21.5	20	34.5	6.1
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	0.01	0.01	0.01	<0.01
Manganese	mg/L	0.03	0.08	1.2	0.06	<0.03	0.06	0.1	0.28	0.05	0.03	0.06	0.03	0.05	0.07	0.09
Zinc	mg/L	0.03	0.03	0.01	0.02	0.02	0.02	0.04	0.05	0.03	0.05	0.01	0.04	0.01	0.02	0.04
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.04	0.07		0.05	0.04	0.05	0.05	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	<0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RAW WATER Scheme Component:	SW	ID-HIN209 SWA 2002/2003 02-Jun-03 SP78 - Bore 4	ID:HIN208 SWA 2002/2003 02-Jun-03 SP77 - Well 3	ID:HIN251 SWA 2003/2004 27-Oct-03 SP59 - Combined Bores	ID:HIN259 SWA 2003/2004 20-Nov-03 SP59 - Combined Bores	ID-HIN269 SWA 2003/2004 22-Dec-03 SP59 - Combined Bores	ID-HIN278 SWA 2003/2004 17-Feb-04 SP59 - Combined Bores	ID-HIN281 SWA 2003/2004 20-May-04 SP59 - Combined Bores	ID-HIN298 SWA 2003/2004 15-Jun-04 SP59 - Combined Bores	ID-HIN302 SWA 2004/2005 07-Jul-04 SP59 - Combined Bores	ID:HIN312 SWA 2003/2004 26-Oct-04 SP59 - Combined Bores	ID-HIN328 SWA 2004/2005 09-Nov-04 SP81 - Bore 7	ID-HIN326 SWA 2004/2005 09-Nov-04 SP78 - Bore 4	ID:HIN325 SWA 2004/2005 09-Nov-04 SP77 - Well 3	ID_HIN327 SWA 2004/2005 09-Nov-04 SP80 - Bore 6	ID:HIN337 SWA 2004/2005 09-Dec-04 SP59 - Combined Bores
PARAMETER	**UNITS**															
Conductivity @ 25' C	us/cm	160	130	140	155	160	245	220	195	190	220	5.65	203	150	4.04	241
pH @ 21' C		6.05	6.6	6.25	6.2	6.2	5.05	6	5.85	5.9	6.05	189	5.94	6.45		5.97
Total Hardness CaCO3/L	mg	25	23.5	16	22.5	20.5	43	26.5	30	29.5	38	22	35	25	40	31
Temp Hardness CaC03/L	mg	18.5											19			
Alkalinity CaCO3/L	mg	18.5	33.5	15	22	15	2.4	18.5	11	12.5	19.5	12	19	34	<2	14
Residual Alkalinity	meq/L	0	0.2	0	0	0	0	0	0	0	0	0	0	0.2	0	0
Silica	mg/L	40	33	34	35	39	38	38	42	41	42	38	40	30	33	39
Total Dissolved Ions	mg/L	100	91	81	96	91	130	130	110	110	130	109	119	97	124	141
Total Dissolved Solids	mg/L	130	100	110	120	120	170	150	140	140	160	140	147	106	158	171
Colour	HAZEN	1	<1	<1	<1	<1	<1	1	3	<1	1	1	1	1	1	3
Turbidity	NTU	8	2	17	21	21	55	35	37	28	29	29	10	2	78	53
pH SAT* (calc for CaCO3)																
Saturation Index		-3.4	-2.6	-3.5	-3.2	-3.4	-5	-3.4	-3.7	-3.6		-4	-3.3	-2.7	-5.8	-3.5
Mole Ratio		4.4	3.4	4.2	4.1	4.1	6.1	4.6	4.7	4.6		4.9	4.5	3.6	>10	4.7
Sodium Adsorption Ratio		1.8	1.3	2	1.6	1.9	1.6	2.3	1.5	1.7	1.6	2.1	1.6	1.4	1.4	2.3
Figure Of Merit Ratio		0.6	0.8	0.4	0.6	0.5	0.9	0.4	0.7	0.7	0.8	0.4	0.7	0.7	0.9	0.5
CATIONS																
Sodium	mg/L	20.5	14.5	18.5	18	20	23.5	27.5	19	20.5	23	23	21	16	21	30
Potassium	mg/L	2.3	2.7	2.7	2.7	3	4.2	3.2	3.5	3.1	3.2	3.2	2.5	3	3.4	3.5
Calcium	mg/L	5.5	5	3.3	5	4.3	9.2	5.7	6.6	6.5	9.2	4.7	7.7	5.1	9.3	6.9
Magnesium	mg/L	2.7	2.7	1.8	2.5	2.3	4.9	3	3.4	3.2	3.6	2.4	3.8	3	4	3.5
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	22.5	40.5	18	27	18	3.5	22.5	14	15.5	23.5	15	24	41	<2	17
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	18	13	13.5	15.5	13	14	26	16.5	16.5	17.5	16	19	15	14	23
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	<0.5	6	1.6	1.5	0.7	0.5	0.9	1	1.5	0.8	<0.5	<0.5	9.1	<0.5	1.1
Sulphate	mg/L	30.5	6.5	20.5	24.5	29.5	75	36.5	45	43.5	50	45	41	5.1	73	57
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Manganese	mg/L	0.06	0.08	0.03	0.03	0.04	0.1	0.05	0.07	0.06	0.08	0.06	0.09	<0.03	0.13	0.07
Zinc	mg/L	0.02	0.02	0.01	0.01	0.03	0.18	0.03	0.04	0.06	0.04	0.03	0.01	<0.01	0.03	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	<0.02	<0.02	<0.02	0.02	<0.02	0.32	0.11	0.05	0.07	0.04	0.04	0.02	0.02	0.02	0.08
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RAW WATER Scheme Component:	SW	ID_HIN335 SWA 2004/2005 09-Dec-04 SP80 - Bore 6	ID:HIN347 SWA 2004/2005 12-Jan-05 SP77 - Well 3	ID_HIN345 SWA 2004/2005 12-Jan-05 SP80 - Bore 6	ID-HIN346 SWA 2004/2005 12-Jan-05 SP78 - Bore 4	ID-HIN344 SWA 2004/2005 12-Jan-05 SP81 - Bore 7	ID_HIN359 SWA 2004/2005 24-Feb-05 SP80 - Bore 6	ID:HIN357 SWA 2004/2005 24-Feb-05 SP77 - Well 3	ID:HIN356 SWA 2004/2005 24-Feb-05 SP76 - Well 2	ID-HIN360 SWA 2004/2005 24-Feb-05 SP81 - Bore 7	ID-HIN346 SWA 2004/2005 28-Feb-05 SP78 - Bore 4	ID:HIN361 SWA 2004/2005 28-Feb-05 SP59 - Combined Bores	HIN389 SWA 2004/2005 09-Jun-05 SP80 - Bore 6	ID:HIN 388 SWA 2004/2005 09-Jun-05 SP59 - Combined Bores	ID:HIN399 SWA 2005/2006 03-Aug-05 SP59 - Combined Bores	HIN406 SWA 2005/2006 25-Aug-05 SP80 - Bore 6
PARAMETER	**UNITS**															
Conductivity @ 25' C	us/cm	4.92	145	4.75	204	5.52	5.09	142	219	5.93	195	239	6.05	178	188	5.49
pH @ 21' C			6.42		5.86	199		6.77	6.46	182	6.13	6.96		5.79	5.72	
Total Hardness CaCO3/L	mg	34	25	39	35	24	37	26	38	21	32	46	43	26	25	68
Temp Hardness CaC03/L	mg				21						20					
Alkalinity CaCO3/L	mg	2	33	2	21	10	4	41	28	12	20	26	24	12	12	10
Residual Alkalinity	meq/L	0	0.2	0	0	0	0	0.3	0	0	0	0	0	0	0	0
Silica	mg/L	42	31	42	41	39	40	30	40	40	40	39	41	39	40	43
Total Dissolved Ions	mg/L	115	94	134	121	113	117	99	139	106	118	148	179	105	103	244
Total Dissolved Solids	mg/L	155	104	174	149	146	155	104	162	138	145	170	205	137	135	281
Colour	HAZEN	2	4	<1	3	<1	<1	1	<1	<1	<1	2	<1	<1	7	6
Turbidity	NTU	44	12	77	10	29	65	16	18	26	9	5	79	21	27	94
pH SAT* (calc for CaCO3)																
Saturation Index		-5.2	-2.8	-5.3	-3.4	-4.2	-4.8	-2.2	-2.6	-3.8	-3.2	-2	-3.1	-3.8	-3.9	-3.8
Mole Ratio		6.2	3.6	6.4	4.5	5.1	5.9	3.1	3.8	4.6	4.3	3.4	4.2	4.8	4.8	5
Sodium Adsorption Ratio		1.6	1.3	1.8	1.6	2.1	1.4	1.3	1.7	2.1	1.7	1.5	2.2	1.7	1.8	2.2
Figure Of Merit Ratio		0.8	0.7	0.7	0.8	0.5	0.8	0.8	0.7	0	0.7	0.9	0.6	0.6	0.6	0.7
CATIONS																
Sodium	mg/L	21	15	25	21	24	20	15	25	22	22	24	33	20	20	42
Potassium	mg/L	3.4	2.9	3.8	2.5	3.3	3.3	2.9	2.8	3.1	2.4	2.9	4.7	2.9	2.8	5.9
Calcium	mg/L	7.5	5.1	8.5	7.7	5.2	7.9	6.3	7.9	4.4	6.8	12	8.8	5.6	5.4	14
Magnesium	mg/L	3.7	2.9	4.3	3.9	2.7	4.1	2.5	4.3	2.4	3.7	3.9	5	2.8	2.8	7.7
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	3	41	4	26	13	5	50	34	15	25	32	29	15	15	12
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	14	14	16	19	18	15	12	20	18	19	22	17	18	18	14
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	<0.5	8.8	<0.5	<0.5	<0.5	1.9	6	2.4	0.8	<0.5	1.3	<0.5	<0.5	1.5	<0.5
Sulphate	mg/L	63	4.2	72	40	48	60	4.1	42	40	40	50	81	41	37	148
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	4.1
Manganese	mg/L	0.1	<0.03	0.13	0.07	0.06	0.1	<0.03	0.05	0.05	0.06	<0.03	0.1	0.06	0.06	0.25
Zinc	mg/L	0.07	<0.01	0.04	0.03	0.04	0.04	0.01	0.03	0.03	0.02	<0.01	0.01	0.03	0.04	0.05
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.04	0.03	0.06	0.03	0.06	0.04	0.04	0.05	0.06	0.03	0.03	0.06	0.04	0.04	0.07
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RAW WATER Scheme Component:		ID-HIN407 SWA 2004/2005 26-Oct-05 SP81 - Bore 7	ID-HIN408 SWA 2005/2006 26-Oct-05 Bore 8	ID-HIN425 SWA 2005/2006 10-Apr-06 Bore 8	HIN426 SWA 2005/2006 10-Apr-06 SP80 - Bore 6	ID-HIN459 SWA 2006/2007 04-May-07 SP81 - Bore 7	ID-HIN458 SWA 2006/2007 04-May-07 SP78 - Bore 4	ID-HIN SWA 2006/2007 05-May-07 SP78 - Bore 4	ID-HIN471 SWA 2007/2008 28-Jul-07 SP81 - Bore 7	ID-HIN495 SWA 2007/2008 02-Nov-07 SP78 - Bore 4	HIN496 SWA 2007/2008 07-Nov-07 SP80 - Bore 6	ID-HIN497 SWA 2007/2008 07-Nov-07 SP81 - Bore 7	ID-HIN511 SWA 2007/2008 29-Feb-08 SP81 - Bore 7	ID:HIN517 SWA 2007/2008 22-Apr-08 SP59 - Combined Bores	ID:HIN621 SWA 2008/2009 24-Oct-08 SP59 - Combined Bores	ID:HIN679 SWA 2009/2010 31-Jul-09 SP59 - Combined Bores
PARAMETER	UNITS															
Conductivity @ 25' C	us/cm	5.73	3.48	3.58	5.17	5.83	240	234	5.82	212	3.35	5.84	8.89	305	183	187
pH @ 21' C		173	435	365		171	5.93	5.98	171	6.11		166	221	3.98	6.18	5.99
Total Hardness CaCO3/L	mg	22	59	47	52	19	16	18	13	36	70	18	39	47	16	28
Temp Hardness CaC03/L	mg						16	18		23						
Alkalinity CaCO3/L	mg	10	<2	<2	5	13	16	18	13	23	<2	14	34	<2	16	19
Residual Alkalinity	meq/L	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Silica	mg/L	38	43	46	42	36	38	39	37	36	42	34	33	39	35	38
Total Dissolved Ions	mg/L	99	192	157	177	100	137	132	96	128	228	100	136	142	108	113
Total Dissolved Solids	mg/L	130	235	203	216	128	166	160	125	150	271	125	150	181	132	139
Colour	HAZEN	3	3	1	2	<1	<1	1	<1	4	3	4	2	3	4	9
Turbidity	NTU	26	64	55	215	21	15	7	30	8	80	20	2	91	17	18
pH SAT* (calc for CaCO3)																
Saturation Index		-4	-5.6	-5.7	-4.6	-3.9	-3.3	-3.3	-3.9	-3.1	-5.6	-3.9	0.1	-5.8	-3.3	-3.4
Mole Ratio		4.8	>10	>10	5.7	4.7	4.7	4.6	4.7	4.3	>10	4.6	1.4	>10	4.3	4.5
Sodium Adsorption Ratio		1.8	1.6	1.5	1.9	2.2	1.6	1.6	2.1	1.7	1.7	2.2	1.7	1.5	1.8	1.8
Figure Of Merit Ratio		0.5	1	0.9	0.8	0.4	0.8	0.8	0.4	0.7	1	0.4	0.7	0.9	0.6	0.6
CATIONS																
Sodium	mg/L	20	28	24	32	22	1.6	24	21	24	32	21	24	24	21	22
Potassium	mg/L	2.8	5.4	4.9	5.3	2.8	3	2.9	2.8	2.8	6.4	2.7	2.5	4.5	2.8	3.1
Calcium	mg/L	4.8	12	9.9	10	4.2	9.4	8.7	4.1	7.6	14	3.9	14	9.9	5.4	6
Magnesium	mg/L	2.5	7	5.4	6.5	2.2	5.1	4.8	2.2	4.2	8.3	2.1	0.8	5.3	2.9	3.2
Hydrogen	mg/L	0	0.3	0.3	0	0	0	0	0	0	0.4	0	0	0	0	0
ANIONS																
Bicarbonate	mg/L	13	<2	<2	6	16	19	22	16	28	<2	17	38	<2	20	23
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0	0	1.5	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0	0.1	0	0	0
Chloride	mg/L	16	15	16	17	17	25	24	16	22	16	17	25	16	19	20
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.1	<0.1	<0.1	<0.1	0.06	<0.1	0.05	<0.1
Nitrate as NO3	mg/L	0.7	<0.5	1	<0.5	1	1.3	0.8	1.6	0.7	<0.5	1.9	1.1	0.6	1.1	1.2
Sulphate	mg/L	39	124	96	100	35	49	46	33	39	151	34	28	82	35	34
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	0.16	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.17	<0.01	0.11	<0.01	<0.01	<0.01
Manganese	mg/L	0.06	0.25	0.21	0.19	0.06	0.1	0.09	0.06	0.08	0.28	0.06	<0.01	0.18	0.08	0.07
Zinc	mg/L	0.04	0.01	0.1	0.05	0.03	0.03	0.02	0.03	0.04	0.12	0.1	<0.01	0.11	0.05	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05	<0.05
Boron	mg/L	0.04	0.03	0.11	0.07	0.04	0.03	0.02	0.03	0.04	0.15	0.09	0.03	0.08	0.04	0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RAW WATER Scheme Component:		ID-HIN683 SWA 2009/2010 13-Aug-09 SW SP78 - Bore 4	ID-HIN684 SWA 2009/2010 13-Aug-09 SP81 - Bore 7	JX/0612 SWA 2009/2010 14-Sep-09 SP80 - Bore 6	JX/0612 SWA 2009/2010 14-Sep-09 SP76 - Well 2	JX/0612 SWA 2009/2010 14-Sep-09 SP75 - Well 1	JX/0612 SWA 2009/2010 14-Sep-09 SP77 - Well 3	ID:HIN712 SWA 2009/2010 03-Dec-09 SP77 - Well 3	ID:HIN713 SWA 2009/2010 03-Dec-09 SP76 - Well 2	ID:HIN803 SWA 2011/2012 19-Jan-12 SP59 - Combined Bores	ID:HIN803 SWA 2012/2013 30-Aug-12 SP59 - Combined Bores	ID:HIN855 SWA 2012/2013 27-Nov-12 SP59 - Combined Bores	ID-HIN861 Pest/Herb 2012/2013 29-Nov-12 SP59 - Combined Bores	QLD Government HIN904 SWA 2013/2014 20-Nov-13 SP59 - Combined Bores	QLD Government HIN980 Blue Green Algae Count 2014/2015 03-Dec-14 SP59 - Combined Bores	QLD Government HIN1122 SWA 2016/17 04-Oct-16 SP86 - Bore 8
PARAMETER	**UNITS**															
Conductivity @ 25' C	us/cm	216	6.01	5.96	209	159	135	154	119	137	151	140		121		134
pH @ 21' C		6.18	156		6.05	6.57	6.15	6.83	6.5	6.58	6.57	6.61		6.89		6.13
Total Hardness CaCO3/L	mg	34	17	17.5	20.3	16.1	12.2	27	19	19	22	18		15		11
Temp Hardness CaC03/L	mg	22												15		11
Alkalinity CaCO3/L	mg	22	15	27	32	50	41	34	28	24	33	26		22		26
Residual Alkalinity	meq/L	0	0	-0.026	0	0.3	2.6	0.2	0.2	0.1	0.2	0.1		0.1		0.3
Silica	mg/L	38	36	41	63.7	63.7	63.7	31	31	34	34	34		33		40
Total Dissolved Ions	mg/L	122	87					104	79	88	101	88		7.6		87
Total Dissolved Solids	mg/L	146	113	191	110	97	89	113	92	107	114	106		96		111
Colour	HAZEN	2	1	249	10	37	51	<1	<1	6	<1	2		6		1
Turbidity	NTU	9	10	55		4.3	6.2	1	3	12	15	14		7		20
pH SAT* (calc for CaCO3)														9.6		9.6
Saturation Index		-3	-3.7					-2.1	-2.7	-2.8	-2.7	-2.8		-2.7		-3.5
Mole Ratio		4.2	4.4					3.1	3.4	3.6	3.5	3.6		3.3		4
Sodium Adsorption Ratio		1.8	2	2.7	1.7	1.8	1.7	1.4	1.3	1.8	1.7	1.8		1.8		2.7
Figure Of Merit Ratio		0.7	0.4					0.7	0.6	0.5	0.6	0.5		0.4		0.2
CATIONS																
Sodium	mg/L	24	19	25.8	18	16.6	13.8	17	13	18	18	17		16		20
Potassium	mg/L	2.9	2.8	2.1	1.6	1.3	1.2	3.2	2.3	2.6	2.9	2.7		2.5		2.6
Calcium	mg/L	7.2	3.7	3.2	5	5.3	3.4	8.3	5.8	4.1	4.7	3.9		3.3		2.3
Magnesium	mg/L	3.9	1.9	2.3	1.9	0.7	0.9	1.5	1	2	2.4	2		1.7		1.2
Hydrogen	mg/L	0	0					0	0	0	0	0		0		0
ANIONS																
Bicarbonate	mg/L	27	18	16.5	19.5	30.5	25	42	34	30	40	31		27		31
Carbonate	mg/L	0	0	<0.01	<0.01	<0.01	6.6	0	0	0	0	0		0		0
Hydroxide	mg/L	0	0	<0.01	<0.01	<0.01	<0.01	0	0	0	0	0		0		0
Chloride	mg/L	22	16	19.6	19.2	14.6	12.4	12	9.1	15	15	15		14		17
Fluoride	mg/L	<0.1	<0.1	0.06	0.05	0.06	0.04	<0.1	<0.1	<0.1	<0.1	<0.1		<0.05		<0.05
Nitrate as NO3	mg/L	1.5	0.5			0.02		9	7.5	0.6	0.9	0.9		1.3		<0.5
Sulphate	mg/L	34	25	87.3	30.5	7.5	8.4	11	5.6	16.1	16.3	15.2		11.1		12.7
OTHER DISSOLVED ELEMENTS																
Iron	mg/L	<0.01	<0.01	23.4	0.17	0.39	0.26	<0.01	<0.01	0.02	<0.01	0.01		0.18		0.01
Manganese	mg/L	0.07	0.06	0.08	0.02	0.11	0.004	<0.01	<0.01	0.03	0.04	0.04		0.01		0.08
Zinc	mg/L	0.03	0.03	<0.002	0.011	0.015	0.024	0.05	0.03	0.01	0.02	0.03		<0.01		0.02
Aluminium	mg/L	<0.05	<0.05	<0.002	0.012	0.034	0.187	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05		<0.05
Boron	mg/L	0.04	0.04					0.03	<0.02	0.03	0.03	0.04		0.03		0.03
Copper	mg/L	<0.03	<0.03	<0.002	0.002	0.002	0.002	<0.03	<0.03	<0.03	0.03	<0.03		<0.03		<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RAW WATER Scheme Component:		QLD Government HIN1123 SWA 2016/17 06-Oct-16 SW	QLD Government HIN1145 SWA 2016/17 15-Feb-17 SP59 - Combined Bores	QLD Government HIN1192 SWA 2017/18 03-Aug-17 SP59 - Combined Bores	QLD Government HIN1232 SWA 2017/18 06-Jun-18 SP59 - Combined Bores	QLD Government HIN1291 SWA 2018/19 05-Dec-18 SP59 - Combined Bores	QLD Government HIN1321 SWA 2018/19 13-Mar-19 SP59 - Combined Bores	QLD Government HIN1340 SWA 2018/19 11-Jun-19 SP59 - Combined Bores	QLD Government HIN1385 SWA 2019/2020 15-Apr-20 SP59 - Combined Bores	QLD Government HIN1396 SWA 2020/2021 18-Jul-20 SP59 - Combined Bores	QLD Government HIN1435 SWA 2020/2021 20-Jan-21 SP59 - Combined Bores
PARAMETER	**UNITS**										
Conductivity @ 25° C	us/cm	146	174	163	174	128	131	145	166	140	151
pH @ 21° C		6.21	7	6.84	6.75	6.28	6.56	6.49	7.12	7.02	6.27
Total Hardness CaCO3/L	mg	18	24	23	27	12	16	18	30	17	25
Temp Hardness CaCO3/L	mg	18	23	23	27	12	16	18	30	17	25
Alkalinity CaCO3/L	mg	24	23	24	30	21	22	21	35	23	27
Residual Alkalinity	meq/L	0.1	0	0	0	0.2	0.1	0.1	0.1	0.1	0
Silica	mg/L	38	37	35	32	35	33	35	37	34	32
Total Dissolved Ions	mg/L	90	101	100	109	80	85	89	112	91	99
Total Dissolved Solids	mg/L	113	124	120	123	102	105	111	127	111	114
Colour	HAZEN	<1	2	<1	1	3	2	<1	19	1	<7
Turbidity	NTU	16	6	12	4	14	12	19	17	16	4
pH SAT* (calc for CaCO3)		9.4	9.3	9.3	9.2	9.7	9.6	9.5	8.9	9.5	9.3
Saturation Index		-3.2	-2.3	-2.5	-2.4	-3.4	-3	-3	-1.8	-2.5	-3
Mole Ratio		4	3.4	3.5	3.5	4	3.6	3.9	3	3.1	3.9
Sodium Adsorption Ratio		2	1.9	1.9	1.6	2.3	1.9	1.9	1.6	2	1.6
Figure Of Merit Ratio		0.4	0.5	0.5	0.6	0.3	0.4	0.4	0.7	0.4	0.6
CATIONS											
Sodium	mg/L	19	21	20	20	19	18	19	20	19	18
Potassium	mg/L	2.6	3.1	2.8	3.2	2.5	2.6	2.7	2.7	2.4	3
Calcium	mg/L	4	5.3	5.2	5.9	2.7	3.6	4.1	8.8	3.8	5.3
Magnesium	mg/L	2	2.6	2.3	3.1	1.4	1.7	1.9	2	1.9	2.8
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0
ANIONS											
Bicarbonate	mg/L	30	28	29	36	25	27	25	42	28	33
Carbonate	mg/L	0	0	0	0	0	0	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	14	18	19	21	17	19	20	18	17	15
Fluoride	mg/L	<0.05	<0.05	<0.05	0.7	0.05	0.06	<0.05	0.06	0.06	0.06
Nitrate as NO3	mg/L	0.9	1.9	1.7	2.2	<0.5	2.1	2.4	3	1.8	3.8
Sulphate	mg/L	17.5	21	19	18	11	12	15	15	17	17
OTHER DISSOLVED ELEMENTS											
Iron	mg/L	0.01	0.06	0.01	<0.01	<0.01	<0.01	0.05	0.25	0.01	<0.01
Manganese	mg/L	0.07	0.04	0.05	0.04	0.04	0.04	0.04	0.015	0.032	0.036
Zinc	mg/L	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.06	<0.06	<0.06
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<0.03	<0.03
Boron	mg/L	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.04	0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.003	<0.003	<0.003

HINCHINBROOK SHIRE COUNCIL

SCHEME 3
FORREST BEACH WATER SUPPLY
TREATED WATER

Scheme Component: WTP

METHOD	PARAMETER	UNITS	HEALTH	AESTHETIC	LABORATORY NAME	HIN120	HIN204	HIN611	HIN638	HIN659	ID-HIN686
					REPORT #	HIN120	HIN204	HIN611	HIN638	HIN659	ID-HIN686
					TYPE	SWA	SWA	SWA	SWA	SWA	SWA
					FINANCIAL YEAR	2002/2003	2002/2003	2008/2009	2008/2009	2008/2009	2009/2010
					SAMPLE DATE	16-Jul-02	02-Jun-03	13-Oct-08	02-Mar-09	17-Jun-09	14-Aug-09
					SAMPLE LOCATION	SP26 - Hi Lift Pumps	SP26 - Hi Lift Pumps	SP26 - Hi Lift Pumps	SP26 - Hi Lift Pumps	SP26 - Hi Lift Pumps	SP26 - Hi Lift Pumps
18320	Conductivity @ 25' C	us/cm				160	175	210	184	222	230
18226	pH @ 21' C			6.5-8.5		7.55	7.65	7.11	7.23	7.27	7.19
18209	Total Hardness CaCO3/L	mg		200		29	36.5	25	21	25	32
18209	Temp Hardness CaCO3/L	mg									
18208	Alkalinity CaCO3/L	mg				30.5	41.5	17	20	0	22
18209	Residual Alkalinity	meq/L				0	0.1	0	0	0	0
18195	Silica	mg/L				35	37	34	31	36	36
18209	Total Dissolved Ions	mg/L		500		100	120	116	113	128	130
18209	Total Dissolved Solids	mg/L				120	130	139	131	150	153
18206	Colour	HAZEN		15		5	2	2	<1	2	<1
18212	Turbidity	NTU		5		4	2	1	1	1	1
18209	pH SAT* (calc for CaCO3)										
18209	Saturation Index					-1.5	-1.1	-2.3	-2.2	-2.1	-2
18209	Mole Ratio					2.6	2.4	3.3	3.3	3.3	3.3
18209	Sodium Adsorption Ratio					1.4	1.4	2.1	2.3	2.5	2.1
18209	Figure Of Merit Ratio					0.8	0.9	0.5	0.4	0.4	0.5
	CATIONS										
18195	Sodium	mg/L		180		17.5	18.5	25	24	29	28
18195	Potassium	mg/L				2.1	2.5	2.8	2.3	3	3.2
18195	Calcium	mg/L				8.5	11	5.6	5	5.5	7.8
18195	Magnesium	mg/L				1.9	2.1	2.7	2.2	2.8	3.1
18209	Hydrogen	mg/L				0	0	0	0	0	0
	ANIONS										
18209	Bicarbonate	mg/L				37	50	21	25	26	27
18209	Carbonate	mg/L				0.1	0.1	0	0	0	0
18209	Hydroxide	mg/L				0	0	0	0	0	0
18204	Chloride	mg/L		250		15.5	17.5	23	27	29	26
18204	Fluoride	mg/L	1.5			<0.1	<0.1	<0.1	0.05	0.05	0.05
18204	Nitrate as NO3	mg/L	50			0.9	2.3	0.7	0.8	0.8	1
18204	Sulphate	mg/L	500	250		19.5	18.5	35	27	32	34
	OTHER DISSOLVED ELEMENTS										
18195	Iron	mg/L		0.3		0.11	0.09	0.05	0.03	0.05	0.01
18195	Manganese	mg/L	0.5	0.1		<0.03	<0.03	<0.01	<0.01	<0.01	<0.01
18195	Zinc	mg/L		3		0.01	<0.01	0.01	0.03	<0.01	0.02
18195	Aluminium	mg/L		0.2		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
18195	Boron	mg/L	4			0.05	<0.02	0.04	0.03	0.04	0.03
18195	Copper	mg/L	2	1		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY TREATED WATER Scheme Component:		ID-HIN726 SWA 2009/2010 26-Feb-10 WTP	ID-HIN745 SWA 2010/2011 06-Aug-10 WTP	ID-HIN757 SWA 2010/2011 12-Nov-10 WTP	ID-HIN852 SWA 2012/2013 14-Nov-12 WTP	QLD Government ID-HIN870 SWA 2012/2013 21-May-13 WTP	QLD Government HIN887 SWA 2013/2014 29-Aug-13 WTP	QLD Government HIN901 SWA 2013/2014 20-Nov-13 WTP	QLD Government HIN908 SWA 2013/2014 09-Jan-14 WTP
PARAMETER	**UNITS**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**
Conductivity @ 25' C	us/cm	163	165	173	166	153	155	150	158
pH @ 21' C		7.49	7.44	7.49	7.64	7.71	7.49	7.21	7.48
Total Hardness CaCO3/L	mg	19	21	23	24	22	19	18	19
Temp Hardness CaCO3/L	mg					22	19	18	19
Alkalinity CaCO3/L	mg	22	25	25	33	29	29	26	26
Residual Alkalinity	meq/L	0.1	0.1	0	0.2	0.2	0.2	0.2	0.1
Silica	mg/L	34	36	33	34	33	34	33	35
Total Dissolved Ions	mg/L	98	103	105	107	95	97	94	94
Total Dissolved Solids	mg/L	119	124	123	120	110	113	110	113
Colour	HAZEN	4	12	3	4	6	4	4	1
Turbidity	NTU	1	1	2	1	2	2	1	8
pH SAT* (calc for CaCO3)						9.2	9.3	9.4	9.3
Saturation Index		-1.9	-1.9	-1.8	-1.5	-1.5	-1.8	-2.2	-1.9
Mole Ratio		2.9	2.9	2.9	2.5	2.5	2.7	3.1	2.7
Sodium Adsorption Ratio		2.1	2	2	1.8	1.7	2	2.1	2.1
Figure Of Merit Ratio		0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4
CATIONS									
Sodium	mg/L	22	22	22	20	18	20	21	20
Potassium	mg/L	2.5	2.7	2.5	2.6	2.5	2.6	2.5	2.7
Calcium	mg/L	4.7	4.8	5.7	6.1	5.5	4.3	4.2	4.5
Magnesium	mg/L	1.9	2.3	2.1	2	1.9	2.1	2	1.9
Hydrogen	mg/L	0	0	0	0	0	0	0	0
ANIONS									
Bicarbonate	mg/L	27	30	30	40	35	35	32	32
Carbonate	mg/L	0	0	0	0.1	0.1	0.1	0	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0
Chloride	mg/L	22	20	21	18	17	17	19	17
Fluoride	mg/L	0.05	<0.1	<0.1	<0.1	<0.05	0.82	0.61	0.48
Nitrate as NO3	mg/L	1.2	1	1.1	0.8	0.8	1	1.4	1
Sulphate	mg/L	17.2	21	21	16.5	13	13.9	11.8	13.7
OTHER DISSOLVED ELEMENTS									
Iron	mg/L	0.04	0.04	0.19	0.13	0.36	0.12	0.08	0.04
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY TREATED WATER Scheme Component:	WTP	QLD Government HIN922 SWA 2013/2014 19-Feb-14 SP26 - Hi Lift Pumps	QLD Government HIN931 SWA 2013/2014 09-Apr-14 SP26 - Hi Lift Pumps	QLD Government HIN941 SWA 2013/2014 13-May-14 SP26 - Hi Lift Pumps	QLD Government HIN962 SWA 2013/2014 26-Jun-14 SP26 - Hi Lift Pumps	QLD Government HIN965 SWA 2014/2015 24-Jul-14 SP26 - Hi Lift Pumps	QLD Government HIN970 SWA 2014/2015 14-Aug-14 SP26 - Hi Lift Pumps	QLD Government HIN976 SWA 2014/2015 15-Oct-14 SP26 - Hi Lift Pumps	QLD Government HIN979 SWA 2014/2015 25-Nov-14 SP26 - Hi Lift Pumps
PARAMETER	**UNITS**								
Conductivity @ 25' C	us/cm	124	152	159	166	156	194	192	187
pH @ 21' C		7.59	7.59	7.67	7.82	7.56	8.19	8.1	7.85
Total Hardness CaCO3/L	mg	14	19	20	26	21	37	40	35
Temp Hardness CaCO3/L	mg	14	19	20	26	21	37	40	35
Alkalinity CaCO3/L	mg	20	21	28	30	26	45	44	37
Residual Alkalinity	meq/L	0.1	0	0.2	0.1	0.1	0.2	0.1	0.1
Silica	mg/L	28	32	33	33	34	32	32	34
Total Dissolved Ions	mg/L	75	91	98	102	93	126	123	117
Total Dissolved Solids	mg/L	90	109	113	116	111	131	129	128
Colour	HAZEN	2		3	11	7	10	8	3
Turbidity	NTU	2		2	2	2	1	2	3
pH SAT* (calc for CaCO3)		9.6	9.5	9.3	9.2	9.3	8.7	8.7	8.9
Saturation Index		-2	-1.9	-1.7	-1.3	-1.8	-0.5	-0.6	-1
Mole Ratio		2.7	2.7	2.6	2.4	2.7	1.9	1.9	2.2
Sodium Adsorption Ratio		2	1.9	1.9	1.6	1.8	1.5	1.4	1.5
Figure Of Merit Ratio		0.4	0.5	0.5	0.6	0.5	0.8	0.9	0.8
CATIONS									
Sodium	mg/L	17	19	20	19	19	20	20	20
Potassium	mg/L	2.3	2.5	2.7	2.6	2.7	2.7	2.7	3
Calcium	mg/L	3.2	4.3	4.4	6.6	5	11	12	9.7
Magnesium	mg/L	1.4	2	2.1	2.2	2.1	2.3	2.5	2.5
Hydrogen	mg/L	0	0	0	0	0	0	0	0
ANIONS									
Bicarbonate	mg/L	25	26	34	37	31	54	52	45
Carbonate	mg/L	0	0.1	0.1	0.1	0.1	0.4	0.4	0.2
Hydroxide	mg/L	0	0	0	0	0	0	0	0
Chloride	mg/L	15	18	18	17	16	18	17	18
Fluoride	mg/L	0.77	0.1	0.76	0.7	0.7	0.56	0.63	0.7
Nitrate as NO3	mg/L	1.4	2.4	1.9	2.2	2.4	2.2	2	4
Sulphate	mg/L	0	16.4	14	13.9	13.7	13.5	13.7	14
OTHER DISSOLVED ELEMENTS									
Iron	mg/L	0.07	0.13	0.12	0.28	0.26	0.63	0.67	0.39
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.04
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY TREATED WATER Scheme Component:	WTP	QLD Government HIN981 SWA 2014/2015 11-Dec-14 SP26 - Hi Lift Pumps	QLD Government HIN986 SWA 2014/2015 13-Jan-15 SP26 - Hi Lift Pumps	QLD Government HIN1001 SWA 2014/2015 11-Feb-15 SP26 - Hi Lift Pumps	QLD Government HIN1006 SWA 2014/2015 09-Mar-15 SP26 - Hi Lift Pumps	QLD Government HIN1009 SWA 2014/2015 22-Apr-15 SP26 - Hi Lift Pumps	QLD Government HIN1018 2014/2015 22-May-15 SP26 - Hi Lift Pumps	QLD Government HIN1019 SWA 2014/2015 18-Jun-15 SP26 - Hi Lift Pumps	QLD Government HIN1030 SWA 2015/2016 30-Jul-15 SP26 - Hi Lift Pumps
PARAMETER	**UNITS**								
Conductivity @ 25' C	us/cm	169	182	191	168	188	169	179	184
pH @ 21' C		7.52	7.68	7.76	7.29	7.92	7.7	7.94	7.75
Total Hardness CaCO3/L	mg	25	31	30	23	34	27	27	26
Temp Hardness CaCO3/L	mg	25	31	30	23	34	27	27	26
Alkalinity CaCO3/L	mg	28	40	39	27	44	34	37	32
Residual Alkalinity	meq/L	0.1	0.2	0.5	0.1	0.2	0.1	0.2	0.1
Silica	mg/L	35	34	31	33	31	34	30	32
Total Dissolved Ions	mg/L	102	120	120	100	127	112	114	108
Total Dissolved Solids	mg/L	120	130	127	116	131	125	121	120
Colour	HAZEN	1	3	6	1	8	2	4	4
Turbidity	NTU	<1	<1	<1	<1	1	<1	1	1
pH SAT* (calc for CaCO3)		9.2	8.9	8.9	9.3	8.8	9.1	9	9.1
Saturation Index		-1.6	-1.2	-1.2	-2	-0.9	-1.4	-1.1	-1.4
Mole Ratio		2.7	2.3	2.4	3	2.1	2.5	2.2	2.3
Sodium Adsorption Ratio		1.7	1.6	1.7	1.8	1.6	1.7	1.8	1.8
Figure Of Merit Ratio		0.6	0.7	0.6	0.5	0.7	0.6	0.6	0.6
CATIONS									
Sodium	mg/L	20	20	22	20	21	20	21	22
Potassium	mg/L	3.6	3.6	3.7	3.6	3.5	3.5	3.3	3.3
Calcium	mg/L	6.4	8.4	7.9	5.4	9.8	7.1	7.7	6.9
Magnesium	mg/L	2.1	2.5	2.4	2.2	2.4	2.2	2	2.1
Hydrogen	mg/L	0	0	0	0	0	0	0	0
ANIONS									
Bicarbonate	mg/L	34	48	47	33	53	41	44	39
Carbonate	mg/L	0.1	0.2	0.1	0	0.2	0.1	0.2	0.2
Hydroxide	mg/L	0	0	0	0	0	0	0	0
Chloride	mg/L	18	19	20	18	20	20	20	20
Fluoride	mg/L	0.63	0.67	0.75	0.56	0.66	0.12	0.56	0.56
Nitrate as NO3	mg/L	4.7	4.3	3.9	3.8	3.6	3.5	2.2	2.1
Sulphate	mg/L	13.9	13.3	12.5	13.3	12.3	13.8	11.8	12.1
OTHER DISSOLVED ELEMENTS									
Iron	mg/L	0.04	0.15	0.38	0.07	0.63	0.1	0.35	0.39
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY TREATED WATER Scheme Component:		QLD Government HIN1039 SWA 2015/2016 20-Aug-15 WTP SP26 - Hi Lift Pumps	QLD Government HIN1040 SWA 2015/2016 24-Sep-15 SP26 - Hi Lift Pumps	QLD Government HIN1052 SWA 2015/2016 29-Oct-15 SP26 - Hi Lift Pumps Forrest Beach	QLD Government HIN1060 SWA 2015/2016 24-Nov-15 SP26 - Hi Lift Pumps	QLD Government HIN1064 SWA 2015/2016 10-Dec-15 SP26 - Hi Lift Pumps	QLD Government HIN1069 SWA 2015/2016 19-Jan-16 SP26 - Hi Lift Pumps	QLD Government HIN1077 SWA 2015/2016 28-Feb-16 SP26 - Hi Lift Pumps
PARAMETER	**UNITS**							
Conductivity @ 25' C	us/cm	170	198	177	163	157	169	184
pH @ 21' C		7.7	8.3	7.67	7.67	7.61	7.59	7.45
Total Hardness CaCO3/L	mg	24	40	27	26	23	24	29
Temp Hardness CaCO3/L	mg	24	40	27	26	23	24	29
Alkalinity CaCO3/L	mg	31	48	33	36	32	32	39
Residual Alkalinity	meq/L	0.1	0.2	0.1	0.2	0.2	0.2	0.2
Silica	mg/L	33	31	33	32	32	33	36
Total Dissolved Ions	mg/L	108	134	107	106	98	103	120
Total Dissolved Solids	mg/L	121	137	119	116	110	116	132
Colour	HAZEN	2	9	2	3	7	3	12
Turbidity	NTU	<1	2	<1	2	12	2	3
pH SAT* (calc for CaCO3)		9.2	8.7	9.1	9.1	9.2	9.1	9
Saturation Index		-1.5	-0.4	-1.4	-1.4	-1.6	-1.6	-1.5
Mole Ratio		2.5	1.7	2.5	2.5	2.5	2.4	2.7
Sodium Adsorption Ratio		1.9	1.5	1.7	1.7	1.8	1.9	1.8
Figure Of Merit Ratio		0.5	0.8	0.6	0.6	0.5	0.5	0.6
CATIONS								
Sodium	mg/L	22	22	20	20	20	21	22
Potassium	mg/L	3.1	3.2	3	2.7	2.7	2.8	2.7
Calcium	mg/L	5.9	12	6.9	6.4	5.6	6	7.3
Magnesium	mg/L	2.3	2.7	2.3	2.3	2.1	2.2	2.6
Hydrogen	mg/L	0	0	0	0	0	0	0
ANIONS								
Bicarbonate	mg/L	37	57	41	44	39	39	48
Carbonate	mg/L	0.1	0.7	0.1	0.1	0.1	0.1	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0
Chloride	mg/L	20	20	18	18	18	19	19
Fluoride	mg/L	0.6	0.65	0.48	0.65	0.64	0.64	0.74
Nitrate as NO3	mg/L	3.1	3.3	3.1	2.4	2.4	2.4	5.6
Sulphate	mg/L	14.1	13.3	12.5	9.8	8.3	10.4	12.1
OTHER DISSOLVED ELEMENTS								
Iron	mg/L	0.12	0.74	0.09	0.2	0.15	0.14	0.19
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	<0.01	0.05	<0.01	<0.01	0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.04	0.03	0.03	0.03	0.03	0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY TREATED WATER Scheme Component:		QLD Government HIN1083 SWA 2015/2016 31-Mar-16 WTP	QLD Government HIN1097 SWA 2015/2016 28-Apr-16 WTP	QLD Government HIN1099 SWA 2015/2016 26-May-16 WTP	QLD Government HIN1104 SWA 2016/2017 28-Jul-16 WTP	QLD Government HIN1108 SWA 2016/2017 25-Aug-16 WTP	QLD Government HIN1118 SWA 2016/2017 29-Aug-16 WTP	QLD Government HIN1124 SWA 2016/2017 27-Oct-16 WTP
PARAMETER	**UNITS**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**	**SP26 - Hi Lift Pumps**
Conductivity @ 25' C	us/cm	200	227	197	203	186	180	174
pH @ 21' C		7.92	8.15	7.75	8.04	7.78	7.51	7.63
Total Hardness CaCO3/L	mg	38	44	38	36	35	30	27
Temp Hardness CaCO3/L	mg	38	44	38	36	35	30	27
Alkalinity CaCO3/L	mg	53	57	47	45	49	36	36
Residual Alkalinity	meq/L	0.3	0.2	0.2	0.2	0.3	0.1	0.2
Silica	mg/L	36	35	33	36	33	32	35
Total Dissolved Ions	mg/L	141	155	131	134	131	115	111
Total Dissolved Solids	mg/L	144	155	135	143	134	124	124
Colour	HAZEN	4	3	1	3	4	2	11
Turbidity	NTU	1	<1	1	1	2	1	2
pH SAT* (calc for CaCO3)		8.7	8.6	8.7	8.8	8.7	9	9
Saturation Index		-0.8	-0.4	-1	-0.7	-0.9	-1.5	-1.3
Mole Ratio		2.1	1.9	2.2	2	2.2	2.6	2.6
Sodium Adsorption Ratio		1.6	1.6	1.5	1.7	1.6	1.7	1.8
Figure Of Merit Ratio		0.7	0.8	0.8	0.7	0.8	0.6	0.6
CATIONS								
Sodium	mg/L	23	25	22	23	21	21	21
Potassium	mg/L	2.6	3.8	3.3	3.7	3.5	3.2	3.2
Calcium	mg/L	10	13	11	10	10	8.2	7.6
Magnesium	mg/L	2.8	2.7	2.5	2.5	2.4	2.3	2
Hydrogen	mg/L	0	0	0	0	0	0	0
ANIONS								
Bicarbonate	mg/L	64	68	57	54	59	44	43
Carbonate	mg/L	0.3	0.5	0.2	0.3	0.2	0.1	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0
Chloride	mg/L	20	23	21	20	20	20	20
Fluoride	mg/L	0.59	0.62	0.27	0.56	0.21	0.54	0.41
Nitrate as NO3	mg/L	6.8	6	5.6	11	4.1	4	2.9
Sulphate	mg/L	10.5	12.1	8.8	8.3	10.3	10.6	11
OTHER DISSOLVED ELEMENTS								
Iron	mg/L	0.28	0.13	0.1	0.13	0.27	0.08	0.77
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	<0.01	0.08	<0.01	<0.01	<0.01	<0.01	0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.02	0.02	0.02	0.02	0.02	0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY TREATED WATER Scheme Component:	WTP	QLD Government HIN1130 SWA 2016/2017 30-Nov-16 SP26 - Hi Lift Pumps	QLD Government HIN1137 SWA 2016/2017 25-Jan-17 SP26 - Hi Lift Pumps	QLD Government HIN1141 SWA 2016/2017 08-Feb-17 SP26 - Hi Lift Pumps	QLD Government HIN1150 SWA 2016/2017 23-Feb-17 SP26 - Hi Lift Pumps	QLD Government HIN1156 SWA 2016/2017 16-Mar-17 SP26 - Hi Lift Pumps	QLD Government HIN1163 SWA 2016/2017 11-May-17 SP26 - Hi Lift Pumps	QLD Government HIN1231 SWA 2017/2018 06-Jun-18 SP26 - Hi Lift Pumps	QLD Government HIN1286 SWA 2018/2019 28-Nov-18 SP26 - Hi Lift Pumps
PARAMETER	**UNITS**								
Conductivity @ 25' C	us/cm	185	204	184	191	193	186	184	160
pH @ 21' C		7.47	8.31	7.83	7.87	7.72	7.69	7.16	7.52
Total Hardness CaCO3/L	mg	30	34	33	33	33	32	36	30
Temp Hardness CaCO3/L	mg	30	34	33	33	33	32	36	30
Alkalinity CaCO3/L	mg	44	50	43	43	43	42	42	42
Residual Alkalinity	meq/L	0.3	0.3	0.2	0.2	0.2	0.2	0.1	0.2
Silica	mg/L	36	36	38	39	39	40	34	35
Total Dissolved Ions	mg/L	126	142	126	128	127	126	123	109
Total Dissolved Solids	mg/L	135	148	138	140	140	141	131	118
Colour	HAZEN	14	1	11	10	8	5	6	11
Turbidity	NTU	2	1	2	2	2	1	<1	1
pH SAT* (calc for CaCO3)		8.9	8.7	8.8	8.8	8.8	8.9	8.8	8.9
Saturation Index		-1.4	-0.4	-1	-1	-1.1	-1.2	-1.7	-1.4
Mole Ratio		2.6	1.8	2.2	2.2	2.3	2.3	2.8	2.5
Sodium Adsorption Ratio		1.8	2	1.8	1.7	1.8	1.9	1.5	1.5
Figure Of Merit Ratio		0.6	0.6	0.6	0.7	0.6	0.6	0.8	0.7
CATIONS									
Sodium	mg/L	22	27	24	23	24	25	20	19
Potassium	mg/L	3.3	2.7	1.8	2.3	2.5	2	2.3	2.1
Calcium	mg/L	8.3	9.8	9	8.9	8.7	8.1	9.8	8.2
Magnesium	mg/L	2.3	2.2	2.2	2.7	2.7	2.8	2.8	2.3
Hydrogen	mg/L	0	0	2.6	0	0	0	0	0
ANIONS									
Bicarbonate	mg/L	53	60	52	52	52	51	51	50
Carbonate	mg/L	0.1	0.6	0.2	0.2	0.1	0.2	0.1	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0
Chloride	mg/L	21	24	18	20	19	21	21	18
Fluoride	mg/L	0.43	0.46	0.44	0.39	0.54	0.12	0.1	0.07
Nitrate as NO3	mg/L	2.7	5.2	8.7	9.3	8	8.6	4.3	2.4
Sulphate	mg/L	13	11	8	9	10	8	11	7
OTHER DISSOLVED ELEMENTS									
Iron	mg/L	0.67	0.21	0.55	0.53	0.51	0.35	0.29	0.64
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.09	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.02	0.02	0.02	0.02	0.02	0.02	<0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY TREATED WATER Scheme Component: WTP		QLD Government HIN1318 SWA 2018/2019 06-Mar-19 SP26 - Hi Lift Pumps	QLD Government HIN1339 SWA 2018/2019 29-May-19 SP26 - Hi Lift Pumps	QLD Government HIN1367 SWA 2019/2020 10-Mar-20 SP26 - Hi Lift Pumps	QLD Government HIN1397 SWA 2020/2021 16-Jul-20 SP26 - Hi Lift Pumps	QLD Government HIN1436 SWA 2020/2021 20-Jan-21 SP26 - Hi Lift Pumps
PARAMETER	**UNITS**					
Conductivity @ 25' C	us/cm	177	191	166	180	163
pH @ 21' C		7.65	7.7	7.11	7.62	6.86
Total Hardness CaCO3/L	mg	33	39	29	32	30
Temp Hardness CaCO3/L	mg	33	39	29	32	30
Alkalinity CaCO3/L	mg	40	45	37	41	38
Residual Alkalinity	meq/L	0.1	0.1	0.2	0.2	0.2
Silica	mg/L	37	39	38	38	34
Total Dissolved Ions	mg/L	118	131	114	124	112
Total Dissolved Solids	mg/L	130	142	129	137	122
Colour	HAZEN	5	4	4	6	<7
Turbidity	NTU	<1	<1	1	4	2
pH SAT* (calc for CaCO3)		8.9	8.8	9	8.9	9
Saturation Index		-1.2	-1.1	-1.9	-1.3	-2.1
Mole Ratio		2.4	2.4	3	2.5	3.2
Sodium Adsorption Ratio		1.6	1.6	1.7	1.7	1.6
Figure Of Merit Ratio		0.7	0.8	0.6	0.7	0.7
CATIONS						
Sodium	mg/L	21	22	21	22	20
Potassium	mg/L	1.8	1.8	1.9	2	2
Calcium	mg/L	8.8	11	7.5	8.6	7.9
Magnesium	mg/L	2.7	2.8	2.6	2.7	2.4
Hydrogen	mg/L	0	0	0	0	0
ANIONS						
Bicarbonate	mg/L	49	54	45	50	46
Carbonate	mg/L	0.1	0.1	0	0.1	0
Hydroxide	mg/L	0	0	0	0	0
Chloride	mg/L	19	20	19	20	17
Fluoride	mg/L	0.06	<0.05	0.07	0.06	0.05
Nitrate as NO3	mg/L	8.1	9.3	8.6	7.2	6.4
Sulphate	mg/L	8	9	8.8	11	10
OTHER DISSOLVED ELEMENTS						
Iron	mg/L	0.31	0.18	0.34	0.49	0.22
Manganese	mg/L	<0.01	<0.01	0.002	0.0006	0.002
Zinc	mg/L	<0.01	<0.01	<0.06	<0.06	<0.06
Aluminium	mg/L	<0.05	<0.05	0.04	0.04	<0.03
Boron	mg/L	<0.02	<0.02	0.02	0.03	0.02
Copper	mg/L	<0.03	<0.03	0.005	0.003	<0.003

HINCHINBROOK SHIRE COUNCIL

SCHEME 3
FORREST BEACH WATER SUPPLY
RETICULATED WATER
Scheme Component: R

METHOD	PARAMETER	UNITS	HEALTH	AESTHETIC	LABORATORY NAME	W1517	ID-HIN045	ID-HIN062	ID_HIN075		ID_HIN097	ID_HIN101	HIN121	HIN122	HIN123
					REPORT #										
					TYPE	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA	SWA
					FINANCIAL YEAR	1997/1998	1999/2000	2000/2001	2000/2001	2001/2002	2001/2002	2001/2002			
					SAMPLE DATE	14-Apr-88	21-Jun-00	02-Feb-01	20-Jun-01	23-Jan-02	24-Jan-02	06-Mar-02	16-Jul-02	16-Jul-02	16-Jul-02
					SAMPLE LOCATION	68 Leichhardt Street	P27 - Water Tower Forrest Beac	P27 - Water Tower Forrest Beac	P27 - Water Tower Forrest Beac	P27 - Water Tower Forrest Beac	P27 - Water Tower Forrest Beac	P27 - Water Tower Forrest Beac	P27 - Water Tower Forrest Beac	SP20 - End Beatts Road	SP50 - End Main Cassady Beach
18320	Conductivity @ 25' C	us/cm				240	173	186	193	170	170	165	155	155	165
18226	pH @ 21' C			6.5-8.5		5.6	7.38	6.99	8.09	7.57	7.57	7.9	7.55	7.6	7.6
18209	Total Hardness CaCO3/L	mg		200		64	28	29.2	46.2		24.2	33.5	28	28	31.5
18209	Temp Hardness CaCO3/L	mg													
18208	Alkalinity CaCO3/L	mg				<2	35	34	55	31	31	38.5	32	28	35.5
18209	Residual Alkalinity	meq/L				0	0.3	0.2	0.4		0.3	0.1	0.1	0	0.1
18195	Silica	mg/L				35	38	27	32	28	27.9	24	35	35	35
18209	Total Dissolved Ions	mg/L		500		140						110	100	98	110
18209	Total Dissolved Solids	mg/L				170	87	99	98		88	110	120	120	130
18206	Colour	HAZEN		15		5	9		14	65	65	<1	3	4	2
18212	Turbidity	NTU		5		10	0.3		4.3	16.5	17.5	15	5	4	3
18209	pH SAT* (calc for CaCO3)														
18209	Saturation Index					-5.5						-0.9	-1.5	-1.5	-1.3
18209	Mole Ratio					>10						2.1	2.6	2.6	2.5
18209	Sodium Adsorption Ratio					1.1	1.6	1.7	1.1		1.7	1.3	1.4	1.4	1.4
18209	Figure Of Merit Ratio					1.4						0.9	0.7	0.8	0.8
	CATIONS														
18195	Sodium	mg/L		180		21	19	20.6	17.8		19.5	17.5	17.5	17	18
18195	Potassium	mg/L				3	2.3	2.3	2		2.32	2	2.1	2	2.1
18195	Calcium	mg/L				17	8.4	7.9	15.2		7.04	10.5	8.2	8.5	9.6
18195	Magnesium	mg/L				5.3	1.7	2.3	2		1.61	1.8	1.8	1.7	1.8
18209	Hydrogen	mg/L				0						0	0	0	0
	ANIONS														
18209	Bicarbonate	mg/L				0	42.5	41.5	67.7	37.8	37.8	46.5	38.5	34	43
18209	Carbonate	mg/L				0	0	0	0		0	0.2	0.1	0.1	0.1
18209	Hydroxide	mg/L				0	0	0	0		0	0	0	0	0
18204	Chloride	mg/L		250		15	16	19	11		16	15	15	14.5	15.5
18204	Fluoride	mg/L	1.5			<0.1	0.6	0.37	0.09		0.08	<0.1	<0.1	<0.1	<0.1
18204	Nitrate as NO3	mg/L	50									3.1	0.9	0.9	0.8
18204	Sulphate	mg/L	500	250		72	12	21	7		17	12	19	19	21
	OTHER DISSOLVED ELEMENTS														
18195	Iron	mg/L		0.3		0.04	0.28	0.25	0.65		0.9	0.05	0.02	0.9	0.04
18195	Manganese	mg/L	0.5	0.1		0.17	0	0	0		0.02	<0.03	<0.03	<0.03	<0.03
18195	Zinc	mg/L		3		0.28	0.03	0.05	0.03		0	0.02	0.01	0.01	0.01
18195	Aluminium	mg/L		0.2		0.2	0.11	0	0		0	<0.05	<0.05	<0.05	<0.05
18195	Boron	mg/L	4			0.02						<0.02	0.05	0.04	0.04
18195	Copper	mg/L	2	1		0.15	0	0.2	0		0	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RETICULATED WATER Scheme Component:		HIN168 SWA 2002/2003 08-Jan-03 R	HIN169 SWA 2002/2003 08-Jan-03	HIN169 SWA 2002/2003 08-Jan-03	HIN180 SWA 2002/2003 25-Feb-03	HIN181 SWA 2002/2003 25-Feb-03	HIN192 SWA 2002/2003 14-Mar-03	HIN200 SWA 2002/2003 02-Jun-03	HIN202 SWA 2002/2003 02-Jun-03	HIN252 SWA 2003/2004 27-Oct-03	HIN264 SWA 2003/2004 22-Dec-03	HIN273 SWA 2003/2004 17-Feb-04
PARAMETER	**UNITS**	**P27 - Water Tower Forrest Beac**	**P27 - Water Tower Forrest Beac**	**P27 - Water Tower Forrest Beac**	**P26 - Hi Lift Pumps Forrest Beac**	**SP09 - Coconut Grove**	**P27 - Water Tower Forrest Beac**	**SP09 - Coconut Grove**	**SP20 - End Beatts Road**	**P27 - Water Tower Forrest Beac**	**P27 - Water Tower Forrest Beac**	**P27 - Water Tower Forrest Beac**
Conductivity @ 25' C	us/cm	185	190	190	190	195	185	185	180	205	225	235
pH @ 21' C		7.55	7.7	7.7	7.8	8	7.55	7.8	7.75	7.65	7.9	7.8
Total Hardness CaCO3/L	mg	40.5	43	43	49.5	51	46.5	39.5	38.5	37.5	42	43
Temp Hardness CaCO3/L	mg											
Alkalinity CaCO3/L	mg	44.5	45	45	51	54	50	43.5	42.5	41	47	32.5
Residual Alkalinity	meq/L	0.1	0	0	0	0.1	0.1	0.1	0.1	0.1	0.1	0
Silica	mg/L	34	34	34	32	33	32	37	37	34	37	33
Total Dissolved Ions	mg/L	120	130	130	140	140	140	130	130	130	150	150
Total Dissolved Solids	mg/L	130	130	130	140	140	140	140	140	140	160	160
Colour	HAZEN	14	11	11	4	2	<1	3	2	<1	4	2
Turbidity	NTU	4	4	4	1	1	3	2	2	3	3	1
pH SAT* (calc for CaCO3)												
Saturation Index		-1.1	-0.9	-0.9	-0.8	-0.5	-1	-0.9	-1	-1.1	-0.7	-1
Mole Ratio		2.4	2.3	2.3	2.2	1.9	2.4	2.2	2.3	2.5	2.2	2.5
Sodium Adsorption Ratio		1.3	1.3	1.3	1.2	1.3	1.2	1.4	1.4	1.7	1.8	1.6
Figure Of Merit Ratio		1	1.1	1.1	1.1	1.1	1.1	0.9	0.9	0.7	0.7	0.8
CATIONS												
Sodium	mg/L	19	19	19	20	20.5	19.5	19.5	19.5	23.5	26	24.5
Potassium	mg/L	2.3	2.3	2.3	2.4	2.5	2.5	2.5	2.5	2.7	3	3
Calcium	mg/L	13.5	14.5	14.5	16.5	17.5	15.5	12.5	12.5	11.5	13	13
Magnesium	mg/L	1.7	1.7	1.7	1.9	1.8	1.8	2	2	2.2	2.2	2.7
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0
ANIONS												
Bicarbonate	mg/L	54	55	55	62	65	61	53	51	49.5	57	39.5
Carbonate	mg/L	0.1	0.2	0.2	0.2	0.4	0.1	0.2	0.2	0.1	0.3	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	16	16	16	17.5	17.5	16	18	17.5	21.5	23.5	21.5
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	1.8	1.8	1.8	2	2.2	1.5	2.5	2.4	2	1.7	1.7
Sulphate	mg/L	16	16	16	17.5	17	17.5	19	18.5	20	26.5	40
OTHER DISSOLVED ELEMENTS												
Iron	mg/L	0.31	0.27	0.27	0.06	0.06	0.04	0.11	0.11	0.06	0.2	0.13
Manganese	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Zinc	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	0.01	<0.01	0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.02	0.03	0.03	0.02	0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RETICULATED WATER Scheme Component:		HIN288 SWA 2003/2004 20-May-04 R	ID HIN296 SWA 2003/2004 15-Jun-04 P27 - Water Tower Forrest Beac	HIN307 SWA 2004/2005 07-Jul-04 P27 - Water Tower Forrest Beac	HIN314 SWA 2004/2005 20-Oct-04 P27 - Water Tower Forrest Beac	HIN321 SWA 2004/2005 09-Nov-04 P27 - Water Tower Forrest Beac	HIN331 SWA 2004/2005 09-Dec-04 SP09 - Coconut Grove	HIN334 SWA 2004/2005 09-Dec-04 P27 - Water Tower Forrest Beac	HIN349 SWA 2004/2005 12-Jan-05 SP07 - End of Allamanda Avenue	HIN350 SWA 2004/2005 12-Jan-05 SP09 - Coconut Grove	HIN362 SWA 2004/2005 24-Feb-05 P27 - Water Tower Forrest Beac	HIN390 SWA 2004/2005 09-Jun-05 P27 - Water Tower Forrest Beac
PARAMETER	**UNITS**											
Conductivity @ 25' C	us/cm	235	240	225	220	247	243	239	252	230	243	214
pH @ 21' C		7.75	7.6	7.55	7	7.21	7.51	7.44	8.47	7.33	7.23	7.5
Total Hardness CaCO3/L	mg	46	43.5	39.5	33.5	45	44	42	47	39	42	34
Temp Hardness CaCO3/L	mg											
Alkalinity CaCO3/L	mg	33.5	31.5	28	17	27	32	31	31	21	23	26
Residual Alkalinity	meq/L	0	0	0	0	0	0	0	0	0	0	0
Silica	mg/L	37	40	38	42	36	37	37	37	36	39	37
Total Dissolved Ions	mg/L	150	140	140	130	149	154	152	155	136	146	134
Total Dissolved Solids	mg/L	170	160	160	160	168	171	169	173	159	171	155
Colour	HAZEN	3	6	1	2	2	2	2	<1	<1	<1	1
Turbidity	NTU	1	<1	<1	<1	1	<1	1	1	1	1	1
pH SAT* (calc for CaCO3)												
Saturation Index		-1.1	-1.3	-1.4	-2.3	-1.7	-1.3	-1.5	-0.3	-1.8	-1.8	-1.6
Mole Ratio		2.5	2.7	2.8	3.5	2.9	2.7	2.9	1.8	3.1	3.2	2.9
Sodium Adsorption Ratio		1.6	1.6	1.7	1.9	1.6	1.7	1.7	1.6	1.7	1.8	1.8
Figure Of Merit Ratio		0.8	0.9	0.8	0.6	0.9	0.8	0.8	0.9	0.7	0.7	0.6
CATIONS												
Sodium	mg/L	25	23.5	24	24.5	24	26	26	25	25	26	24
Potassium	mg/L	3.3	3.4	3.1	3.2	3.2	3.1	3.1	3.2	3.2	3	2.9
Calcium	mg/L	13	12.5	10.5	8.2	12	13	11	16	11	10	9.1
Magnesium	mg/L	3.4	3.1	3.2	3.2	3.6	3.2	3.3	1.5	2.8	3.9	2.7
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0
ANIONS												
Bicarbonate	mg/L	40.5	38.5	33.5	20.5	33	38	38	37	26	28	31
Carbonate	mg/L	0.1	0.1	0.1	0	0	0.1	0.1	0.6	0	0	0.1
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0	0	0
Chloride	mg/L	22.5	23	22.5	20	21	23	23	23	22	24	24
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nitrate as NO3	mg/L	2.4	1.5	2.5	1.9	2.5	2.1	2.2	1.5	1.5	1.5	1.5
Sulphate	mg/L	42	39	39	47.5	49	45	45	46	45	49	38
OTHER DISSOLVED ELEMENTS												
Iron	mg/L	0.08	0.1	0.17	0.01	0.01	0.02	0.05	0.04	0.07	0.02	0.04
Manganese	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Zinc	mg/L	<0.01	0.01	<0.01	0.04	0.02	<0.01	0.02	<0.01	<0.01	0.05	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.07	0.04	0.04	0.03	0.03	0.03	0.03	0.04	0.03	0.03
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RETICULATED WATER Scheme Component:		HIN395 SWA 2005/2006 03-Aug-05 R P27 - Water Tower Forrest Beac	HIN403 SWA 2005/2006 03-Aug-05 SP09 - Coconut Grove	HIN498 SWA 2007/2008 02-Nov-07 P27 - Water Tower Forrest Beac	HIN522 SWA 2007/2008 22-Apr-08 P27 - Water Tower Forrest Beac	HIN608 SWA 2008/2009 10-Sep-08 P27 - Water Tower Forrest Beac	HIN608 SWA 2008/2009 29-Sep-08 P27 - Water Tower Forrest Beac	HIN629 SWA 2008/2009 29-Jan-09 P27 - Water Tower Forrest Beac	HIN644 SWA 2008/2009 30-Mar-09 P27 - Water Tower Forrest Beac	ID-HIN660 SWA 2008/2009 17-Jun-09 SP37 - End of Pangola Street	ID-HIN685 SWA 2009/2010 13-Aug-09 P27 - Water Tower Forrest Beac	ID-HIN701 SWA 2009/2010 30-Oct-09 SP20 - End Beatts Road
PARAMETER	**UNITS**											
Conductivity @ 25' C	us/cm	226	228	246	231	204	212	197	208	237	237	201
pH @ 21' C		7.51	7.51	7.57	7.52	7.23	7.22	6.73	7.37	9.4	7.3	7.21
Total Hardness CaCO3/L	mg	34	35	45	33	28	28	23	24	33	37	25
Temp Hardness CaCO3/L	mg											
Alkalinity CaCO3/L	mg	25	25	39	23	22	20	20	20	31	31	21
Residual Alkalinity	meq/L	0	0	0	0	0	0	0	0	0	0	0
Silica	mg/L	39	39	34	35	36	35	32	36	30	35	36
Total Dissolved Ions	mg/L	133	134	158	130	124	119	116	119	135	139	113
Total Dissolved Solids	mg/L	156	157	168	151	146	142	135	142	151	154	136
Colour	HAZEN	7	8	5	<1	1	1	<1	1	9	1	1
Turbidity	NTU	1	3	2	2	16	1	1	1	4	1	1
pH SAT* (calc for CaCO3)												
Saturation Index		-1.6	-1.5	-1.2	-1.7	-2.1	-2	-2.7	-2	0.5	-1.7	-2.2
Mole Ratio		2.9	2.9	2.7	3	3.3	3.3	3.9	3.2	1.1	3	3.3
Sodium Adsorption Ratio		1.8	1.8	1.8	2	2.1	2	2.3	2.4	2.1	2	2.1
Figure Of Merit Ratio		0.6	0.6	0.7	0.6	0.5	0.5	0.4	0.4	0.5	0.6	0.5
CATIONS												
Sodium	mg/L	25	25	28	27	25	25	25	27	28	27	24
Potassium	mg/L	2.7	2.7	2.9	2.8	2.8	2.8	2.6	2.7	2.7	3.2	2.9
Calcium	mg/L	9.4	9.9	13	8.4	6.5	7.3	5.3	5.6	12	8.9	5.8
Magnesium	mg/L	2.6	2.5	3	3	2.8	2.5	2.2	2.5	0.5	3.7	2.5
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0
ANIONS												
Bicarbonate	mg/L	30	31	47	28	26	24	24	24	28	38	25
Carbonate	mg/L	0.1	0.1	0.1	0	0	0	0	0	3.8	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0	0	0.4	0	0
Chloride	mg/L	25	25	26	27	24	23	26	28	30	26	23
Fluoride	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.05	0.05	0.05	0.05
Nitrate as NO3	mg/L	1.2	1.5	1.4	0.8	1	0.9	1	0.6	<0.5	1	0.7
Sulphate	mg/L	37	37	37	34	36	34	30	29	29	31	28
OTHER DISSOLVED ELEMENTS												
Iron	mg/L	0.09	0.09	0.04	0.16	0.02	0.04	<0.01	0.04	0.39	<0.01	0.02
Manganese	mg/L	<0.03	<0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.03	<0.01	0.02	0.02	0.03	0.03	0.16	0.01	<0.01	0.02	0.03
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.04	0.03	0.04	0.03	0.04	0.03	0.04	0.04	0.03	0.04	0.04
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RETICULATED WATER Scheme Component:	R	ID-HIN708 SWA 2009/2010 27-Nov-09 SP09 - Coconut Grove	ID-HIN719 SWA 2009/2010 07-Jan-10 SP07 - End of Allamanda Avenue	ID-HIN720 SWA 2009/2010 07-Jan-10 SP49 - Forrest Lane	ID-HIN751 SWA 2010/2011 01-Sep-10 SP09 - Coconut Grove	ID-HIN750 SWA 2010/2011 01-Sep-10 SP38 - Blackbean Street	ID-HIN 814 SWA 2011/2012 13-Mar-12 SP09 - Coconut Grove	ID-HIN 830 SWA 2011/2012 19-Jun-12 SP36 - Bill Johnson Drive	ID-HIN837 SWA 2012/2013 11-Sep-12 P27 - Water Tower Forrest Beac	ID-HIN 844 SWA 2012/2013 10-Oct-12 SP07 - End of Allamanda Avenue	ID-HIN 865 SWA 2012/2013 11-Jan-13 SP38 - Blackbean Street	QLD Government HIN876 SWA 2013/2014 12-Jul-13 P27 - Water Tower Forrest Beac
PARAMETER	**UNITS**											
Conductivity @ 25' C	us/cm	192	183	168	173	177	164	175	180	191	152	153
pH @ 21' C		7.5	8.55	7.25	7.53	7.49	7.83	7.79	7.77	8.2	7.83	7.68
Total Hardness CaCO3/L	mg	30	30	20	21	22	25	31	28	34	24	20
Temp Hardness CaCO3/L	mg											20
Alkalinity CaCO3/L	mg	28	34	24	23	24	31	37	35	37	35	26
Residual Alkalinity	meq/L	0	0.1	0.1	0	0	0.1	0.1	0.1	0.1	0.2	0.1
Silica	mg/L	35	35	36	35	35	30	32	34	34	33	34
Total Dissolved Ions	mg/L	118	113	99	102	102	103	116	110	121	103	91
Total Dissolved Solids	mg/L	136	128	120	123	122	114	126	122	131	115	108
Colour	HAZEN	<1	1	1	3	3	3	1	2	3	4	2
Turbidity	NTU	1	1	2	2	1	2	1	1	1	1	2
pH SAT* (calc for CaCO3)												9.3
Saturation Index		-1.6	-0.3	-2.1	-1.8	-1.8	-1.2	-1.2	-1.2	-0.6	-1.2	-1.7
Mole Ratio		2.8	1.6	3.1	2.8	2.9	2.3	2.4	2.4	1.9	2.3	2.6
Sodium Adsorption Ratio		1.8	1.6	2	2	2	1.8	1.7	1.6	1.6	1.7	1.9
Figure Of Merit Ratio		0.6	0.7	0.4	0.5	0.5	0.6	0.7	0.6	0.7	0.6	0.5
CATIONS												
Sodium	mg/L	23	20	21	21	21	21	21	20	21	19	19
Potassium	mg/L	2.9	2.5	2.6	2.6	2.6	2.5	2.6	2.5	2.7	2.5	2.5
Calcium	mg/L	8	11	4.9	5.3	5.4	7.2	8.4	7.6	12	6.5	4.7
Magnesium	mg/L	2.5	0.7	2	2	2	1.6	2.4	2.3	1.2	1.8	1.9
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0	0	0
ANIONS												
Bicarbonate	mg/L	34	40	29	29	29	38	44	43	47	42	31
Carbonate	mg/L	0.1	0.9	0	0.1	0.1	0.2	0.1	0.1	0.4	0.2	0.1
Hydroxide	mg/L	0	0.1	0	0	0	0	0	0	0	0	0
Chloride	mg/L	22	19	19	21	21	19	19	18	19	17	17
Fluoride	mg/L	0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	<0.1	<0.05	0.06
Nitrate as NO3	mg/L	0.5	0.6	0.6	0.8	0.8	1.1	0.9	0.9	1	0.6	0.8
Sulphate	mg/L	26	18.9	19.9	21	21	13.7	17.1	15.8	16.7	14.2	13.5
OTHER DISSOLVED ELEMENTS												
Iron	mg/L	0.03	0.06	0.06	0.05	0.04	0.26	0.12	0.15	0.17	0.29	0.22
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L	0.04	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.03	0.03
Copper	mg/L	<0.03	<0.03	<0.03	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RETICULATED WATER		QLD Government HIN881 **Pest/Herb** 2013/2014 **23-Jul-13**	QLD Government HIN892 **SWA** 2013/2014 **09-Oct-13**	QLD Government HIN916 **SWA** 2013/2014 **16-Jan-14**	QLD Government HIN929 **SWA** 2013/2014 **13-Mar-14**	QLD Government HIN1027 **SWA** 2015/2016 **15-Jul-15**	QLD Government HIN1045 **SWA** 2015/2016 **06-Oct-15**	QLD Government HIN1089 **SWA** 2015/2016 **14-Apr-16**	QLD Government HIN1112 **SWA** 2016/2017 **08-Sep-16**	QLD Government HIN1158 **SWA** 2016/2017 **05-Apr-17**
Scheme Component:	**R**	**SP27 - Water Tower Forrest Beach**	**SP07 - End of Allamanda Avenue**	**SP38 - Blackbean Street**	**SP09 - Coconut Grove**	**SP27 - Water Tower Forrest Beach**	**SP38 - Blackbean Street**	**SP38 - Blackbean Street**	**SP50 - End Main Cassady Beach**	**SP20 - End Beatts Road**
PARAMETER	**UNITS**									
Conductivity @ 25' C	us/cm		156	152	144	173	186	191	177	185
pH @ 21' C			7.77	7.25	7.8	7.93	8	7.63	7.73	7.56
Total Hardness CaCO3/L	mg		21	19	17	29	32	35	32	31
Temp Hardness CaCO3/L	mg		21	19	17	29	32	35	32	31
Alkalinity CaCO3/L	mg		27	27	24	37	39	44	38	42
Residual Alkalinity	meq/L		0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2
Silica	mg/L		34	35	31	32	32	37	32	40
Total Dissolved Ions	mg/L		92	97	84	113	120	128	109	125
Total Dissolved Solids	mg/L		110	115	100	122	129	139	118	139
Colour	HAZEN		<1	6	<1	6	5	2	3	8
Turbidity	NTU		3	4	2	1	1	2	2	3
pH SAT* (calc for CaCO3)			9.2	9.3	9.4	9	8.9	8.8	8.8	8.9
Saturation Index			-1.5	-2	-1.6	-1	-0.9	-1.2	-1.1	-1.3
Mole Ratio			2.4	3	2.5	2.2	2.1	2.3	2.3	2.5
Sodium Adsorption Ratio			1.9	2.1	1.9	1.7	1.6	1.7	1.5	1.9
Figure Of Merit Ratio			0.5	0.4	0.4	0.6	0.7	0.7	0.8	0.6
CATIONS										
Sodium	mg/L		19	21	18	21	21	23	19	24
Potassium	mg/L		2.6	2.7	2.4	2.8	2.9	2.1	1.8	1.8
Calcium	mg/L		5.8	4.8	4.8	8	9.4	10	9.5	8.3
Magnesium	mg/L		1.5	1.6	1.3	2.2	2.1	2.3	2	2.6
Hydrogen	mg/L		0	0	0	0	0	0	0	0
ANIONS										
Bicarbonate	mg/L		32	33	29	45	47	53	46	51
Carbonate	mg/L		0.1	0	0.1	0.2	0.03	0.1	0.1	0.1
Hydroxide	mg/L		0	0	0	0	0	0	0	0
Chloride	mg/L		16	19	17	19	19	19	17	19
Fluoride	mg/L		0.5	0.46	0.63	0.54	0.64	0.52	0.48	0.41
Nitrate as NO3	mg/L		0.8	1.3	1.8	2.2	3.1	8.7	5.3	9
Sulphate	mg/L		13.3	13.9	9.7	12.8	13.8	9.3	7.5	9
OTHER DISSOLVED ELEMENTS										
Iron	mg/L		0.22	0.28	0.09	0.24	0.25	0.12	0.18	0.4
Manganese	mg/L		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zinc	mg/L		<0.01	<0.01	<0.01	<0.01	0.01	0.02	<0.01	<0.01
Aluminium	mg/L		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Boron	mg/L		0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02
Copper	mg/L		<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03

SCHEME 3 FORREST BEACH WATER SUPPLY RETICULATED WATER		QLD Government HIN1159 **SWA** 2016/2017 **05-Apr-17**	QLD Government HIN1208 **SWA** 2017/2018 **26-Oct-17**	QLD Government HIN1219 **SWA** 2017/2018 **31-Jan-18**	QLD Government HIN1229 **SWA** 2016/2017 **05-Apr-17**	QLD Government HIN1274 **SWA** 2018/2019 **24-Oct-18**	QLD Government HIN1307 **SWA** 2018/2019 **18-Feb-19**	QLD Government HIN1324 **SWA** 2018/2019 **13-Mar-19**	QLD Government HIN1362 **SWA** 2019/2020 **30-Jan-20**	QLD Government HIN1366 **SWA** 2019/2020 **10-Mar-20**
Scheme Component:	**R**	**SP38 - Blackbean Street**	**SP27 - Water Tower Forrest Beach**	**SP07 - End of Allamanda Avenue**	**SP38 - Blackbean Street**	**SP27 - Water Tower Forrest Beach**	**SP20 - End Beatts Road**	**SP07 - End of Allamanda Avenue**	**SP20 - End Beatts Road**	**Forrest Beach TP_Neil**
PARAMETER	**UNITS**									
Conductivity @ 25' C	us/cm	190	155	193	200	170	173	182	167	159
pH @ 21' C		7.71	7.68	8.74	7.56	6.89	7.56	7.8	7.29	6.92
Total Hardness CaCO3/L	mg	34	30	38	36	31	33	35	28	26
Temp Hardness CaCO3/L	mg	34	30	38	36	31	33	35	28	26
Alkalinity CaCO3/L	mg	44	37	48	43	40	40	43	35	34
Residual Alkalinity	meq/L	0.2	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.2
Silica	mg/L	40	32	29	37	33	33	37	38	37
Total Dissolved Ions	mg/L	129	107	130	131	116	117	123	112	108
Total Dissolved Solids	mg/L	142	116	131	142	123	126	133	128	124
Colour	HAZEN	8	8	5	2	10	1	7	10	5
Turbidity	NTU	2	1	1	<1	<1	<1	<1	2	1
pH SAT* (calc for CaCO3)		8.8	8.9	8.6	8.8	8.9	8.9	8.8	9	9.1
Saturation Index		-1	-1.2	0.2	-1.2	-2	-1.4	-1	-1.8	-2.2
Mole Ratio		2.3	2.4	1.3	2.6	3.2	2.5	2.3	2.9	3.2
Sodium Adsorption Ratio		1.8	1.6	1.5	1.7	1.6	1.6	1.6	1.8	1.8
Figure Of Merit Ratio		0.7	0.7	0.8	0.7	0.7	0.7	0.8	0.6	0.6
CATIONS										
Sodium	mg/L	24	20	22	24	20	21	21	22	20
Potassium	mg/L	1.7	2.2	2	2.2	2.5	1.7	1.8	1.9	1.9
Calcium	mg/L	10	8.1	14	10	8.1	8.7	11	7.2	6.5
Magnesium	mg/L	2	2.3	0.8	2.7	2.7	2.7	2	2.4	2.3
Hydrogen	mg/L	0	0	0	0	0	0	0	0	0
ANIONS										
Bicarbonate	mg/L	53	44	55	52	49	48	52	42	41
Carbonate	mg/L	0.1	0.1	1.6	0.1	0	0.1	0.2	0	0
Hydroxide	mg/L	0	0	0.1	0	0	0	0	0	0
Chloride	mg/L	19	18	21	22	21	19	19	20	19
Fluoride	mg/L	0.41	0.07	0.06	0.05	0.07	0.06	0.06	0.06	0.06
Nitrate as NO3	mg/L	9	3.4	5.7	6.4	3.2	8.5	8.2	7.3	7.9
Sulphate	mg/L	9	7	8	11	9	8	8	9	9.1
OTHER DISSOLVED ELEMENTS										
Iron	mg/L	0.5	0.24	52	0.14	0.37	0.21	0.35	0.53	0.28
Manganese	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.002	0.001
Zinc	mg/L	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.06	<0.06
Aluminium	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	<0.03
Boron	mg/L	0.02	0.03	0.02	0.02	0.02	0.02	0.02	<0.02	0.02
Copper	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.003	<003

SCHEME 3 FORREST BEACH WATER SUPPLY RETICULATED WATER Scheme Component:	R	QLD Government HIN1375 SWA 2019/2020 25-Mar-20 SP27 - Water Tower Forrest Beach	QLD Government HIN1386 SWA 2019/2020 15-Apr-20 SP38 - Blackbean Street	QLD Government HIN1389 SWA 2019/2020 30-Apr-20 SP20 - End Beatts Road	QLD Government HIN1411 SWA 2020/2021 24-Sep-20 SP27 - Water Tower Forrest Beach	QLD Government HIN1418 SWA 2020/2021 10-Nov-20 SP36 - Bill Johnson Drive	QLD Government HIN1415 SWA 2020/2021 04-Nov-20 SP49 - Forrest Lane	QLD Government HIN1416 SWA 2020/2021 04-Nov-20 SP37 - End of Pangola Street
PARAMETER	**UNITS**							
Conductivity @ 25' C	us/cm	169	186	189	181	184	174	182
pH @ 21' C		7.2	7.34	7.39	7.04	7.03	6.79	6.09
Total Hardness CaCO3/L	mg	29	33	34	34	35	30	35
Temp Hardness CaCO3/L	mg	29	33	34	34	35	30	35
Alkalinity CaCO3/L	mg	38	41	40	42	45	40	43
Residual Alkalinity	meq/L	0.2	0.2	0.1	0.2	0.2	0.2	0.2
Silica	mg/L	37	38	38	37	36	37	37
Total Dissolved Ions	mg/L	116	126	127	124	130	120	127
Total Dissolved Solids	mg/L	130	138	140	135	138	132	137
Colour	HAZEN	5	17	4	<7	<7	<7	<7
Turbidity	NTU	<1	3	2	3	2	2	3
pH SAT* (calc for CaCO3)		9	8.8	8.9	8.8	8.8	9	8.8
Saturation Index		-1.8	-1.5	-1.5	-1.8	-1.8	-2.2	-1.8
Mole Ratio		2.9	2.8	2.8	3	3	3.3	3.1
Sodium Adsorption Ratio		1.7	1.6	1.7	1.6	1.6	1.7	1.6
Figure Of Merit Ratio		0.6	0.7	0.7	0.7	0.7	0.6	0.7
CATIONS								
Sodium	mg/L	21	22	23	21	22	22	22
Potassium	mg/L	1.9	2	2.2	2.2	2.4	2.3	2.3
Calcium	mg/L	7.5	9.5	8.9	9.1	9.5	7.7	10
Magnesium	mg/L	2.5	2.4	2.9	2.7	2.7	2.7	2.2
Hydrogen	mg/L	0	0	0	0	0	0	0
ANIONS								
Bicarbonate	mg/L	46	50	48	51	55	48	53
Carbonate	mg/L	0	0.1	0.1	0	0	0	0
Hydroxide	mg/L	0	0	0	0	0	0	0
Chloride	mg/L	19	20	22	19	19	19	19
Fluoride	mg/L	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Nitrate as NO3	mg/L	8.5	7.4	6.9	7.2	6.3	6.9	6.8
Sulphate	mg/L	9.5	12	13	11	12	12	12
OTHER DISSOLVED ELEMENTS								
Iron	mg/L	0.25	0.36	0.28	0.26	0.26	0.2	0.18
Manganese	mg/L	0.002	0.001	0.004	0.009	0.006	0.006	0.006
Zinc	mg/L	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Aluminium	mg/L	<0.03	<0.03	<0.03	<0.03	0.03	<0.03	<0.03
Boron	mg/L	0.02	0.02	0.03	0.02	0.03	0.02	0.02
Copper	mg/L	<0.003	0.004	0.003	<0.003	<0.003	0.01	<0.003

Water Sample Data – Summary for each Test Site (Historical to 2018)

Data Period: Commencement of Testing – 2018

Scheme 1 – Ingham Water Supply

Table D-1 Herbert River Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Herbert River						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2001 to 2017	36	0.2	1	0.09	0	• During high rainfall sourcing from the Herbert River ceases. • Herbert River has high turbidity. • Good pH levels. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		34	0.6	0.04	0.02	0.01	
Chloride, mg/L		36	250	13	9.65	6.8	
Colour, HTU		36	15	70	13.04	0.5	
Copper, mg/L		36	0.8	0.07	0.02	0	
Fluoride, mg/L		36	1.5	9.1	0.33	0.025	
Hardness as CaCO3, mg/L		36	500	30	16.63	7.6	
Iron, mg/L		36	0.3	0.4	0.08	0.005	
Manganese, mg/L		36	0.5	0.9	0.04	0.005	
Nitrate as NO3, mg/L		34	50	8.3	1.16	0.25	
pH		36	6.5 – 8.5	7.6	7.16	6.4	
Sodium, mg/L		36	180	18	10.20	5.8	
Sulfate, mg/L		36	250	3	1.27	0.5	
Total Dissolved Solids, mg/L		36	500	138	69.86	43	
Turbidity, NTU		36	5	185	14.83	0.5	
Zinc, mg/L		36	3	0.04	0.01	0	

Table D-2 Tokalon Well 1 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Tokalon Well 1						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2003	3	0.2	0.03	0.03	0.03	• Not always in use, hence lack of sampling. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		3	0.6	0.03	0.02	0.01	
Chloride, mg/L		3	250	24.50	16.83	12.00	
Colour, HTU		3	15	0.50	0.50	0.50	
Copper, mg/L		3	0.8	0.02	0.02	0.02	
Fluoride, mg/L		3	1.5	0.10	0.08	0.05	
Hardness as CaCO3, mg/L		3	500	34.00	32.50	30.50	
Iron, mg/L		3	0.3	0.01	0.01	0.01	
Manganese, mg/L		3	0.5	0.15	0.09	0.03	
Nitrate as NO3, mg/L		3	50	18.00	6.42	0.25	
pH		3	6.5 – 8.5	6.75	6.47	6.10	
Sodium, mg/L		3	180	33.50	25.00	19.50	
Sulfate, mg/L		3	250	3.90	1.97	1.00	
Total Dissolved Solids, mg/L		3	500	160.00	143.33	130.00	
Turbidity, NTU		3	5	56.00	19.83	0.50	
Zinc, mg/L		3	3	0.05	0.04	0.03	

Table 3-3 Tokalon Well 2 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Tokalon Well 2						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2003	3	0.2	0.03	0.03	0.03	• pH average below guideline. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		3	0.6	0.03	0.02	0.01	
Chloride, mg/L		3	250	19.50	15.00	12.50	
Colour, HTU		3	15	1.00	0.67	0.50	
Copper, mg/L		3	0.8	0.02	0.02	0.02	
Fluoride, mg/L		3	1.5	0.05	0.05	0.05	
Hardness as CaCO3, mg/L		3	500	34.00	32.67	31.50	
Iron, mg/L		3	0.3	0.01	0.01	0.01	
Manganese, mg/L		3	0.5	0.04	0.02	0.02	
Nitrate as NO3, mg/L		3	50	17.00	12.07	2.70	
pH		3	6.5 – 8.5	6.55	6.35	6.15	

Sodium, mg/L		3	180	20.50	19.67	18.50	
Sulfate, mg/L		3	250	4.70	4.63	4.60	
Total Dissolved Solids, mg/L		3	500	140.00	133.33	130.00	
Turbidity, NTU		3	5	7.00	3.83	0.50	
Zinc, mg/L		3	3	0.03	0.02	0.02	

Table D-4 Tokalon Well 3 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Tokalon Well 3						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2003	3	0.2	0.03	0.03	0.03	• pH average below guideline. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		3	0.6	0.05	0.04	0.01	
Chloride, mg/L		3	250	20.00	14.83	11.50	
Colour, HTU		3	15	0.50	0.50	0.50	
Copper, mg/L		3	0.8	0.02	0.02	0.02	
Fluoride, mg/L		3	1.5	0.05	0.05	0.05	
Hardness as CaCO3, mg/L		3	500	33.50	32.17	30.50	
Iron, mg/L		3	0.3	0.01	0.01	0.01	
Manganese, mg/L		3	0.5	0.03	0.02	0.02	
Nitrate as NO3, mg/L		3	50	20.50	13.47	2.40	
pH		3	6.5 – 8.5	6.35	6.28	6.20	
Sodium, mg/L		3	180	20.00	19.50	19.00	
Sulfate, mg/L		3	250	5.10	4.97	4.70	
Total Dissolved Solids, mg/L		3	500	140.00	136.67	130.00	
Turbidity, NTU		3	5	0.50	0.50	0.50	
Zinc, mg/L		3	3	0.18	0.07	0.01	

Table D-5 Como Bore 4 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Como Road Bore 4						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2003	3	0.2	0.03	0.03	0.03	• No exceedances recorded. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		3	0.6	0.04	0.03	0.01	
Chloride, mg/L		3	250	20.00	14.50	11.50	
Colour, HTU		3	15	0.50	0.50	0.50	
Copper, mg/L		3	0.8	0.02	0.02	0.02	
Fluoride, mg/L		3	1.5	0.05	0.05	0.05	
Hardness as CaCO3, mg/L		3	500	38.50	33.83	30.50	
Iron, mg/L		3	0.3	0.01	0.01	0.01	
Manganese, mg/L		3	0.5	0.08	0.04	0.02	
Nitrate as NO3, mg/L		3	50	20.00	13.17	2.50	
pH		3	6.5 – 8.5	6.35	6.27	6.20	
Sodium, mg/L		3	180	20.00	19.50	19.00	
Sulfate, mg/L		3	250	5.80	5.03	4.30	
Total Dissolved Solids, mg/L		3	500	140.00	136.67	130.00	
Turbidity, NTU		3	5	0.50	0.50	0.50	
Zinc, mg/L		3	3	0.04	0.02	0.01	

Table 3-6 Como Bore 5 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Como Road Bore 5						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2001 to 2017	21	0.2	0.025	0.02	0	• No exceedances recorded. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		20	0.6	0.08	0.02	0.01	
Chloride, mg/L		21	250	17	13.50	11	
Colour, HTU		20	15	7	1.23	0.5	
Copper, mg/L		21	0.8	0.27	0.05	0.015	
Fluoride, mg/L		21	1.5	0.3	0.06	0.025	
Hardness as CaCO3, mg/L		21	500	36.5	31.06	25.3	
Iron, mg/L		21	0.3	0.005	0.00	0	
Manganese, mg/L		21	0.5	0.015	0.01	0	
Nitrate as NO3, mg/L		20	50	25	14.62	8.5	
pH		21	6.5 – 8.5	7.35	6.49	6.23	

Sodium, mg/L		21	180	21	19.63	18	
Sulfate, mg/L		21	250	8	4.96	4	
Total Dissolved Solids, mg/L		21	500	150	131.71	86	
Turbidity, NTU		20	5	1	0.55	0.5	
Zinc, mg/L		21	3	0.9	0.10	0.005	

Table D-7 Combined Bores Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Combined Bores						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	1998 to 2009	16	0.2	0.25	0.04	0	• No exceedances recorded.
Boron, mg/L		12	0.6	0.05	0.02	0.01	
Chloride, mg/L		16	250	27	13.51	10	
Colour, HTU		15	15	2	0.61	0	
Copper, mg/L		16	0.8	0.74	0.10	0	
Fluoride, mg/L		16	1.5	0.3	0.07	0.04	
Hardness as CaCO3, mg/L		16	500	46.2	32.50	26	
Iron, mg/L		16	0.3	0.02	0.01	0	
Manganese, mg/L		16	0.5	0.06	0.02	0	
Nitrate as NO3, mg/L		11	50	21	14.59	9	
pH		16	6.5 – 8.5	7.72	6.38	5.71	
Sodium, mg/L		16	180	27	20.71	19	
Sulfate, mg/L		16	250	17	5.92	4	
Total Dissolved Solids, mg/L		16	500	152	124.38	80	
Turbidity, NTU		15	5	12	1.39	0	
Zinc, mg/L		16	3	1.6	0.23	0	

Table D-8 Ingham River Pump Station Treated Water Quality (Physical and Chemical Analysis)

Sampling Location	Ingham River Pump Station						
Parameter	Period	No of Samples	Results			ADWG Limit (aesthetic/ health)	Comments
			Max	Average	Min		
Aluminium, mg/L	2002 to 2017	49	0.08	0.036	0.025	0.2	• One exceedance of Turbidity recorded
Boron, mg/L		49	0.03	0.014	0.01	0.6	
Chloride, mg/L		49	29	14.83	9.2	250	
Colour, HTU		49	13	2.08	0.500	15	
Copper, mg/L		49	0.015	0.015	0.015	0.8	
Fluoride, mg/L		49	0.68	0.38	0.05	1.5	
Hardness as CaCO3, mg/L		49	39	22.78	12	500	
Iron, mg/L		49	0.14	0.051	0.01	0.3	
Manganese, mg/L		49	0.015	0.009	0.005	0.5	
Nitrate as NO3, mg/L		49	15	4.4	0.5	50	
pH		49	8.12	7.11	6.39	6.5 – 8.5	
Sodium, mg/L		49	26	15.83	10	180	
Sulfate, mg/L		49	5	2.07	0.42	250	
Total Dissolved Solids, mg/L		49	145	97.96	59	500	
Turbidity, NTU		49	9	1.86	1	5	
Zinc, mg/L		49	0.4	0.03	0.005	3	
Trihalomethanes		0	0	0	0	0.25	

Table D-9 Depot Treatment Plant Treated Water Quality (Physical and Chemical Analysis)

Sampling Location	Depot Treatment Plant						
Parameter	Period	No of Samples	Results			ADWG Limit (aesthetic/ health)	Comments
			Max	Average	Min		
Aluminium, mg/L	2004 to 2017	49	0.050	0.026	0.025	0.2	• One exceedance of Turbidity recorded
Boron, mg/L		49	0.030	0.016	0.010	0.6	
Chloride, mg/L		49	69.000	16.243	9.200	250	
Colour, HTU		48	13.000	1.906	0.500	15	
Copper, mg/L		49	0.030	0.015	0.015	0.8	
Fluoride, mg/L		49	0.680	0.399	0.050	1.5	
Hardness as CaCO3, mg/L		49	39.000	23.857	12.000	500	
Iron, mg/L		49	0.110	0.013	0.005	0.3	

Manganese, mg/L		49	0.015	0.005	0.005	0.5	
Nitrate as NO3, mg/L		49	20.000	5.858	0.250	50	
pH		49	8.120	7.146	6.390	6.5 – 8.5	
Sodium, mg/L		49	62.000	16.912	1.700	180	
Sulfate, mg/L		48	5.500	2.584	0.420	250	
Total Dissolved Solids, mg/L		49	235.000	105.571	59.000	500	
Turbidity, NTU		48	9.000	1.781	0.500	5	
Zinc, mg/L		49	0.400	0.030	0.005	3	
Trihalomethanes		2	0.006	0.006	0.006	0.25	

Table D-10 Reticulated Water Quality

Parameter	Period	No of Samples	Results			ADWG Limit (aesthetic/ health)	Comments
			Max	Average	Min		
Aluminium, mg/L	2000 to 2018	109	0.08	0.01	0	0.2	• Two exceedances of Turbidity recorded
Boron, mg/L		106	0.03	0.02	0	0.6	
Chloride, mg/L		109	31	16.59	11	250	
Colour, HTU		108	7	1.3	0.1	15	
Copper, mg/L		109	0.1	0.015	0	0.8	
Fluoride, mg/L		109	0.55	0.13	0.05	1.5	
Hardness as CaCO3, mg/L		109	40	29.80	13	500	
Iron, mg/L		109	0.15	0.02	0	0.3	
Manganese, mg/L		109	0.015	0.009	0	0.5	
Nitrate as NO3, mg/L		105	21	9.93	0.5	50	
pH		109	7.87	7.32	6.49	6.5 – 8.5	
Sodium, mg/L		109	29	19.66	11	180	
Sulfate, mg/L		108	13	3.88	1.2	250	
Total Dissolved Solids, mg/L		109	155	121.16	46	500	
Turbidity, NTU		108	8	1.09	0	5	
Zinc, mg/L		109	2	0.05	0.005	3	
Trihalomethanes		0	0	0	0	0.25	

Table D-11 Bacteria Testing for E. Coli Scheme 1 Reticulated Water Quality

Sample Point	Period	No of Samples	Passed	Failed	Comments
Jabiru Street, Toobanna (*Sample Point 5*)	1998 to 2018	117	117	0	
Trebonne State School (*Sample Point 6*)	1997 to 2018	116	116	0	
46 Orient Road, Blackrock (*Sample Point 8*)	1997 to 2018	118	118	0	
44 Gorton Street, Trebonne (*Sample Point 10*)	1997 to 2018	109	109	0	
32 Halifax Road (*Sample Point 18*)	1998 to 2018	101	101	0	
10 Victoria Mill Road (*Sample Point 19*)	1997 to 2018	133	133	0	
Ingham Water Tower (*Sample Point 21*)	1982 to 2018	204	204	0	
Tokalon Tower (*Sample Point 22*)	1983 to 2018	219	217	2	Exceeded guideline on 16 November 1988 and 1 March 1995.
High Lift at Depot (*Sample Point 23*)	1983 to 2018	160	160	0	
Trebonne Water Tower (*Sample Point 24*)	1982 to 2018	112	112	0	
Hi Lift at River (*Sample Point 25*)	1997 to 2018	134	134	0	
Townsville Road Old Library (*Sample Point 31*)	1982 to 1989	193	192	1	Exceeded guideline on 31 August 1988.
Sewerage Plant (*Sample Point 33*)	2004 to 2018	62	62	0	
1 Davidson Street, Ingham (*Sample Point 35*)	1982 to 1988	56	55	1	Exceeded guideline on 16 March 1988.
12 Marina Parade, Ingham (*Sample Point 36*)	1982 to 1995	164	163	1	Exceeded guideline on 30 March 1995
1 Forgan Street, Ingham (*Sample Point 37*)	1982 to 1996	175	173	2	Exceeded guideline on 3 February 1982 and 4 December 1986.
29 Palm Terrace, Ingham (*Sample Point 38*)	1984 to 1985	12	12	0	
43 Sir Arthur Fadden Parade, Ingham (*Sample Point 39*)	1985 to 1987	12	12	0	
Kelly Hall (*Sample Point 40*)	1983 to 1985	6	6	0	
Ingham Nursery (*Sample Point 41*)	1987 to 1993	2	2	0	
Bruce Highway, Toobanna (*Sample Point 42*)	1982 to 1994	44	43	1	Exceeded guideline on 15 February 1983.
Ingham Showgrounds (*Sample Point 43*)	1988 to 1995	19	19	0	

Shire Hall (*Sample Point 44*)	1986 to 1996	196	194	2	Exceeded guideline on 27 April 1994 and 1 March 1995.
International Club (*Sample Point 45*)	1989 to 1992	53	53	0	
Rotary Park (*Sample Point 46*)	1983 to 1995	6	6	0	
Trebonne Park (*Sample Point 47*)	1982 to 1996	42	42	0	
	TOTAL	2565	2555	10	

Table D-12 Water Quality Complaints Scheme 1

Year (Financial Year)	No of Water Quality Complaints	Water Quality Complaints per 1000 Connections	Main Reasons for Complaints	Likely Sources/Causes of Problems	Resolution of Problem
2003 – 2004	16	5	• Black Flaky substance in water (caused by flexible hose under sink) • Dirty Water • Dirty water with low pressure • Dirty Water, Oil and grease in water • Undrinkable water • High amount of chlorine	• Lack of Maintenance • Tuberculosis • Corrosion • Overload • Water cart (pressure issues) • Maintenance • Old Age • Air • Owners' responsibility	• Flushed hydrants • Flushed meter at house • Run water for air
2004 – 2005	36	11			
2005 – 2006	36	11			
2006 – 2007	18	6			
2007 – 2008	24	7			
2008 – 2009	21	6			
2009 – 2010	9	3			
2010 – 2011	2	1			
2011 – 2012	9	3			
2012 – 2013	3	1			
2013 – 2014	38	13			
2014 – 2015	7	2			
2015 – 2016	7	2			
2016 - 2017	17	6			
2017 - 2018	13	4			
2018 - 2019	4	1			
2019 - 2020	3	1			

Scheme 2 – Lower Herbert Water Supply

Table D-13 Macknade Well 1 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Macknade Well 1						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2009	5	0.2	0.03	0.03	0.03	• The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		5	0.6	0.03	0.02	0.01	
Chloride, mg/L		5	250	22.50	14.96	9.30	
Colour, HTU		5	15	2.00	1.30	0.50	
Copper, mg/L		5	0.8	0.02	0.02	0.02	
Fluoride, mg/L		5	1.5	0.06	0.05	0.05	
Hardness as CaCO3, mg/L		5	500	31.00	26.30	22.00	
Iron, mg/L		5	0.3	0.01	0.01	0.01	
Manganese, mg/L		5	0.5	0.05	0.02	0.01	
Nitrate as NO3, mg/L		5	50	10.00	7.26	3.80	
pH		5	6.5 – 8.5	6.48	6.28	6.16	
Sodium, mg/L		5	180	24.00	18.30	15.50	
Sulfate, mg/L		5	250	19.60	14.68	9.90	
Total Dissolved Solids, mg/L		5	500	140.00	120.20	110.00	
Turbidity, NTU		5	5	9.00	3.10	0.50	
Zinc, mg/L		5	3	0.03	0.02	0.01	

Table D-14 Macknade Well 2 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Macknade Well 2						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2009	3	0.2	0.03	0.03	0.03	• Well is abandoned, but will be reconstructed in future. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		3	0.6	0.08	0.04	0.02	
Chloride, mg/L		3	250	24.50	20.17	14.00	
Colour, HTU		3	15	2.00	1.33	1.00	
Copper, mg/L		3	0.8	0.02	0.02	0.02	
Fluoride, mg/L		3	1.5	0.10	0.07	0.05	
Hardness as CaCO3, mg/L		3	500	26.50	25.33	24.50	
Iron, mg/L		3	0.3	0.01	0.01	0.01	
Manganese, mg/L		3	0.5	0.05	0.04	0.02	
Nitrate as NO3, mg/L		3	50	9.20	7.10	5.20	
pH		3	6.5 – 8.5	6.20	6.18	6.15	
Sodium, mg/L		3	180	30.50	24.50	18.00	
Sulfate, mg/L		3	250	19.00	15.87	13.10	
Total Dissolved Solids, mg/L		3	500	150.00	139.00	117.00	
Turbidity, NTU		3	5	9.00	4.33	1.00	
Zinc, mg/L		3	3	0.07	0.03	0.01	

Table D-15 Macknade Well 3 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Macknade Well 3						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2008	5	0.2	0.03	0.03	0.03	• The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		5	0.6	0.06	0.03	0.01	
Chloride, mg/L		5	250	23.00	15.40	10.00	
Colour, HTU		5	15	2.00	1.00	0.50	
Copper, mg/L		5	0.8	0.02	0.02	0.02	
Fluoride, mg/L		5	1.5	0.06	0.05	0.05	
Hardness as CaCO3, mg/L		5	500	29.00	24.00	21.00	
Iron, mg/L		5	0.3	0.01	0.01	0.01	
Manganese, mg/L		5	0.5	0.04	0.02	0.01	
Nitrate as NO3, mg/L		5	50	8.90	7.22	4.70	
pH		5	6.5 – 8.5	6.47	6.28	6.15	
Sodium, mg/L		5	180	24.50	18.30	15.00	
Sulfate, mg/L		5	250	18.50	12.16	9.50	
Total Dissolved Solids, mg/L		5	500	150.00	117.60	100.00	
Turbidity, NTU		5	5	2.00	1.50	0.50	

Zinc, mg/L		5	3	0.05	0.03	0.01	

Table D-16 Macknade Bore 4 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Macknade Bore 4						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2007	5	0.2	0.025	0.025	0.025	• The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		5	0.6	0.04	0.022	0.01	
Chloride, mg/L		5	250	17	12.94	9.2	
Colour, HTU		5	15	2	1.1	0.5	
Copper, mg/L		5	0.8	0.015	0.015	0.015	
Fluoride, mg/L		5	1.5	0.05	0.05	0.05	
Hardness as CaCO3, mg/L		5	500	31.5	29.8	25.5	
Iron, mg/L		5	0.3	0.005	0.005	0.005	
Manganese, mg/L		5	0.5	0.015	0.011	0.005	
Nitrate as NO3, mg/L		5	50	23	16.6	11.5	
pH		5	6.5 – 8.5	6.41	6.138	6	
Sodium, mg/L		5	180	18	15.6	13	
Sulfate, mg/L		5	250	12.5	11.42	10.9	
Total Dissolved Solids, mg/L		5	500	127	118.8	110	
Turbidity, NTU		5	5	2	1.1	0.5	
Zinc, mg/L		5	3	0.05	0.026	0.005	

Table D-17 Macknade Bore 5 Raw Water Quality (Chemical Analysis)

Sampling Location	Macknade Bore 5						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2007	6	0.2	0.03	0.03	0.03	• Variations in iron levels. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		6	0.6	0.03	0.02	0.01	
Chloride, mg/L		6	250	12.00	10.07	8.40	
Colour, HTU		6	15	8.00	2.00	0.50	
Copper, mg/L		6	0.8	0.03	0.02	0.02	
Fluoride, mg/L		6	1.5	0.05	0.05	0.05	
Hardness as CaCO3, mg/L		6	500	33.00	29.17	21.00	
Iron, mg/L		6	0.3	0.43	0.08	0.01	
Manganese, mg/L		6	0.5	0.04	0.02	0.01	
Nitrate as NO3, mg/L		6	50	25.00	16.03	7.50	
pH		6	6.5 – 8.5	6.36	6.19	6.10	
Sodium, mg/L		6	180	14.00	13.75	12.50	
Sulfate, mg/L		6	250	16.50	13.50	11.10	
Total Dissolved Solids, mg/L		6	500	123.00	115.67	110.00	
Turbidity, NTU		6	5	2.00	1.00	0.50	
Zinc, mg/L		6	3	0.08	0.02	0.01	

Table D-18 Macknade Combined Bores Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Macknade Combined Bores						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2000 to 2017	37	0.2	0.80	0.05	0.00	
Boron, mg/L		34	0.6	0.13	0.03	0.01	
Chloride, mg/L		37	250	31	13.77	6.00	
Colour, HTU		35	15	7.00	1.89	0.50	
Copper, mg/L		37	0.8	0.04	0.015	0.00	
Fluoride, mg/L		37	1.5	9.00	0.26	0.05	
Hardness as CaCO3, mg/L		37	500	34	27.61	22.00	
Iron, mg/L		37	0.3	0.15	0.01	0.01	
Manganese, mg/L		37	0.5	0.04	0.01	0.01	
Nitrate as NO3, mg/L		33	50	22.00	13.92	6.8	
pH		37	6.5 – 8.5	9.20	6.6	5.90	
Sodium, mg/L		37	180	30	17.11	11.00	
Sulfate, mg/L		37	250	19.00	12.15	1.90	
Total Dissolved Solids, mg/L		37	500	160	113.55	22.50	
Turbidity, NTU		36	5	6.00	1.33	0.20	

Zinc, mg/L		37	3	0.16	0.02	0.00	

Table D-19 Halifax Well 1 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Halifax Well 1						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2005	3	0.2	0.03	0.03	0.03	• Well to be closed down and be used for emergencies only with petrol pump. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		3	0.6	0.04	0.02	0.01	
Chloride, mg/L		3	250	56.00	43.00	24.50	
Colour, HTU		3	15	2.00	1.17	0.50	
Copper, mg/L		3	0.8	0.06	0.03	0.02	
Fluoride, mg/L		3	1.5	0.20	0.12	0.05	
Hardness as CaCO3, mg/L		3	500	107.00	71.33	48.00	
Iron, mg/L		3	0.3	0.01	0.01	0.01	
Manganese, mg/L		3	0.5	0.05	0.03	0.02	
Nitrate as NO3, mg/L		3	50	28.00	20.00	11.50	
pH		3	6.5 – 8.5	7.66	7.19	6.50	
Sodium, mg/L		3	180	38.00	31.67	22.50	
Sulfate, mg/L		3	250	12.50	11.50	9.90	
Total Dissolved Solids, mg/L		3	500	271.00	203.67	140.00	
Turbidity, NTU		3	5	0.50	0.50	0.50	
Zinc, mg/L		3	3	0.04	0.02	0.01	

Table D-20 Halifax Bore 2 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Halifax Well 2						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2012	8	0.2	0.03	0.03	0.03	• Well to be closed down and be used for emergencies only with petrol pump. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		8	0.6	0.08	0.03	0.01	
Chloride, mg/L		8	250	90.00	35.83	6.1	
Colour, HTU		8	15	3.00	1.88	1.00	
Copper, mg/L		8	0.8	0.02	0.02	0.02	
Fluoride, mg/L		8	1.5	0.08	0.05	0.05	
Hardness as CaCO3, mg/L		8	500	117.00	55.00	35.00	
Iron, mg/L		8	0.3	0.01	0.01	0.01	
Manganese, mg/L		8	0.5	0.05	0.03	0.02	
Nitrate as NO3, mg/L		8	50	26.00	13.14	6.30	
pH		8	6.5 – 8.5	7.66	6.65	6.34	
Sodium, mg/L		8	180	51.00	26.69	11.00	
Sulfate, mg/L		8	250	14.90	8.55	3.90	
Total Dissolved Solids, mg/L		8	500	300.00	167.88	112	
Turbidity, NTU		8	5	6.00	1.38	0.50	
Zinc, mg/L		8	3	0.10	0.04	0.01	

Table D-21 Halifax Bore 3 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Halifax Bore 3						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2015	5	0.2	0.03	0.03	0.03	• Chloride levels in raw water above guideline in one sample. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		5	0.6	0.15	0.08	0.02	
Chloride, mg/L		5	250	590	234.20	73.00	
Colour, HTU		5	15	2.00	1.25	1.00	
Copper, mg/L		5	0.8	0.02	0.02	0.02	
Fluoride, mg/L		5	1.5	0.10	0.06	0.05	
Hardness as CaCO3, mg/L		5	500	292	1.37.20	59.00	
Iron, mg/L		5	0.3	0.02	0.01	0.01	
Manganese, mg/L		5	0.5	0.38	0.15	0.05	
Nitrate as NO3, mg/L		5	50	22.00	10.54	3.90	
pH		5	6.5 – 8.5	7.05	6.62	6.23	
Sodium, mg/L		5	180	321	136.20	57.00	
Sulfate, mg/L		5	250	79	41.10	15.50	
Total Dissolved Solids, mg/L		5	500	1190	548.60	250.00	

Turbidity, NTU		5	5	5.00	3.25	2.00	
Zinc, mg/L		5	3	0.04	0.02	0.01	

Table D-22 Halifax Well 4 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Halifax Well 4						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2013	11	0.2	0.03	0.03	0.03	• Well to be reconstructed in future. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		11	0.6	0.05	0.03	0.01	
Chloride, mg/L		11	250	44.50	30.06	6.70	
Colour, HTU		11	15	5	1.36	0.50	
Copper, mg/L		11	0.8	0.06	0.02	0.02	
Fluoride, mg/L		11	1.5	0.06	0.05	0.05	
Hardness as CaCO3, mg/L		11	500	63.00	44.55	25.00	
Iron, mg/L		11	0.3	0.01	0.01	0.01	
Manganese, mg/L		11	0.5	0.30	0.05	0.01	
Nitrate as NO3, mg/L		11	50	34.00	12.68	5.2	
pH		11	6.5 – 8.5	7.07	6.43	6.11	
Sodium, mg/L		11	180	35.00	23.55	8.00	
Sulfate, mg/L		11	250	16.00	9.14	4.4	
Total Dissolved Solids, mg/L		11	500	200.00	151.36	92.00	
Turbidity, NTU		11	5	2.00	0.91	0.50	
Zinc, mg/L		11	3	0.05	0.02	0.01	

Table D-23 Halifax Bore 5 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Halifax Bore 5						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2006	6	0.2	0.03	0.03	0.03	• Chloride levels in raw water above guideline in one sample. • Bore 5 is high in salt, but can pumping rate to be reconfigured to avoid this. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		6	0.6	0.12	0.07	0.01	
Chloride, mg/L		6	250	253.00	149.83	67.00	
Colour, HTU		6	15	5.00	1.67	0.50	
Copper, mg/L		6	0.8	0.02	0.02	0.02	
Fluoride, mg/L		6	1.5	0.20	0.09	0.05	
Hardness as CaCO3, mg/L		6	500	115.00	83.67	67.00	
Iron, mg/L		6	0.3	0.05	0.02	0.01	
Manganese, mg/L		6	0.5	0.13	0.06	0.02	
Nitrate as NO3, mg/L		6	50	36.00	15.02	4.30	
pH		6	6.5 – 8.5	6.91	6.67	6.50	
Sodium, mg/L		6	180	150.00	74.67	6.00	
Sulfate, mg/L		6	250	33.00	25.17	15.50	
Total Dissolved Solids, mg/L		6	500	598.00	409.00	250.00	
Turbidity, NTU		6	5	3.00	1.42	0.50	
Zinc, mg/L		6	3	0.06	0.02	0.01	

Table D-24 Halifax Combined Bore Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Halifax Combined Bore						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2000 to 2009	20	0.2	0.17	0.03	0.00	• High iron levels.
Boron, mg/L		17	0.6	0.08	0.05	0.01	
Chloride, mg/L		20	250	110.00	65.90	19.00	
Colour, HTU		19	15	9.00	2.45	0.50	
Copper, mg/L		20	0.8	0.03	0.01	0.00	
Fluoride, mg/L		20	1.5	0.40	0.09	0.05	
Hardness as CaCO3, mg/L		20	500	93.00	59.92	34.00	
Iron, mg/L		20	0.3	0.39	0.05	0.01	
Manganese, mg/L		20	0.5	0.07	0.04	0.01	
Nitrate as NO3, mg/L		17	50	23.00	13.63	7.10	
pH		20	6.5 – 8.5	7.29	6.75	4.31	
Sodium, mg/L		20	180	72.00	43.82	3.10	
Sulfate, mg/L		20	250	21.50	14.92	3.00	

Total Dissolved Solids, mg/L		20	500	330.00	225.65	135.00	
Turbidity, NTU		19	5	8.00	2.52	0.20	
Zinc, mg/L		20	3	0.04	0.02	0.00	

Table D-25 Halifax WTP Treated Water Quality (Physical and Chemical Analysis)

Sampling Location	Halifax WTP						
Parameter	Period	No of Samples	Results			ADWG Limit (aesthetic/ health)	Comments
			Max	Average	Min		
Aluminium, mg/L	2002 to 2017	26	0.080	0.032	0.025	0.2	• No exceedance of guideline.
Boron, mg/L		25	0.07	0.03	0.02	0.6	
Chloride, mg/L		26	220	44.95	13	250	
Colour, HTU		26	11	1.04	0.5	15	
Copper, mg/L		26	0.015	0.015	0.015	0.8	
Fluoride, mg/L		26	0.72	0.28	0.05	1.5	
Hardness as CaCO3, mg/L		26	131	43.41	24	500	
Iron, mg/L		26	0.03	0.01	0.005	0.3	
Manganese, mg/L		26	0.015	0.008	0.005	0.5	
Nitrate as NO3, mg/L		26	18	9.08	4.9	50	
pH		26	7.63	7.38	6.860	6.5 – 8.5	
Sodium, mg/L		26	121	32.66	15	180	
Sulfate, mg/L		26	33	11.35	5.6	250	
Total Dissolved Solids, mg/L		26	491	173.07	104	500	
Turbidity, NTU		26	4	0.89	0.5	5	
Zinc, mg/L		26	0.060	0.02	0.005	3	
Trihalomethanes		0	0	0	0	0.25	

Table D-26 Macknade WTP Treated Water Quality (Physical and Chemical Analysis)

Sampling Location	Macknade WTP						
Parameter	Period	No of Samples	Results			ADWG Limit (aesthetic/ health)	Comments
			Max	Average	Min		
Aluminium, mg/L	2008 to 2017	65	0.025	0.025	0.025	0.2	• No exceedance of guideline.
Boron, mg/L		65	0.05	0.03	0.02	0.6	
Chloride, mg/L		65	33	20.38	12	250	
Colour, HTU		65	6	0.56	0.5	15	
Copper, mg/L		65	0.07	0.025	0.015	0.8	
Fluoride, mg/L		65	0.72	0.47	0.41	1.5	
Hardness as CaCO3, mg/L		65	34	26.89	23	500	
Iron, mg/L		65	0.02	0.006	0.005	0.3	
Manganese, mg/L		65	0.005	0.005	0.005	0.5	
Nitrate as NO3, mg/L		65	17	10.01	6.3	50	
pH		65	7.58	7.1	6.71	6.5 – 8.5	
Sodium, mg/L		65	32	22.09	15	180	
Sulfate, mg/L		65	14	10.56	8	250	
Total Dissolved Solids, mg/L		65	167	129.32	105	500	
Turbidity, NTU		65	5	1	1	5	
Zinc, mg/L		65	0.34	0.03	0.01	3	
Trihalomethanes		0	0	0	0	0.25	

Table 3-27 Reticulated Water Quality

Parameter	Period	No of Samples	Results			ADWG Limit (aesthetic/ health)	Comments
			Max	Average	Min		
Aluminium, mg/L	2000 to 2018	110	0.11	0.025	0	0.2	• Exceedance of pH. • Exceedance of turbidity. • Exceedance of Manganese.
Boron, mg/L		105	0.05	0.02	0	0.6	
Chloride, mg/L		110	70	20.64	11	250	
Colour, HTU		109	12	1.41	0.5	15	
Copper, mg/L		109	0.05	0.015	0	0.8	
Fluoride, mg/L		110	0.59	0.21	0	1.5	
Hardness as CaCO3, mg/L		110	64	33.19	16	500	
Iron, mg/L		110	0.1	0.01	0.005	0.3	
Manganese, mg/L		110	4.7	0.05	0	0.5	
Nitrate as NO3, mg/L		104	22	11.75	1.7	50	
pH		110	9.61	7.45	6.98	6.5 – 8.5	
Sodium, mg/L		110	52	21.35	12	180	

Sulfate, mg/L		108	17	10.24	1.6	250	
Total Dissolved Solids, mg/L		110	240	133.75	69	500	
Turbidity, NTU		109	9	1.01	0.2	5	
Zinc, mg/L		110	0.09	0.01	0	3	
Trihalomethanes		0	0	0	0	0.25	

Table D-28 Bacteria Testing for E. Coli Scheme 2 Reticulated Water Quality

Sample Point	Period	No of Samples	Passed	Failed	Comments
Bemerside Hurley's *(Sample Point 1)*	1997 to 2018	121	121	0	
26 Marbelli Street *(Sample Point 2)*	1997 to 2018	82	82	0	
Rupp's on Alma Street (Sample Point 3)	1984 to 2009	207	206	1	Exceeded guideline on 7 February 1990.
7 Anderssen Street *(Sample Point 4)*	1988 to 2017	75	75	0	
Lucinda Water Tower *(Sample Point 11)*	1998 to 2009	14	14	0	
End of Patterson Parade *(Sample Point 12)*	1988 to 2018	149	149	0	
Corner of Bruce Parade and Vass Street *(Sample Point 13)*	1998 to 2009	79	79	0	
Dungeness *(Sample Point 14)*	1988 to 2018	206	206	0	
Taylors Beach Water Tower *(Sample Point 15)*	1997 to 1998	3	3	0	
End of John Dory Street *(Sample Point 16)*	1993 to 2018	121	120	1	Exceeded guideline on 17 January 1996.
2 Sardine Street *(Sample Point 17)*	1997 to 2018	125	124	1	Exceeded guideline on 21 July 1998.
Washaway Booster Pump Station *(Sample Point 28)*	1998 to 2018	88	88	0	
Halifax Treatment Plant *(Sample Point 29)*	1998 to 2018	122	122	0	
Halifax Water Tower *(Sample Point 30)*	1998 to 2018	112	112	0	
Halifax Depot *(Sample Point 31)*	2004 to 2018	60	60	0	
Macknade Treatment Plant *(Sample Point 32)*	2004 to 2018	90	89	1	Exceeded guideline on 23 July 2014
Lucinda Caravan Park *(Sample Point 32)*	1982 to 1995	79	78	1	Exceeded guideline on 16 July 1984.
Lions Park *(Sample Point 33)*	1982 to 1995	97	96	1	Exceeded guideline on 16 July 1984.
Mona Road *(Sample Point 39)*	2008 to 2018	35	35	0	
Cordelia School Road *(Sample Point 40)*	2009 to 2018	57	57	0	
Mill Road *(Sample Point 41)*	2008 to 2018	31	31	0	
Taylors Beach Boat Ramp *(Sample Point 50)*	1983 to 1994	125	124	1	Exceeded guideline on 28 July 1993.
Taylors Beach Picnic Area *(Sample Point 51)*	1982 to 1996	143	141	2	Exceeded guideline on 28 July 1993 to 17 January 1996.
Borello Park *(Sample Point 52)*	1988 to 1993	60	60	0	
Halifax Library *(Sample Point 53)*	1982 to 1995	145	142	3	Exceeded guideline on 27 January 1982, 21 September 1983 and 7 February 1990.
	TOTAL	2426	2414	12	

Table D-29 Water Quality Complaints Scheme 2

Year (Financial Year)	No of Water Quality Complaints	Water Quality Complaints per 1000 Connections	Main Reasons for Complaints	Likely Sources/Causes of Problems	Resolution of Problem
2003 – 2004	4	4	• Black Flaky substance in water (caused by flexible hose under sink) • Dirty Water • Dirty water with low pressure • Dirty Water, Oil and grease in water • Undrinkable water	• Lack of Maintenance • Tuberculosis • Corrosion • Overload • Water cart (pressure issues) • Maintenance • Old Age	• Flushed hydrants • Flushed meter at house • Run water for air
2004 – 2005	6	6			
2005 – 2006	6	6			
2006 – 2007	2	2			
2007 – 2008	3	3			

2008 – 2009	2	2	• High amount of chlorine	• Air • Owners responsibility	
2009 – 2010	2	2			
2010 – 2011	1	1			
2011 – 2012	0	0			
2012 – 2013	1	1			

Scheme 3 – Forrest Beach Water Supply

Table D-30 Well 1 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Well 1						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2009	3	0.2	0.03	0.03	0.03	• The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		1	0.6	0.01	0.01	0.01	
Chloride, mg/L		3	250	14.60	13.53	12.50	
Colour, HTU		3	15	37.00	14.83	0.50	
Copper, mg/L		3	0.8	0.02	0.01	0.00	
Fluoride, mg/L		3	1.5	0.06	0.05	0.05	
Hardness as CaCO3, mg/L		3	500	23.50	20.70	16.10	
Iron, mg/L		3	0.3	0.39	0.13	0.01	
Manganese, mg/L		3	0.5	1.20	0.47	0.09	
Nitrate as NO3, mg/L		3	50	7.00	3.47	0.02	
pH		3	6.5 – 8.5	6.57	6.49	6.35	
Sodium, mg/L		3	180	16.60	14.37	12.50	
Sulfate, mg/L		3	250	7.50	6.67	6.10	
Total Dissolved Solids, mg/L		3	500	100.00	97.33	95.00	
Turbidity, NTU		3	5	4.30	3.43	3.00	
Zinc, mg/L		3	3	0.04	0.02	0.01	

Table D-31 Well 2 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Well 2						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2009	5	0.2	0.03	0.02	0.01	• The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		4	0.6	0.05	0.03	0.01	
Chloride, mg/L		5	250	20.00	16.16	9.10	
Colour, HTU		5	15	10.00	4.30	0.50	
Copper, mg/L		5	0.8	0.02	0.01	0.00	
Fluoride, mg/L		5	1.5	0.05	0.05	0.05	
Hardness as CaCO3, mg/L		5	500	38.00	27.76	19.00	
Iron, mg/L		5	0.3	0.17	0.04	0.01	
Manganese, mg/L		5	0.5	0.07	0.04	0.01	
Nitrate as NO3, mg/L		4	50	7.50	3.13	0.60	
pH		5	6.5 – 8.5	6.50	6.27	6.05	
Sodium, mg/L		5	180	25.00	18.40	13.00	
Sulfate, mg/L		5	250	42.00	28.12	5.60	
Total Dissolved Solids, mg/L		5	500	162.00	124.80	92.00	
Turbidity, NTU		4	5	29.00	15.75	3.00	
Zinc, mg/L		5	3	0.03	0.02	0.01	

Table D-32 Well 3 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Well 3						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2009	7	0.2	0.19	0.05	0.03	• The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		6	0.6	0.04	0.03	0.01	
Chloride, mg/L		7	250	15.00	12.70	10.50	
Colour, HTU		7	15	51.00	10.00	0.50	
Copper, mg/L		7	0.8	0.02	0.01	0.00	
Fluoride, mg/L		7	1.5	0.05	0.05	0.04	
Hardness as CaCO3, mg/L		7	500	27.00	22.60	12.20	
Iron, mg/L		7	0.3	0.26	0.04	0.01	
Manganese, mg/L		7	0.5	0.08	0.02	0.00	
Nitrate as NO3, mg/L		6	50	9.10	7.20	4.30	
pH		7	6.5 – 8.5	6.83	6.52	6.15	
Sodium, mg/L		7	180	17.00	14.76	12.00	
Sulfate, mg/L		7	250	11.00	6.83	4.10	
Total Dissolved Solids, mg/L		7	500	113.00	100.29	86.00	
Turbidity, NTU		7	5	16.00	5.89	1.00	

Zinc, mg/L		7	3	0.05	0.02	0.01	

Table D-33 Bore 4 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Bore 4						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2009	9	0.2	0.03	0.03	0.03	• The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		9	0.6	0.05	0.03	0.01	
Chloride, mg/L		9	250	25.00	20.22	14.00	
Colour, HTU		9	15	4.00	1.89	0.50	
Copper, mg/L		9	0.8	0.02	0.02	0.02	
Fluoride, mg/L		9	1.5	0.10	0.06	0.05	
Hardness as CaCO3, mg/L		9	500	36.00	27.72	16.00	
Iron, mg/L		9	0.3	0.01	0.01	0.01	
Manganese, mg/L		9	0.5	0.10	0.08	0.06	
Nitrate as NO3, mg/L		9	50	1.50	0.62	0.25	
pH		9	6.5 – 8.5	6.35	6.06	5.86	
Sodium, mg/L		9	180	24.00	19.34	1.60	
Sulfate, mg/L		9	250	49.00	37.67	19.50	
Total Dissolved Solids, mg/L		9	500	166.00	143.67	100.00	
Turbidity, NTU		9	5	21.00	10.78	7.00	
Zinc, mg/L		9	3	0.04	0.02	0.01	

Table D-34 Bore 6 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Bore 6						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2016	15	0.2	0.03	0.02	0.00	• Has been upgraded from a well. • Emergency use only. • The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		13	0.6	0.15	0.05	0.01	
Chloride, mg/L		15	250	19.60	15.09	11.00	
Colour, HTU		16	15	249.00	22.38	0.50	
Copper, mg/L		15	0.8	0.02	0.01	0.00	
Fluoride, mg/L		15	1.5	0.15	0.05	0.05	
Hardness as CaCO3, mg/L		15	500	70.00	32.95	12.00	
Iron, mg/L		15	0.3	23.40	1.9	0.01	
Manganese, mg/L		15	0.5	0.91	0.17	0.03	
Nitrate as NO3, mg/L		13	50	1.90	0.50	0.25	
pH		16	6.5 – 8.5	6.25	5.44	3.35	
Sodium, mg/L		15	180	42.00	24.09	15.00	
Sulfate, mg/L		15	250	151.00	63.68	16.00	
Total Dissolved Solids, mg/L		15	500	281.00	162.73	73.00	
Turbidity, NTU		16	5	215.00	59.89	16	
Zinc, mg/L		15	3	0.22	0.04	0.00	

Table D-35 Bore 7 Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Bore 7						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	2002 to 2009	12	0.2	0.03	0.03	0.03	• The number of samples for individual bores can vary as samples are usually taken from the aerator (Combined Bores).
Boron, mg/L		12	0.6	0.09	0.04	0.01	
Chloride, mg/L		12	250	25.00	16.88	13.00	
Colour, HTU		12	15	4.00	1.50	0.50	
Copper, mg/L		12	0.8	0.02	0.02	0.02	
Fluoride, mg/L		12	1.5	0.10	0.06	0.05	
Hardness as CaCO3, mg/L		12	500	39.00	19.21	10.50	
Iron, mg/L		12	0.3	0.11	0.02	0.01	
Manganese, mg/L		12	0.5	0.10	0.05	0.01	
Nitrate as NO3, mg/L		12	50	1.90	0.74	0.25	
pH		11	6.5 – 8.5	8.89	6.14	5.52	
Sodium, mg/L		12	180	24.00	21.29	17.00	
Sulfate, mg/L		12	250	48.00	32.25	19.00	
Total Dissolved Solids, mg/L		12	500	150.00	127.08	100.00	
Turbidity, NTU		12	5	36.00	21.33	2.00	

Zinc, mg/L		12	3	0.10	0.04	0.01	

Table D-36 Combined Bores Raw Water Quality (Physical and Chemical Analysis)

Sampling Location	Combined Bores						
Parameter	Period	No of Samples	ADWG Limit (aesthetic/ health)	Results			Comments
				Max	Average	Min	
Aluminium, mg/L	1999 to 2017	33	0.2	0.49	0.05	0.00	
Boron, mg/L		27	0.6	0.32	0.05	0.01	
Chloride, mg/L		33	250	26.00	16.03	1.5	
Colour, HTU		31	15	60.00	7.65	0.50	
Copper, mg/L		33	0.8	0.04	0.01	0.00	
Fluoride, mg/L		33	1.5	0.35	0.07	0.04	
Hardness as CaCO3, mg/L		33	500	125	31.29	12.00	
Iron, mg/L		33	0.3	14.5	1.49	0.01	
Manganese, mg/L		33	0.5	3.3	0.16	0.01	
Nitrate as NO3, mg/L		27	50	2.10	1.17	0.25	
pH		33	6.5 – 8.5	7.29	6.01	3.98	
Sodium, mg/L		33	180	30.00	19.85	13.50	
Sulfate, mg/L		33	250	82.00	28.66	6	
Total Dissolved Solids, mg/L		33	500	181.00	124.05	67.00	
Turbidity, NTU		31	5	91.00	22.15	1.20	
Zinc, mg/L		33	3	0.33	0.04	0.00	

Table D-37 Treated Water Quality (Physical and Chemical Analysis)

Sampling Location	Forrest Beach Water Treatment Plant						
Parameter	Period	No of Samples	Results			ADWG Limit (aesthetic/health)	Comments
			Max	Average	Min		
Aluminium, mg/L	1999 to 2017	50	0.025	0.024	0.01	0.2	• Exceedance of iron. • Exceedance of turbidity.
Boron, mg/L		49	0.05	0.03	0.01	0.6	
Chloride, mg/L		50	29	19.6	13.3	250	
Colour, HTU		50	14	4.84	0.5	15	
Copper, mg/L		50	0.015	0.014	0	0.8	
Fluoride, mg/L		50	0.82	0.49	0.05	1.5	
Hardness as CaCO3, mg/L		50	44	28.09	14	500	
Iron, mg/L		50	0.77	0.24	0.01	0.3	
Manganese, mg/L		50	0.015	0.008	0.005	0.5	
Nitrate as NO3, mg/L		49	11	3.33	0.7	50	
pH		50	8.31	7.67	7.11	6.5 – 8.5	
Sodium, mg/L		50	29	21.5	17	180	
Sulfate, mg/L		50	35	14.15	0	250	
Total Dissolved Solids, mg/L		50	155	126.48	90	500	
Turbidity, NTU		50	12	1.71	1	5	
Zinc, mg/L		50	0.09	0.01	0	3	
Trihalomethanes		0	0	0	0	0.25	

Table D-38 Reticulated Water Quality

Parameter	Period	No of Samples	Results			ADWG Limit (aesthetic/ health)	Comments
			Max	Average	Min		
Aluminium, mg/L	2000 to 2018	65	0.2	0.025	0.000	0.2	• Exceedance of iron. • Exceedance of pH. • Exceedance of turbidity. • Exceedance of colour.
Boron, mg/L		61	0.07	0.03	0.01	0.6	
Chloride, mg/L		65	30	20.08	11	250	
Colour, HTU		65	65	5.37	0.5	15	
Copper, mg/L		65	0.2	0.01	0	0.8	
Fluoride, mg/L		65	0.64	0.1	0.050	1.5	
Hardness as CaCO3, mg/L		65	64	34.25	17	500	
Iron, mg/L		65	52	0.96	0.005	0.3	
Manganese, mg/L		65	0.17	0.01	0	0.5	
Nitrate as NO3, mg/L		60	9	2.09	0.5	50	
pH		66	9.4	7.62	5.6	6.5 – 8.5	
Sodium, mg/L		65	28	22.15	17	180	
Sulfate, mg/L		65	72	24.50	7	250	
Total Dissolved Solids, mg/L		65	173	136.52	87	500	
Turbidity, NTU		65	17.5	2.78	0.3	5	

Zinc, mg/L		65	0.28	0.02	0	3	
Trihalomethanes		0	0	0	0	0.25	

Table D-39 Bacteria Testing for E. Coli Scheme 3 Reticulated Water Quality

Sample Point	Period	No of Samples	Passed	Failed	Comments
End of Allamanda Avenue *(Sample Point 7)*	1997 to 2018	139	139	0	
Coconut Grove *(Sample Point 9)*	1998 to 2018	115	115	0	
End Beatts Road *(Sample Point 20)*	1989 to 2018	132	132	0	
Hi Lift Pumps Forrest Beach *(Sample Point 26)*	1997 to 2018	152	152	0	
Water Tower Forrest Beach *(Sample Point 27)*	1989 to 2018	208	207	1	Exceeded guideline on 28 May 2002.
End of Pangola Street *(Sample Point 37)*	2008 to 2018	43	43	0	
Bill Johnson Drive *(Sample Point 36)*	2009 to 2018	62	62	0	
Blackbean Street *(Sample Point 38)*	2008 to 2018	65	65	0	
Forrest Beach Boat Ramp *(Sample Point 48)*	1982 to 1995	129	125	4	Exceeded guideline on 13 April 1985, 23 June 1988, 31 May 1989 and 12 July 199.
Forrest Beach Picnic Area *(Sample Point 49)*	1982 to 1995	131	128	3	Exceeded guideline on 23 June 1988, 31 May 1989 and 25 October 1989.
		1176	1168	8	

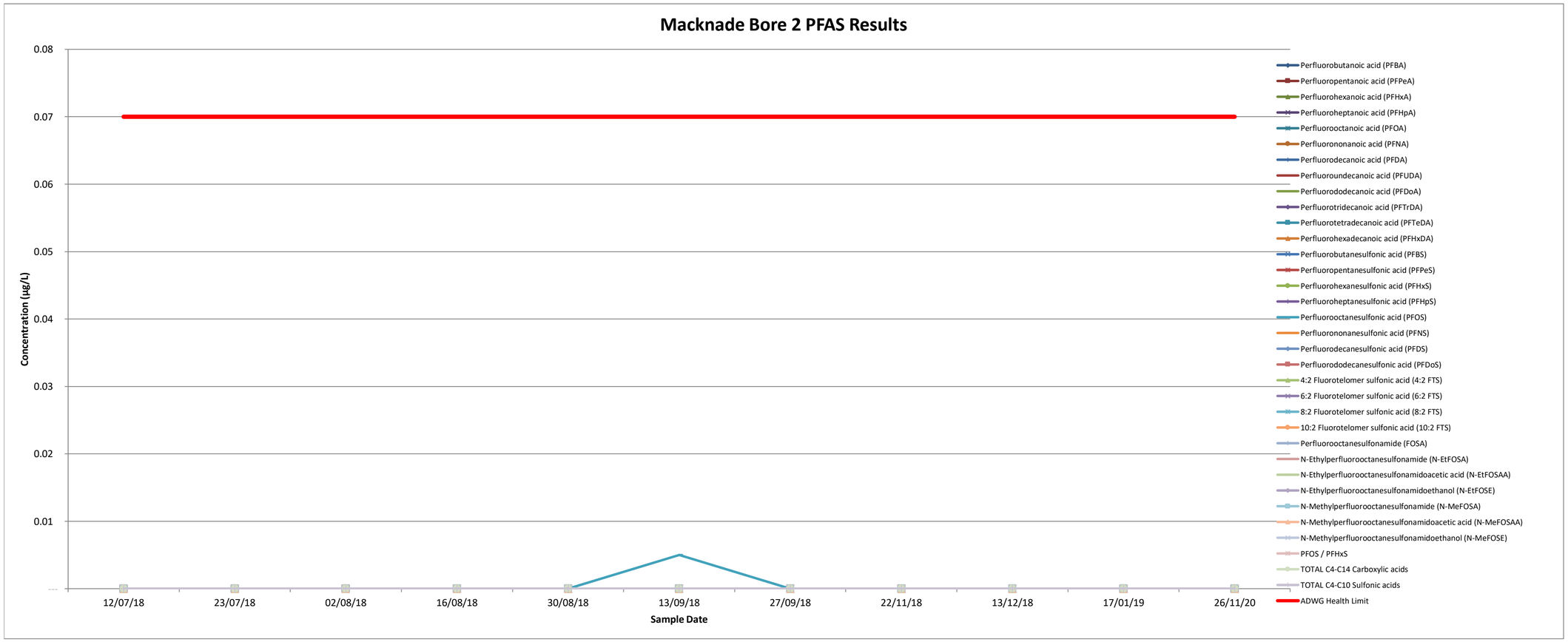
Table D-40 Water Quality Complaints Scheme 3

Year (Financial Year)	No of Water Quality Complaints	Water Quality Complaints per 1000 Connections	Main Reasons for Complaints	Likely Sources/Causes of Problems	Resolution of Problem
2003 – 2004	4	4	• Black Flaky substance in water (caused by flexible hose under sink) • Dirty Water • Dirty water with low pressure • Dirty Water, Oil and grease in water • Undrinkable water • High amount of chlorine	• Lack of Maintenance • Tuberculosis • Corrosion • Overload • Water cart (pressure issues) • Maintenance • Old Age • Air • Owners responsibility	• Flushed hydrants • Flushed meter at house • Run water for air
2004 – 2005	20	20			
2005 – 2006	8	8			
2006 – 2007	2	2			
2007 – 2008	2	2			
2008 – 2009	11	11			
2009 – 2010	8	8			
2010 – 2011	4	4			
2011 – 2012	3	3			
2012 – 2013	1	1			
2013 – 2014	6	6			
2014 – 2015	1	1			
2015 – 2016	1	1			
2016 – 2017	4	4			
2017 - 2018	2	2			
2018 - 2019	3	1			
2019 - 2020	1	1			

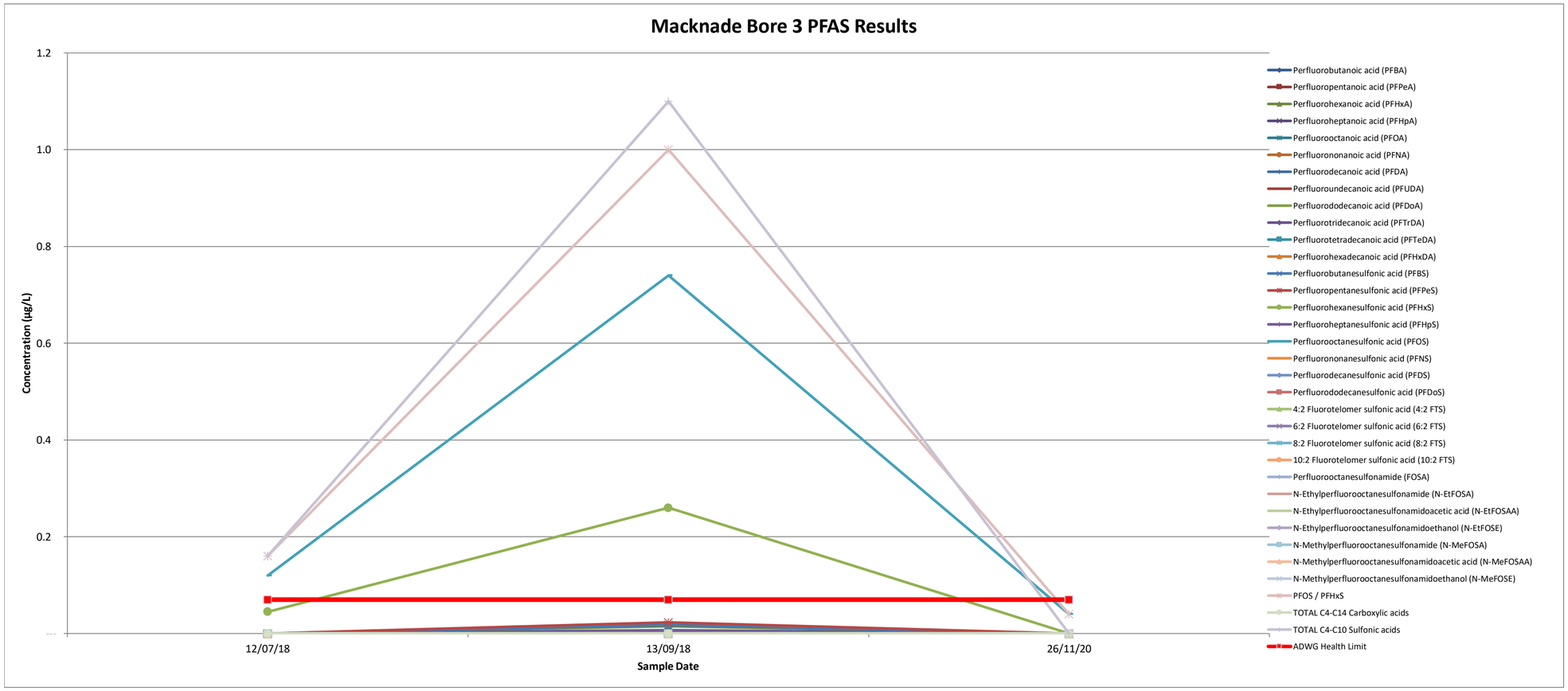
Water Sample Data – PFAS Testing Results

Client sample name			HSC005	HSC006	HSC007	HSC008	HSC1238	HIN1242	HIN1243	HIN1244	HIN1245	HIN1246	HIN1247	HIN1251	HIN1254	HIN1262	HIN1429	HIN1430	HIN1431	HIN1432	HIN1433
Sample Point			Macknade Sample Point 2	Lucinda BPS	Sample Point 14 Dungeness	Sample Point 12 Patterson Pde	Macknade TP	SP 41 Mill Road	SP 14 Dungeness	SP 54 Lucinda Pump	SP 12 Patterson PDE	SP 30 Halifax Tower	SP 16 John Dory Beach	Dungeness SP 14	Dungeness SP14	Dungeness SP14	SP 41 Mill Road	SP 13 Vass Street	SP 30 Halifax Tower	SP 53 Victoria Terrace	SP 17 Sardine Street
Date Sample Taken	LOR	Health	12/07/18	12/07/18	12/07/18	12/07/18	18/07/18	23/07/18	23/07/18	23/07/18	23/07/18	23/07/18	23/07/18	02/08/18	16/08/18	27/09/18	17/12/20	17/12/20	17/12/20	17/12/20	17/12/20
Location numbers	(µg/L)	value	18KE5989	18KE5990	18KE5991	18KE5992	SS18KE6178	18KE6214	18KE6215	18KE6216	18KE6217	18KE6218	18KE6219	18KE6554	18KE6855	18KE7733					
Perfluorobutanoic acid (PFBA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanoic acid (PFPeA)	0.007	---	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Perfluorohexanoic acid (PFHxA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroheptanoic acid (PFHpA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanoic acid (PFOA)	0.007	0.56	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Perfluorononanoic acid (PFNA)	0.007	---	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Perfluorodecanoic acid (PFDA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUDA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoA)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorotridecanoic acid (PFTrDA)	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perfluorotetradecanoic acid (PFTeDA)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorohexadecanoic acid (PFHxDA)	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perfluorobutanesulfonic acid (PFBS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoropentanesulfonic acid (PFPeS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorohexanesulfonic acid (PFHxS)	0.005	0.07	0.022	0.021	0.022	0.022	< 0.005	< 0.005	0.009	0.009	0.01	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroheptanesulfonic acid (PFHpS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanesulfonic acid (PFOS)	0.005	0.07	0.056	0.055	0.058	0.061	0.009	0.006	0.024	0.024	0.026	< 0.005	< 0.005	0.005	< 0.005	< 0.005	0.02	0.009	0.002	<0.002	<0.002
Perfluorononanesulfonic acid (PFNS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanesulfonic acid (PFDS)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorododecanesulfonic acid (PFDoS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.04	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanesulfonamide (FOSA)	0.04	---	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
N-Ethylperfluorooctanesulfonamide (N-EtFOSA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoethanol (N-EtFOSE)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
N-Methylperfluorooctanesulfonamide (N-MeFOSA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
PFOS / PFHxS	0.01	0.07	0.08	0.08	0.08	0.08	< 0.01	< 0.01	0.03	0.03	0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.025	0.009	< 0.005	< 0.005	< 0.005
TOTAL C4-C14 Carboxylic acids	0.15	---	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
TOTAL C4-C10 Sulfonic acids	0.05	---	0.08	0.08	0.08	0.08	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
ADWG Health Limit			0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07

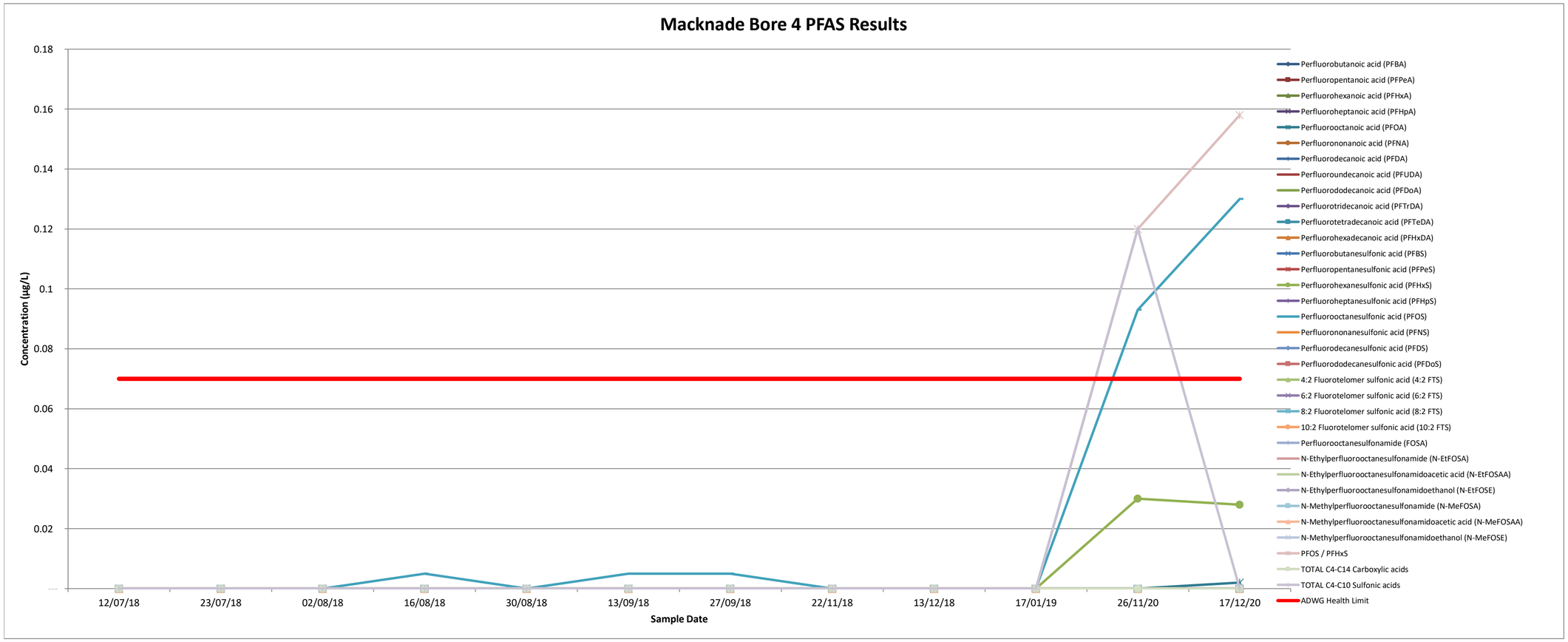
Client sample name			HSC001	HIN1239	HIN1248	HIN1255	HIN1259	HIN1258	HIN1264	HIN1279	HIN1296	HIN1300	HIN1423
Sample Point			Macknade Bore 2	Bore No 2 Macknade	Bore No 2 Macknade	Bore No 2 Macknade	Bore No 2 Macknade	Bore No 2 Macknade	Bore No 2 Macknade SP58	Bore No 2 Macknade SP58	Bore No 2 Macknade	Bore No 2 Macknade	Bore No 2 Macknade
Sampling Time and Date	LOR	Health	12/07/18	23/07/18	02/08/18	16/08/18	30/08/18	13/09/18	27/09/18	22/11/18	13/12/18	17/01/19	26/11/20
Location numbers	(µg/L)	value	18KE5985	18KE6211	18KE6551	18KE6856	18KE7090	18KE7334	18KE7735	18KE9059	18KE9680	18KE9681	20KE10678
Perfluorobutanoic acid (PFBA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanoic acid (PFPeA)	0.007	---	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Perfluorohexanoic acid (PFHxA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroheptanoic acid (PFHpA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanoic acid (PFOA)	0.007	0.56	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Perfluorononanoic acid (PFNA)	0.007	---	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Perfluorodecanoic acid (PFDA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUDA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoA)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorotridecanoic acid (PFTrDA)	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perfluorotetradecanoic acid (PFTeDA)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorohexadecanoic acid (PFHxDA)	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perfluorobutanesulfonic acid (PFBS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoropentanesulfonic acid (PFPeS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorohexanesulfonic acid (PFHxS)	0.005	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroheptanesulfonic acid (PFHpS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanesulfonic acid (PFOS)	0.005	0.07	< 0.005	< 0.005	< 0.005	< 0.006	< 0.005	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorononanesulfonic acid (PFNS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanesulfonic acid (PFDS)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorododecanesulfonic acid (PFDoS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.01	---	< 0.01	< 0.01	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanesulfonamide (FOSA)	0.04	---	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
N-Ethylperfluorooctanesulfonamide (N-EtFOSA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoethanol (N-EtFOSE)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
N-Methylperfluorooctanesulfonamide (N-MeFOSA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
PFOS / PFHxS	0.01	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
TOTAL C4-C14 Carboxylic acids	0.15	---	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
TOTAL C4-C10 Sulfonic acids	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
ADWG Health Limit			0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07



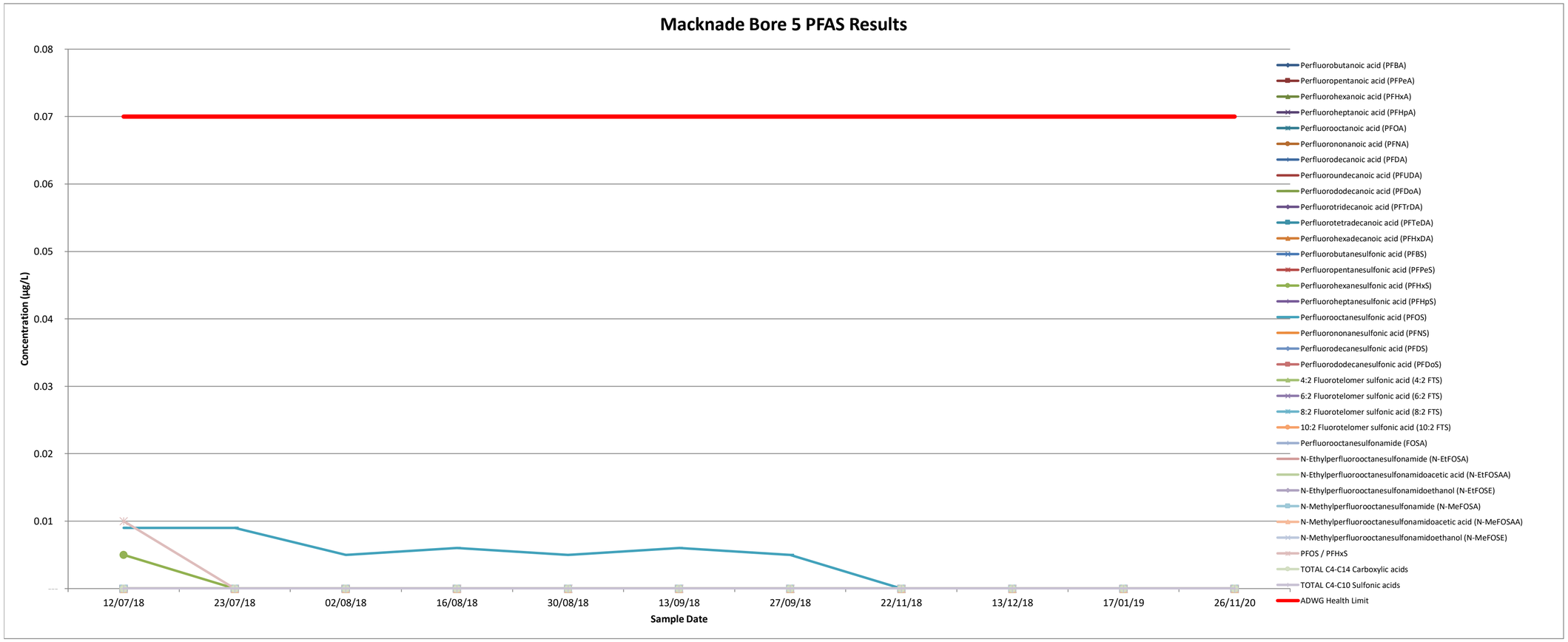
Client sample name			HSC002	HIN1259	HIN1426
Sample Point			Macknade Bore 3	Bore No 3 Macknade	Bore No 3 Macknade
Sampling Time and Date	LOR	Health	12/07/18	13/09/18	26/11/20
Location numbers	(µg/L)	value	18KE5986	18KE7335	20KE10681
Perfluorobutanoic acid (PFBA)	0.01	---	< 0.01	< 0.01	< 0.01
Perfluoropentanoic acid (PFPeA)	0.007	---	< 0.007	< 0.007	< 0.007
Perfluorohexanoic acid (PFHxA)	0.005	---	< 0.005	0.015	< 0.005
Perfluoroheptanoic acid (PFHpA)	0.005	---	< 0.005	< 0.005	< 0.005
Perfluorooctanoic acid (PFOA)	0.007	0.56	< 0.007	0.007	< 0.007
Perfluorononanoic acid (PFNA)	0.007	---	< 0.007	< 0.007	< 0.007
Perfluorodecanoic acid (PFDA)	0.01	---	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUDA)	0.01	---	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoA)	0.02	---	< 0.02	< 0.02	< 0.02
Perfluorotridecanoic acid (PFTrDA)	0.05	---	< 0.05	< 0.05	< 0.05
Perfluorotetradecanoic acid (PFTeDA)	0.02	---	< 0.02	< 0.02	< 0.02
Perfluorohexadecanoic acid (PFHxDA)	0.05	---	< 0.05	< 0.05	< 0.05
Perfluorobutanesulfonic acid (PFBS)	0.005	---	< 0.005	0.018	< 0.005
Perfluoropentanesulfonic acid (PFPeS)	0.005	---	< 0.005	0.023	< 0.005
Perfluorohexanesulfonic acid (PFHxS)	0.005	0.07	0.045	0.26	< 0.005
Perfluoroheptanesulfonic acid (PFHpS)	0.005	---	< 0.005	0.006	< 0.005
Perfluorooctanesulfonic acid (PFOS)	0.005	0.07	0.12	0.74	0.04
Perfluorononanesulfonic acid (PFNS)	0.005	---	< 0.005	< 0.005	< 0.005
Perfluorodecanesulfonic acid (PFDS)	0.02	---	< 0.02	< 0.02	< 0.02
Perfluorododecanesulfonic acid (PFDoS)	0.005	---	< 0.005	< 0.005	< 0.005
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.01	---	< 0.01	< 0.01	< 0.01
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005
Perfluorooctanesulfonamide (FOSA)	0.04	---	< 0.04	< 0.04	< 0.04
N-Ethylperfluorooctanesulfonamide (N-EtFOSA)	0.005	---	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoethanol (N-EtFOSE)	0.02	---	< 0.02	< 0.02	< 0.02
N-Methylperfluorooctanesulfonamide (N-MeFOSA)	0.005	---	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	0.005	---	< 0.005	< 0.005	< 0.005
PFOS / PFHxS	0.01	0.07	0.16	1.0	0.04
TOTAL C4-C14 Carboxylic acids	0.15	---	< 0.15	< 0.15	< 0.15
TOTAL C4-C10 Sulfonic acids	0.05	---	0.16	1.1	< 0.05
ADWG Health Limit			0.07	0.07	0.07



Client sample name			HSC003	HIN1240	HIN1249	HIN1256	HIN1260	HIN1260	HIN1266	HIN1280	HIN1297	HIN1301	HIN1424	HIN1428
Sample Point			Macknade Bore 4	Bore No 4 Macknade	Macknade Bore No 4	Bore No 4 Macknade	Bore No 4 Macknade	Bore No 4 Macknade	Bore No 4 Macknade SP58	Bore No 4 Macknade SP58	Bore No 4 Macknade	Bore No 4 Macknade	Bore No 4 Macknade	Bore No 4 Macknade
Sampling Time and Date	LOR	Health	12/07/18	23/07/18	02/08/18	16/08/18	30/08/18	13/09/18	27/09/18	22/11/18	13/12/18	17/01/19	26/11/20	17/12/20
Location numbers	(µg/L)	value	18KE5987	18KE6212	18KE6552	18KE6857	18KE7091	18KE7091	18KE7737	18KE9060	18KE9681	18KE9682	20KE10679	
Perfluorobutanoic acid (PFBA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010
Perfluoropentanoic acid (PFPeA)	0.007	---	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	<0.005
Perfluorohexanoic acid (PFHxA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005
Perfluoroheptanoic acid (PFHpA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.005
Perfluorooctanoic acid (PFOA)	0.007	0.56	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	0.002
Perfluorononanoic acid (PFNA)	0.007	---	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	<0.005
Perfluorodecanoic acid (PFDA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.005
Perfluoroundecanoic acid (PFUDA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.005
Perfluorododecanoic acid (PFDoA)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.005
Perfluorotridecanoic acid (PFTrDA)	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.005
Perfluorotetradecanoic acid (PFTeDA)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.005
Perfluorohexadecanoic acid (PFHxDA)	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.005
Perfluorobutanesulfonic acid (PFBS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoropentanesulfonic acid (PFPeS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorohexanesulfonic acid (PFHxS)	0.005	0.07	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	0.03	0.028
Perfluoroheptanesulfonic acid (PFHpS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanesulfonic acid (PFOS)	0.005	0.07	< 0.005	< 0.005	< 0.005	0.005	< 0.005	0.005	0.005	< 0.005	< 0.005	< 0.005	0.093	0.13
Perfluorononanesulfonic acid (PFNS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanesulfonic acid (PFDS)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorododecanesulfonic acid (PFDoS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.010
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.01	---	< 0.01	< 0.01	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	<0.010
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.010
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	<0.010
Perfluorooctanesulfonamide (FOSA)	0.04	---	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
N-Ethylperfluorooctanesulfonamide (N-EtFOSA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoethanol (N-EtFOSE)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
N-Methylperfluorooctanesulfonamide (N-MeFOSA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
PFOS / PFHxS	0.01	0.07	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.12	0.158
TOTAL C4-C14 Carboxylic acids	0.15	---	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
TOTAL C4-C10 Sulfonic acids	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.12	< 0.05
ADWG Health Limit			0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07



Client sample name			HSC004	HIN1241	HIN1250	HIN1257	HIN1261	HIN1261	HIN1267	HIN1281	HIN1298	HIN1302	HIN1425
Sample Point			Macknade Bore 5	Bore No 5 Macknade	Macknade Bore No 5	Bore No 5 Macknade	Bore No 5 Macknade	Bore No 5 Macknade	Bore No 5 Macknade SP58	Bore No 5 Macknade SP58	Bore No 5 Macknade	Bore No 5 Macknade	Bore No 5 Macknade
Sampling Time and Date	LOR	Health	12/07/18	23/07/18	02/08/18	16/08/18	30/08/18	13/09/18	27/09/18	22/11/18	13/12/18	17/01/19	26/11/20
Location numbers	(µg/L)	value	18KE5988	18KE6213	18KE6553	18KE6858	18KE7092	18KE7337	18KE7738	18KE9061	18KE9682	18KE9683	20KE10680
Perfluorobutanoic acid (PFBA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoropentanoic acid (PFPeA)	0.007	---	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Perfluorohexanoic acid (PFHxA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroheptanoic acid (PFHpA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanoic acid (PFOA)	0.007	0.56	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Perfluorononanoic acid (PFNA)	0.007	---	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007	< 0.007
Perfluorodecanoic acid (PFDA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluoroundecanoic acid (PFUDA)	0.01	---	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Perfluorododecanoic acid (PFDoA)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorotridecanoic acid (PFTrDA)	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perfluorotetradecanoic acid (PFTeDA)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorohexadecanoic acid (PFHxDA)	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Perfluorobutanesulfonic acid (PFBS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoropentanesulfonic acid (PFPeS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorohexanesulfonic acid (PFHxS)	0.005	0.07	0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluoroheptanesulfonic acid (PFHpS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanesulfonic acid (PFOS)	0.005	0.07	0.009	0.009	0.005	0.006	0.005	0.006	0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorononanesulfonic acid (PFNS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorodecanesulfonic acid (PFDS)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Perfluorododecanesulfonic acid (PFDoS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
4:2 Fluorotelomer sulfonic acid (4:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	0.01	---	< 0.01	< 0.01	< 0.04	< 0.04	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
10:2 Fluorotelomer sulfonic acid (10:2 FTS)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
Perfluorooctanesulfonamide (FOSA)	0.04	---	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
N-Ethylperfluorooctanesulfonamide (N-EtFOSA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoacetic acid (N-EtFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Ethylperfluorooctanesulfonamidoethanol (N-EtFOSE)	0.02	---	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
N-Methylperfluorooctanesulfonamide (N-MeFOSA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoacetic acid (N-MeFOSAA)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
N-Methylperfluorooctanesulfonamidoethanol (N-MeFOSE)	0.005	---	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
PFOS / PFHxS	0.01	0.07	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
TOTAL C4-C14 Carboxylic acids	0.15	---	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15	< 0.15
TOTAL C4-C10 Sulfonic acids	0.05	---	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
ADWG Health Limit			0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07



Water Sample Data – THM Testing Results

Reference	Description	Sample Description	Sample Date	Sample No.	Replicate	QC Type	Sampling Time	Trihalomethanes, Total		Chlorate	Chlorite	Bromate	Date Analysed, Oxyhalides	Date Analysed, Trihalomethanes
Units								µg/L		µg/L	µg/L	µg/L		
PQL								5		50	10	10		
Method								APHA 6200C						
20-5203	14/12/2020	SP23 Ingham Depot	14/12/2020	1	0	Regular	740	<20		150	40	<10	18/12/2020	15/12/2020
20-5203	14/12/2020	SP25 Hilift at River	14/12/2020	2	0	Regular	752		24	424	33	<10	18/12/2020	15/12/2020
20-5203	14/12/2020	SP21 Ingham Tower	14/12/2020	3	0	Regular	802	<20		142	37	<10	18/12/2020	15/12/2020
20-5203	14/12/2020	SP32 Macknade Trt Plant	14/12/2020	4	0	Regular	817	<20		158	38	<10	18/12/2020	15/12/2020
20-5203	14/12/2020	SP30 Halifx Tower	14/12/2020	5	0	Regular	823	<20		196	41	<10	18/12/2020	15/12/2020
20-5203	14/12/2020	SP26 Forrest Beach Hi Lift	14/12/2020	6	0	Regular	912		26	254	32	<10	18/12/2020	15/12/2020
20-5203	14/12/2020	SP27 Forrets Beach tower	14/12/2020	7	0	Regular	945	<20						15/12/2020
20-5203	14/12/2020	SP22 Tokalon Tower	14/12/2020	8	0	Regular	1010	<20						15/12/2020

Water Sample Data – Pesticides Testing Results

Package No.	**SSP0043704**																				
Client	**Hinchinbrook Shire Council - Ingham**																				
Client Project																					
Client Batch Ref																					
Order No.	**FREDERICKS_N**																				
Package Request Date	**14-Jan-15**																				
Package Registered D	**16-Jan-15**																				
Reported Dates	**16-Jan-15**	**16-Jan-15**	**16-Jan-15**	**16-Jan-15**	**16-Jan-15**	**16-Jan-15**	**30-Jan-15**	**30-Jan-15**	**30-Jan-15**	**30-Jan-15**	**30-Jan-15**	**30-Jan-15**	**30-Jan-15**	**30-Jan-15**	**06-Feb-15**	**06-Feb-15**					
Reporting Analyst	**MICHAEL NUNN (SS|PH)**	**KRISTINE MCDONALD (SS|PHLB)**	**KRISTINE MCDONALD (SS|PHLB)**	**KRISTINE MCDONALD (SS|PHLB)**	**KRISTINE MCDONALD (SS|PHLB)**	**KRISTINE MCDONALD (SS|PHLB)**	**SHU-HUEI HUANG (SS|PH)**	**SHU-HUEI HUANG (SS|PH)**	**SHU-HUEI HUANG (SS|PH)**	**SHU-HUEI HUANG (SS|PH)**	**SHU-HUEI HUANG (SS|PH)**	**SHU-HUEI HUANG (SS|PH)**	**SHU-HUEI HUANG (SS|PH)**	**SHU-HUEI HUANG (SS|PH)**	**ASHLEY TRONOFF (SS|PH)**	**ASHLEY TRONOFF (SS|PH)**					
Names																					

Lab No.										857O5-0424	857O5-0430	857O5-0441	857O5-0457	857O5-0468	857O5-0479	857O5-0485	857O5-0496	857O5-0505	857O5-0519	857O5-0528
Location Number										2015NA470	2015NA471	2015NA472	2015NA473	2015NA474	2015NA475	2015KE289	2015KE290	2015KE291	2015KE292	2015KE293
Sample Id										HIN986	HIN987	HIN988	HIN989	HIN990	HIN991	HIN992	HIN993	HIN994	HIN995	HIN996
Sample Type										Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Sample Source										Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Collected Date / Time										13/01/15 9:15	13/01/15 11:20	13/01/15 14:25	13/01/15 14:45	13/01/15 15:15	13/01/15 11:30	14/01/15 10:00	14/01/15 10:30	14/01/15 9:45	14/01/15 10:15	14/01/15 10:00
Mnemonic	Test/Panel Description	Analyte	Reporting Limi	Upper LOR	Units	Guideline	Guideline Valu	Accreditation	NATA	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
ALL DEPARTMENTS																				
KEHBL1	Herbicides LCMS 1																			
KEAMET	Ametryn (HBL)	Ametryn	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KEATRZ	Atrazine (HBL)	Atrazine	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	0.03	0.03
KEBRM1	Bromacil (HBL)	Bromacil	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KEDEAZ	Desethyl Atrazine (HBL)	Desethyl Atrazine	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KEDOAZ	Desisopropyl Atrazine (HBL)	Desisopropyl Atrazine	0.02		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
KEDIRN	Diuron (HBL)	Diuron	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KEFLMT	Fluometuron (HBL)	Fluometuron	0.02		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
KEHEXZ	Hexazinone (HBL)	Hexazinone	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KEIMID	Imidacloprid (HBL)	Imidacloprid	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KEMTC1	Metolachlor (HBL)	Metolachlor	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KELN	Organics Env. Lab #					--	--	--	--	--	--	--	--	--	--					
KEPMTY	Prometryn (HBL)	Prometryn	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KESIMZ	Simazine (HBL)	Simazine	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KETERT	Terbuthiuron (HBL)	Terbuthiuron	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KETEB1	Terbutryn (HBL)	Terbutryn	0.01		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KEHBG2	Herbs GCMS only																			
KEAMIT	Amitraz (HBG)	Amitraz	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDICM	Diclofop-methyl (HBG)	Diclofop-methyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEFLZF	Fluazifop-butyl (HBG)	Fluazifop-butyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEHOZE	Haloxyfop-2-etotyl (HBG)	Haloxyfop-2-etotyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEHOM	Haloxyfop-methyl (HBG)	Haloxyfop-methyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEMRB	Metribuzin (HBG)	Metribuzin	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEMOLN	Molinate (HBG)	Molinate	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KELN	Organics Env. Lab #					--	--	--	--	--	--	--	--	--	--					
KEOXYF	Oxyfluorfen (HBG)	Oxyfluorfen	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPDM	Pendimethalin (HBG)	Pendimethalin	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPPNL	Propanil (HBG)	Propanil	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPPZN	Propazine (HBG)	Propazine	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KETBTZ	Terbuthylazine (HBG)	Terbuthylazine	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KETRIA	Triallate (HBG)	Triallate	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KETRIF	Trifluralin (HBG)	Trifluralin	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEOC1	Organochlorine Pest																			
KEALD	Aldrin (OC)	Aldrin	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECLDC	Chlordane cis (OC)	Chlordane cis	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECLT	Chlordane Total (OC)	Total Chlordane	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KECLDT	Chlordane trans (OC)	Chlordane trans	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECHL	Chlordene (OC)	Chlordene	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECHLE	Chlordene epoxide (OC)	Chlordene epoxide	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECLH	Chlordene-1-hydroxy (OC)	Chlordene-1-hydroxy	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECLH2	Chlordene-1-hydroxy-2,3-epox	Chlordene-1-hydroxy-2,3-epox	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDIC	Dicofol (OC)	Dicofol	1.5		µg/L	--	--	--	--	--	--	--	--	--	--	< 3.2	< 3.2	< 3.2	< 3.1	< 3.3
KEDIEL	Dieldrin (OC) new	Dieldrin	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEENDA	Endosulfan Alpha (OC)	<alpha>-Endosulfan	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KEENDB	Endosulfan Beta (OC)	<beta>-Endosulfan	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KEENDE	Endosulfan ether (OC)	Endosulfan ether	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEENDL	Endosulfan lactone (OC)	Endosulfan lactone	0.5		µg/L	--	--	--	--	--	--	--	--	--	--	< 1.1	< 1.1	< 1.1	< 1.0	< 1.1
KEENDS	Endosulfan sulfate (OC)	Endosulfan sulfate	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KEERIN	Endrin (OC)	Endrin	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEERIA	Endrin aldehyde (OC)	Endrin aldehyde	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEHCB	HCB (OC)	HCB	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KEHCHA	HCH alpha (OC)	<alpha>-HCH	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEHCHB	HCH beta (OC)	<beta>-HCH	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEHCHD	HCH delta (OC)	<delta>-HCH	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECBH	Heptachlor (OC)	Heptachlor	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECBHE	Heptachlor epoxide (OC)	Heptachlor epoxide	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEELD	Lindane (OC)	Lindane (<gamma>-HCH)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEMET	Methoxychlor (OC)	Methoxychlor	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KENONC	Nonachlor cis (OC)	Nonachlor cis	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KENONT	Nonachlor trans (OC)	Nonachlor trans	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEODDD	o-p DDD (OC)	DDD (op)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEODDE	o-p DDE (OC)	DDE (op)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEODDT	o-p DDT (OC)	DDT (op)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KELN	Organics Env. Lab #					--	--	--	--	--	--	--	--	--	--					
KEOXC	Oxychlordane (OC)	Oxychlordane	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPDDD	p-p DDD (OC)	DDD (pp)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPDDE	p-p DDE (OC)	DDE (pp)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPDDT	p-p DDT (OC)	DDT (pp)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KETAD	Total Aldrin & Dieldrin (OC)	Total Aldrin & Dieldrin	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KEDDT	Total DDT (OC)	Total DDT	0.4		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.8	< 0.9	< 0.8	< 0.8	< 0.9
KEENDO	Total Endosulfan (OC)	Total Endosulfan	0.6		µg/L	--	--	--	--	--	--	--	--	--	--	< 1.3	< 1.3	< 1.3	< 1.2	< 1.3
KETHC	Total Heptachlor (OC)	Total Heptachlor	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KEOP1	Organophos Pest 1																			
KEAZPE	Azinphos-ethyl (OP)	Azinphos-ethyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEAZPM	Azinphos-methyl (OP)	Azinphos-methyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEBMPE	Bromophos-ethyl (OP)	Bromophos-ethyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECADS	Cadusafos (OP)	Cadusafos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECARP	Carbophenothion (OP)	Carbophenothion	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECHFV	Chlorfenvinphos (OP)	Chlorfenvinphos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECHP	Chlorpyrifos (OP)	Chlorpyrifos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECHPO	Chlorpyrifos oxon (OP)	Chlorpyrifos oxon	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECHPM	Chlorpyrifos-methyl (OP)	Chlorpyrifos-methyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KECOUM	Coumaphos (OP)	Coumaphos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDEMT	Demeton-S 16315	Demeton-S	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDESM	Demeton-S-methyl (OP)	Demeton-S-methyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDIAZ	Diazinon (OP)	Diazinon	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDICH	Dichlorvos (OP)	Dichlorvos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDIME	Dimethoate (OP)	Dimethoate	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDIOX	Dioxathion (OP)	Dioxathion	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDIS	Disulfoton (OP)	Disulfoton	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEETHI	Ethion (OP)	Ethion	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEETHP	Ethoprophos (OP)	Ethoprophos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEETRI	Etrimphos (OP)	Etrimphos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEFAMP	Famphur (OP)	Famphur	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEFENA	Fenamiphos (OP)	Fenamiphos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEFENC	Fenchlorphos (OP)	Fenchlorphos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEFENI	Fenitrothion (OP)	Fenitrothion	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEFENM	Fenthion (methyl) (OP)	Fenthion (methyl)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEFENE	Fenthion-ethyl (OP)	Fenthion-ethyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEISOP	Isofenphos (OP)	Isofenphos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEMALA	Malathion (OP)	Malathion (Maldison)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEMETD	Methidathion (OP)	Methidathion	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEMEVI	Mevinphos (OP)	Mevinphos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEMCP	Monocrotophos (OP)	Monocrotophos	0.5		µg/L	--	--	--	--	--	--	--	--	--	--	< 1.1	< 1.1	< 1.1	< 1.0	< 1.1
KEOME	Omethoate (OP)	Omethoate	0.5		µg/L	--	--	--	--	--	--	--	--	--	--	< 1.1	< 1.1	< 1.1	< 1.0	< 1.1
KELN	Organics Env. Lab #					--	--	--	--	--	--	--	--	--	--					
KEOXDM	Oxydemeton-methyl (OP)	Oxydemeton-methyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPARE	Parathion (ethyl) (OP)	Parathion (ethyl)	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KEPARM	Parathion-methyl (OP)	Parathion-methyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPHOR	Phorate (OP)	Phorate	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPHOS	Phosmet (OP)	Phosmet	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KEPHOP	Phosphamidon (OP)	Phosphamidon	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPIRM	Pirimiphos-methyl (OP)	Pirimiphos-methyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPROF	Profenofos (OP)	Profenofos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPROT	Prothiofos (OP)	Prothiofos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEPYRZ	Pyrazophos (OP)	Pyrazophos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KESUL	Sulprofos (OP)	Sulprofos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KETEME	Temephos (OP)	Temephos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KETERB	Terbufos (OP)	Terbufos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KETCVP	Tetrachlorvinphos (OP)	Tetrachlorvinphos	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDIMT	Total Dimethoate (OP)	Total Dimethoate	0.6		µg/L	--	--	--	--	--	--	--	--	--	--	< 1.3	< 1.3	< 1.3	< 1.2	< 1.3
KEOTCG	Oth Compounds GCMS																			
KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.5		µg/L	--	--	--	--	--	--	--	--	--	--	< 1.1	< 1.1	< 1.1	< 1.0	< 1.1
KE1HB1	1H-Benzotriazole, 1-methyl (OT	1H-Benzotriazole, 1-methyl	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KE1HB5	1H-Benzotriazole, 5-methyl (OT	1H-Benzotriazole, 5-methyl	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KEDTBC	2,6-Di-t-butyl-p-cresol (OTCG)	2,6-Di-t-butyl-p-cresol (BHT)	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDTBP	2,6-Di-t-butylphenol (OTCG)	2,6-Di-t-butylphenol	0.3		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.6	< 0.6	< 0.6	< 0.6	< 0.7
KE2NMX	2-Nitro-m-xylene (SUR)	2-Nitro-m-xylene			%	--	--	--	--	--	--	--	--	--	--	70	67	60	77	76
KECDMP	4-Chloro-3,5-dimethylphenol ((	4-Chloro-3,5-dimethylphenol	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEDCCB	Decachlorobiphenyl (SUR)	Decachlorobiphenyl			%	--	--	--	--	--	--	--	--	--	--	88	91	77	100	105
KEDBBP	Dibromobiphenyl (SUR)	Dibromobiphenyl			%	--	--	--	--	--	--	--	--	--	--	75	77	69	84	86
KEGALA	Galaxolide (OTCG)	Galaxolide	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEMOCL	Moclobemide (OTCG)	Moclobemide	1		µg/L	--	--	--	--	--	--	--	--	--	--	< 2.1	< 2.2	< 2.1	< 2.0	< 2.2
KEMSKK	Musk Ketone (OTCG)	Musk Ketone	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEMSKX	Musk Xylene (OTCG)	Musk Xylene	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	NA	NA	NA	NA	NA
KENBBS	N-Butylbenzenesulfonamide ((	N-Butylbenzenesulfonamide	0.2		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
KENBTS	N-Butyltoluenesulfonamide ((	N-Butyltoluenesulfonamide	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KELN	Organics Env. Lab #					--	--	--	--	--	--	--	--	--	--					
KEPDIO	Pyrene-d10 (SUR)	Pyrene-d10			%	--	--	--	--	--	--	--	--	--	--	74	77	66	84	83
KETONL	Tonalid (OTCG)	Tonalid	0.1		µg/L	--	--	--	--	--	--	--	--	--	--	< 0.

Lab No.											85705-0424	85705-0430	85705-0441	85705-0457	85705-0468	85705-0479	85705-0485	85705-0496	85705-0505	85705-0519	85705-0528
Location Number											2015NA470	2015NA471	2015NA472	2015NA473	2015NA474	2015NA475	2015KE289	2015KE290	2015KE291	2015KE292	2015KE293
Sample Id											HIN986	HIN987	HIN988	HIN989	HIN990	HIN991	HIN992	HIN993	HIN994	HIN995	HIN996
Sample Type											Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Sample Source											Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
Collected Date / Time											13/01/15 9:15	13/01/15 11:20	13/01/15 14:25	13/01/15 14:45	13/01/15 15:15	13/01/15 11:30	14/01/15 10:00	14/01/15 10:30	14/01/15 9:45	14/01/15 10:15	14/01/15 10:00
Mnemonic	Test/Panel Description	Analyte	Reporting Limi	Upper LOR	Units	Guideline	Guideline Valu	Accreditation	NATA		Result	Result	Result	Result	Result	Result	Result	Result	Result	Result	Result
PHPCOM	PH Package Comment					--	--	--	--		KWPH Batch W	--	--	--	--	--	--	--	--	--	--
PHPR	PH Priority					--	--	--	--			--	--	--	--	--	--	--	--	--	--
PHRI	PH Report Issued Date - Inorganics					--	--	--	--		30-Jan-15	--	--	--	--	--	--	--	--	--	--
PHSTAN	PH Status - Inorganics					--	--	--	--		Report Issued	--	--	--	--	--	--	--	--	--	--
SWAF	SWA Further Info																				
ACCIM	Actual Imbalance					--	--	--	--		0.31	0.42	0.29	0.31	0.29	1.1	--	--	--	--	--
ACO2	Agressive CO2					--	--	--	--		1.49	2.46	4.59	4.07	5.02	24.21	--	--	--	--	--
CAEQ	Ca meq					--	--	--	--		0.42	0.69	0.33	0.39	0.27	2.13	--	--	--	--	--
CALCI	Calc. Imbalance	Calc. Imbalance				--	--	--	--		0.1	0.02	0.06	0.06	0.07	0.22	--	--	--	--	--
CLEQ	Cl meq					--	--	--	--		0.53	2.89	0.42	0.43	0.41	16.76	--	--	--	--	--
CO3EQ	CO3 meq					--	--	--	--		0	0	0	0	0	0	--	--	--	--	--
CORC	Corrected Conductivity	Corr Cond				--	--	--	--		140	429	117	139	115	2074	--	--	--	--	--
CORSAR	Corrected SAR					--	--	--	--		2.8	4.34	2.45	2.51	2.23	9.13	--	--	--	--	--
FEQ	F meq					--	--	--	--		0.04	0.03	0.03	0.04	0.03		--	--	--	--	--
FCO2	Free CO2					--	--	--	--		1.68	2.93	4.86	4.43	5.33	31.45	--	--	--	--	--
HEQ	H meq					--	--	--	--		0	0	0	0	0	0	--	--	--	--	--
HCO3EQ	HCO3 meq					--	--	--	--		0.79	0.87	0.55	0.9	0.79	1.17	--	--	--	--	--
INFLAG	Inbalance Flag	Inbalance Flag				--	--	--	--		A	A	A	A	A	A	--	--	--	--	--
NALN	Inorganics Lab #					--	--	--	--								--	--	--	--	--
MSIS	Ionic Strength					--	--	--	--		0.0021	0.0052	0.0017	0.002	0.0016	0.0238	--	--	--	--	--
KEQ	K meq					--	--	--	--		0.09	0.1	0.03	0.03	0.04	0.34	--	--	--	--	--
MGEQ	Mg meq					--	--	--	--		0.2	0.77	0.18	0.26	0.22	3.72	--	--	--	--	--
NAMEQ	Na Meq					--	--	--	--		0.89	2.7	0.73	0.91	0.74	13.96	--	--	--	--	--
NAHC	NaHCO3 - calculated					--	--	--	--		14.08	0	3.1	21.55	25.54	0	--	--	--	--	--
NO3EQ	NO3 meq					--	--	--	--		0.07	0.1	0.14	0.19	0.05	0.35	--	--	--	--	--
OHEQ	OH meq					--	--	--	--		0	0	0	0	0	0	--	--	--	--	--
SO4EQ	SO4 meq					--	--	--	--		0.28	0.39	0.19	0.09	0.05	1.64	--	--	--	--	--
SUMA	Sum Anions	Sum Anions				--	--	--	--		1.71	4.28	1.33	1.65	1.33	19.92	--	--	--	--	--
SUMC	Sum Cations	Sum Cations				--	--	--	--		1.61	4.26	1.27	1.59	1.26	20.14	--	--	--	--	--
SUMTE	Sum Total Entries	Sum Total Entries				--	--	--	--		361	826	305	363	297	3435	--	--	--	--	--
SWIC	SW I/C					--	--	--	--		0.53	0.49	0.51	0.52	0.5	0.53	--	--	--	--	--
SWACOM	SWA Comment					--	--	--	--							High turbidity and colour could contribute to	--	--	--	--	--
SWNS	SWA Non-Standard test Flag					--	--	--	--								--	--	--	--	--
SWAHN	SWA Health Report																				
MSALK1	Alkalinity	Alkalinity*	2		mg CaCO^^3/L	--	--	--	--		40	43	27	45	39	58	--	--	--	--	--
MSAL1	Aluminium	Aluminium	0.05		mg/L	--	--	--	--		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	--	--	--	--	--
NAHCO3	Bicarbonate*	Bicarbonate*	2		mg/L	--	--	--	--		48	53	33	55	48	71	--	--	--	--	--
MSB1	Boron	Boron	0.02		mg/L	--	--	--	--		0.03	0.04	0.02	<0.02	0.02	0.15	--	--	--	--	--
MSCA1	Calcium	Calcium			mg/L	--	--	--	--		8.4	14	6.7	7.8	5.3	43	--	--	--	--	--
CO3	Carbonate*	Carbonate*			mg/L	--	--	--	--		0.2	0.1	0	0.1	0	0	--	--	--	--	--
MSCL1	Chloride	Chloride			mg/L	--	--	--	--		19	100	15	15	15	590	--	--	--	--	--
MSCND1	Conductivity @ 25<deg>C	Conductivity @ 25<deg>C			µs/cm	--	--	--	--		182	498	150	178	142	2190	--	--	--	--	--
MSCOP1	Copper	Copper	0.03		mg/L	--	--	--	--		<0.03	<0.03	0.04	0.04	<0.03	<0.03	--	--	--	--	--
FIGOM	Figure of Merit*	Figure of Merit Ratio*				--	--	--	--		0.7	0.5	0.7	0.7	0.7	0.4	--	--	--	--	--
MSF1	Fluoride	Fluoride	0.05		mg/L	--	--	--	--		0.67	0.63	0.64	0.72	0.58	< 0.25	--	--	--	--	--
H	Hydrogen*	Hydrogen*			mg/L	--	--	--	--		0	0	0	0	0	0	--	--	--	--	--
OH	Hydroxide*	Hydroxide*			mg/L	--	--	--	--		0	0	0	0	0	0	--	--	--	--	--
MSFE1	Iron	Iron	0.01		mg/L	--	--	--	--		0.15	0.01	<0.01	<0.01	<0.01	<0.01	--	--	--	--	--
MSMG1	Magnesium	Magnesium			mg/L	--	--	--	--		2.5	9.4	2.1	3.2	2.7	45	--	--	--	--	--
MSMN1	Manganese	Manganese	0.01		mg/L	--	--	--	--		<0.01	<0.01	<0.01	<0.01	<0.01	0.38	--	--	--	--	--
MOLER	Mole Ratio*	Mole Ratio*				--	--	--	--		2.3	3.3	3	2.6	2.8	4.8	--	--	--	--	--
MSNO31	Nitrate	Nitrate	0.5		mg/L	--	--	--	--		4.3	5.9	8.8	12	3.2	22	--	--	--	--	--
MSPH1	pH	pH	1			--	--	--	--		7.68	7.48	7.06	7.32	7.18	6.58	--	--	--	--	--
PHS	pH (Saturation)*	pH Sat.* (calc. for CaCO^^3)				--	--	--	--		8.9	8.7	9.1	8.9	9.1	8.1	--	--	--	--	--
PHSCN1	PH Inorganics Chemist 1	Chemist				--	--	--	--		Daphne Huang	Daphne Huang	Daphne Huang	Daphne Huang	Daphne Huang	Daphne Huang	--	--	--	--	--
PHSBN	PH SWA Batch Number					--	--	--	--		B73309	B73310	B73311	B73312	B73313	B73314	--	--	--	--	--
MSK1	Potassium	Potassium			mg/L	--	--	--	--		3.6	3.8	1.4	1.2	1.5	13	--	--	--	--	--
RFA	Reason for Analysis	Reason for Analysis				--	--	--	--								--	--	--	--	--
RESA	Residual Alkalinity*	Residual Alkalinity*			meq/L	--	--	--	--		0.2	0	0	0.3	0.3	0	--	--	--	--	--
SPT	Sample Point	Sample Point				--	--	--	--		Forrest Beach H	Halifax T/Plant	Macknade T/Pl	Ingham Depot	HiLift @ River	Halifax T/Plant	--	--	--	--	--
SAS	Sample Source	Sample Source				--	--	--	--								--	--	--	--	--
SATI	Saturation Index*	Saturation Index*				--	--	--	--		-1.2	-1.2	-2.1	-1.5	-1.9	-1.5	--	--	--	--	--
MSSIO2	Silica	Silica			mg/L	--	--	--	--		34	37	37	45	36	39	--	--	--	--	--
MSNA1	Sodium	Sodium			mg/L	--	--	--	--		20	62	17	21	17	321	--	--	--	--	--
MSNAAR	Sodium Absorp. Ratio*	Sodium Absorpt. Ratio*	0.1			--	--	--	--		1.6	3.2	1.4	1.6	1.5	8.2	--	--	--	--	--
MSSO41	Sulphate	Sulphate	1		mg/L	--	--	--	--		13.3	18.9	9.2	4.2	2.3	79	--	--	--	--	--
SWACOM	SWA Comment					--	--	--	--							High turbidity and colour could contribute to	--	--	--	--	--
SWDET	SWA Details	Details				--	--	--	--		SP26, pH-7.21,	SP29, pH-6.82,	SP32, pH-6.89,	SP23, pH-6.87,	SP25, pH-6.91,	Bore No.3 pH-6	--	--	--	--	--
SWLN	SWA Lab #					--	--	--	--								--	--	--	--	--
SWOWN	SWA Owner	Owner				--	--	--	--		Neil Fredericks	Neil Fredericks	Neil Fredericks	Neil Fredericks	Neil Fredericks	Neil Fredericks	--	--	--	--	--
SWACD	SWA Report Date	Report Date				--	--	--	--		30-Jan-15	30-Jan-15	30-Jan-15	30-Jan-15	30-Jan-15	30-Jan-15	--	--	--	--	--
SWATYP	SWA Type					--	--	--	--		HD	HD	HD	HD	HD	HD	--	--	--	--	--
TEMPP	Temperature	Temperature			°C	--	--	--	--		23	23	23	23	23	23	--	--	--	--	--
TEMH	Temporary Hardness*	Temporary Hardness*			mg CaCO^^3/L	--	--	--	--		31	43	25	33	24	58	--	--	--	--	--
TDI	Total Dissolved Ions*	Total Dissolved Ions*			mg/L	--	--	--	--		120	270	94	120	95	1190	--	--	--	--	--
TDS	Total Dissolved Solids*	Total Dissolved Solids*			mg/L	--	--	--	--		130	280	113	137	107	1190	--	--	--	--	--
TOTH	Total Hardness*	Total Hardness*			mg CaCO^^3/L	--	--	--	--		31	73	25	33	24	292	--	--	--	--	--
MSTCL1	True Colour (Hazen)	True Colour	1		Hazen	--	--	--	--		3	<1	<1	<1	1	<1	--	--	--	--	--
MSTRB1	Turbidity (NTU)	Turbidity	1	5000	NTU	--	--	--	--		<1	<1	<1	<1	1	<1	--	--	--	--	--
H2OT	Water Treatment	Water Treatment				--	--	--	--								--	--	--	--	--
MSZN	Zinc	Zinc	0.01		mg/L	--	--	--	--		<0.01	0.03	0.04	0.02	0.01	0.03	--	--	--	--	--
ORGANICS (PH)																					
KERPT	KE Environ. Reporting																				
CAOP	Carbamate Operator	HPLC Analyst				--	--	--	--			--	--	--	--	--	--	--	--	--	--
KEGIDE	Flag to turn Water Guidelines off					--	--	--	--			--	--	--	--	--	--	--	--	--	--
GCOP	GC/LC Operator	GCMS/LCMS Analyst				--	--	--	--		Cassandra Kell	--	--	--	--	--	--	--	--	--	--
KECP	KE Cover Page	Cover Page Only (y)				--	--	--	--			--	--	--	--	--	--	--	--	--	--
PHCP2C	KE Organic Chemistry Reason for Analysis					--	--	--	--		16315 - OC, OP	--	--	--	--	--	--	--	--	--	--
KERCOM	Organic Chemistry Remarks					--	--	--	--		The Reporting Limits are based on the extraction and concentration of clean water under optimum conditions. The results for each sample have been calculated to account for varying initial	--	--	--	--	--	--	--	--	--	--
PHOAR	Organics - Analysis Requested					--	--	--	--		Pesticide Resid	--	--	--	--	--	--	--	--	--	--
PHOCD	Organics Completed Date	Completed Date				--	--	--	--			--	--	--	--	--	--	--	--	--	--
OTOP	Other Operator	Other Analyst				--	--	--	--			--	--	--	--	--	--	--	--	--	--
PHDSO	PH Date started - Organics					--	--	--	--		23-Jan-15	--	--	--	--	--	--	--	--	--	--
PHSCO	PH Organics Analyst					--	--	--	--		Stewart Carswe	--	--	--	--	--	--	--	--	--	--
PHSCO3	PH Organics Chemist 3	Chemist				--	--	--	--		Ashley Tronoff	--	--	--	--	--	--	--	--	--	--
PHRIO	PH Report Issued Date - Organics					--	--	--	--		06-Feb-15	--	--	--	--	--	--	--	--	--	--
PHOP	Phenoxy Operator	Phenox. Herb. Analyst				--	--	--	--			--	--	--	--	--	--	--	--	--	--
ORLOR	Report LOR					--	--	--	--			--	--	--	--	--	--	--	--	--	--
ORGMAN	Organic Pkg Mgmt																				
PHNATA	Apply NATA to Document	Add NATA to Report				--	--	--	--			--	--	--	--	--	--	--	--	--	--
PHDDO	PH Due Date - Organics					--	--	--	--			--	--	--	--	--	--	--	--	--	--
PHECDO	PH Est Date Completion - Organics					--	--	--	--			--	--	--	--	--	--	--	--	--	--
PHSTAO	PH Status - Organics					--	--	--	--		Report Issued	--	--	--	--	--	--	--	--	--	--
KWPH	Water Pest,Herb GC+LC																				
KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.5		µg/L	--	--	--	--		--	--	--	--	--	--	< 1.1	< 1.1	< 1.1	< 1.0	< 1.1
KEALD	Aldrin (OC)	Aldrin	0.1		µg/L	--	--	--	--		--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEAMET	Ametryn (HBL)	Ametryn	0.01		µg/L	--	--	--	--		--	--	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
KEAMIT	Amitraz (HBG)	Amitraz	0.1		µg/L	--	--	--	--		--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEAZPE	Azinphos-ethyl (OP)	Azinphos-ethyl	0.1		µg/L	--	--	--	--		--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
KEBENA	Benalaxyl (OTP)	Benalaxyl	0.1		µg/L	--	--	--	--		--	--	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2

Report output for SSP0056110 created on 08:57 08-Sep-17 by MARTHA DUPLESSIS (SS|PUBH) V1

Package No.	**SSP0056110**
Client	**Hinchinbrook Shire Council - Ingham**
Client Project	
Client Batch Ref	
Order No.	**FREDERICKS_N**
Package Request Date	**24-Jul-17**
Package Registered D	**25-Jul-17**

Reported Dates	**26-Jul-17**	**26-Jul-17**	**08-Aug-17**	**09-Aug-17**	**09-Aug-17**	**21-Aug-17**	**21-Aug-17**	**22-Aug-17**
Reporting Analyst	**KRISTINE MCDONALD**	**BRUCE GRAY (SS|PH)**	**LORINDA**	**MARTHA**	**MARTHA**	**ROBERT LEE**	**ROBERT LEE**	**ROBERT LEE**
Names	**(SS|PHLB)**		**SWANN**	**DUPLESSIS**	**DUPLESSIS**	**(SS|PH)**	**(SS|PH)**	**(SS|PH)**
			(SS|PHLB)	**(SS|PUBH)**	**(SS|PUBH)**			

	Lab No.										72387-0653	72387-0662	72387-0671
	Location Number										2017XE5759	SS2017MW11888	2017NAB232
	Sample Id										HIN1188	1	HIN1187
	Sample Type										Water	Water	Water
	Sample Source										Ground	Ground	Ground
	Collected Date / Time										24/07/17 10:00	24/07/17 9:50	24/07/17 9:55
	Mnemonic	Test/Panel Description	Analyte	Reporting Limit	Upper LOR	Units	Guideline	Guideline Valu	Accreditation	NATA	Result	Result	Result
	ALL DEPARTMENTS												
	KEHBL1	Herbicides LCMS 1											
	KEAMET	Ametryn (HBL)	Ametryn	0.01		µg/L	Australian Drin	70	--	--	< 0.02	--	--
	KEATRZ	Atrazine (HBL)	Atrazine	0.01		µg/L	Australian Drin	20	--	--	< 0.02	--	--
	KEBRM1	Bromacil (HBL)	Bromacil	0.01		µg/L	Australian Drin	400	--	--	< 0.02	--	--
	KEDEAZ	Desethyl Atrazine (HBL)	Desethyl Atrazine	0.01		µg/L	--	--	--	--	< 0.02	--	--
	KEDOAZ	Desisopropyl Atrazine (HBL)	Desisopropyl Atrazine	0.02		µg/L	--	--	--	--	< 0.04	--	--
	KEDIRN	Diuron (HBL)	Diuron	0.01		µg/L	Australian Drin	20	--	--	< 0.02	--	--
	KEFLMT	Fluometuron (HBL)	Fluometuron	0.02		µg/L	Public Health R	70	--	--	< 0.04	--	--
	KEHEXZ	Hexazinone (HBL)	Hexazinone	0.01		µg/L	Australian Drin	400	--	--	< 0.02	--	--
	KEIMID	Imidacloprid (HBL)	Imidacloprid	0.01		µg/L	--	--	--	--	< 0.02	--	--
	KEMTC1	Metolachlor (HBL)	Metolachlor	0.01		µg/L	Australian Drin	300	--	--	< 0.02	--	--
	KELN	Organics Env. Lab #					--	--	--	--		--	--
	KEPMTY	Prometryn (HBL)	Prometryn	0.01		µg/L	--	--	--	--	< 0.02	--	--
	KESIMZ	Simazine (HBL)	Simazine	0.01		µg/L	Public Health R	20	--	--	< 0.02	--	--
	KETEBT	Tebuthiuron (HBL)	Tebuthiuron	0.01		µg/L	--	--	--	--	< 0.02	--	--
	KETEB1	Terbutryn (HBL)	Terbutryn	0.01		µg/L	Public Health R	400	--	--	< 0.02	--	--
	KEHBG2	Herbs GCMS only											
	KE34DA	3,4-Dichloroaniline	3,4-Dichloroaniline	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEAMIT	Amitraz (HBG)	Amitraz	0.1		µg/L	Australian Drin	9	--	--	< 0.2	--	--
	KEDICM	Diclofop-methyl (HBG)	Diclofop-methyl	0.1		µg/L	Australian Drin	5	--	--	< 0.2	--	--
	KEFLZF	Fluazifop-butyl (HBG)	Fluazifop-butyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEHOZE	Haloxyfop-2-etotyl (HBG)	Haloxyfop-2-etotyl	0.1		µg/L	Australian Drin	1	--	--	< 0.2	--	--
	KEHOM	Haloxyfop-methyl (HBG)	Haloxyfop-methyl	0.1		µg/L	Australian Drin	1	--	--	< 0.2	--	--
	KEMRB	Metribuzin (HBG)	Metribuzin	0.1		µg/L	Australian Drin	70	--	--	< 0.2	--	--
	KEMOLN	Molinate (HBG)	Molinate	0.1		µg/L	Australian Drin	4	--	--	< 0.2	--	--
	KELN	Organics Env. Lab #					--	--	--	--		--	--
	KEOXYF	Oxyfluorfen (HBG)	Oxyfluorfen	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEPDM	Pendimethalin (HBG)	Pendimethalin	0.1		µg/L	Australian Drin	400	--	--	< 0.2	--	--
	KEPPNL	Propanil (HBG)	Propanil	0.1		µg/L	Australian Drin	700	--	--	< 0.2	--	--
	KEPPZN	Propazine (HBG)	Propazine	0.1		µg/L	Australian Drin	50	--	--	< 0.2	--	--
	KETBTZ	Terbuthylazine (HBG)	Terbuthylazine	0.1		µg/L	Australian Drin	10	--	--	< 0.2	--	--
	KETRIA	Triallate (HBG)	Triallate	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETRIF	Trifluralin (HBG)	Trifluralin	0.1		µg/L	Australian Drin	90	--	--	< 0.2	--	--
	KEOC1	Organochlorine Pest											
	KEALD	Aldrin (OC)	Aldrin	0.1		µg/L	Australian Drin	0.3	--	--	< 0.2	--	--
	KECLDC	Chlordane cis (OC)	Chlordane cis	0.1		µg/L	Australian Drin	2	--	--	< 0.2	--	--
	KECLT	Chlordane Total (OC)	Total Chlordane	0.2		µg/L	Australian Drin	2	--	--	< 0.4	--	--
	KECLDT	Chlordane trans (OC)	Chlordane trans	0.1		µg/L	Australian Drin	2	--	--	< 0.2	--	--
	KECHL	Chlordene (OC)	Chlordene	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KECHLE	Chlordene epoxide (OC)	Chlordene epoxide	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEC1H	Chlordene-1-hydroxy (OC)	Chlordene-1-hydroxy	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEC1H2	Chlordene-1-hydroxy-2,3-epox	Chlordene-1-hydroxy-2,3-epox	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEDIC	Dicofol (OC)	Dicofol	1.5		µg/L	Australian Drin	4	--	--	< 3.3	--	--
	KEDIEL	Dieldrin (OC) new	Dieldrin	0.1		µg/L	Australian Drin	0.3	--	--	< 0.2	--	--
	KEENDA	Endosulfan Alpha (OC)	<alpha>-Endosulfan	0.5		µg/L	Australian Drin	20	--	--	< 1.1	--	--
	KEENDB	Endosulfan Beta (OC)	<beta>-Endosulfan	0.1		µg/L	Australian Drin	20	--	--	< 0.2	--	--
	KEENDE	Endosulfan ether (OC)	Endosulfan ether	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEENDL	Endosulfan lactone (OC)	Endosulfan lactone	0.5		µg/L	--	--	--	--	< 1.1	--	--
	KEENDS	Endosulfan sulfate (OC)	Endosulfan sulfate	0.1		µg/L	Australian Drin	20	--	--	< 0.2	--	--
	KEERIN	Endrin (OC)	Endrin	0.2		µg/L	--	--	--	--	< 0.4	--	--
	KEERIA	Endrin aldehyde (OC)	Endrin aldehyde	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEHCB	HCB (OC)	HCB	0.2		µg/L	--	--	--	--	< 0.4	--	--
	KEHCHA	HCH alpha (OC)	<alpha>-HCH	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEHCHB	HCH beta (OC)	<beta>-HCH	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEHCHD	HCH delta (OC)	<delta>-HCH	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KECBH	Heptachlor (OC)	Heptachlor	0.1		µg/L	Australian Drin	0.3	--	--	< 0.2	--	--
	KECBHE	Heptachlor epoxide (OC)	Heptachlor epoxide	0.1		µg/L	Australian Drin	0.3	--	--	< 0.2	--	--
	KEELD	Lindane (OC)	Lindane (<gamma>-HCH)	0.1		µg/L	Australian Drin	10	--	--	< 0.2	--	--
	KEMET	Methoxychlor (OC)	Methoxychlor	0.1		µg/L	Australian Drin	300	--	--	< 0.2	--	--
	KENONC	Nonachlor cis (OC)	Nonachlor cis	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KENONT	Nonachlor trans (OC)	Nonachlor trans	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEODDO	o-p DDD (OC)	DDD (op)	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEODDE	o-p DDE (OC)	DDE (op)	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEODDT	o-p DDT (OC)	DDT (op)	0.1		µg/L	Australian Drin	9	--	--	< 0.2	--	--
	KELN	Organics Env. Lab #					--	--	--	--		--	--
	KEOXC	Oxychlordane (OC)	Oxychlordane	0.1		µg/L	Australian Drin	2	--	--	< 0.2	--	--
	KEPDDD	p-p DDD (OC)	DDD (pp)	0.1		µg/L	Australian Drin	9	--	--	< 0.2	--	--
	KEPDDE	p-p DDE (OC)	DDE (pp)	0.1		µg/L	Australian Drin	9	--	--	< 0.2	--	--
	KEPDDT	p-p DDT (OC)	DDT (pp)	0.1		µg/L	Australian Drin	9	--	--	< 0.2	--	--
	KETAD	Total Aldrin & Dieldrin (OC)	Total Aldrin & Dieldrin	0.2		µg/L	Australian Drin	0.3	--	--	< 0.4	--	--
	KEDDT	Total DDT (OC)	Total DDT	0.4		µg/L	Australian Drin	9	--	--	< 0.9	--	--
	KEEND	Total Endosulfan (OC)	Total Endosulfan	0.7		µg/L	Australian Drin	20	--	--	< 1.5	--	--
	KETHC	Total Heptachlor (OC)	Total Heptachlor	0.2		µg/L	Australian Drin	0.3	--	--	< 0.4	--	--
	KEOP1	Organophos Pest 1											
	KEAZPE	Azinphos-ethyl (OP)	Azinphos-ethyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEAZPM	Azinphos-methyl (OP)	Azinphos-methyl	0.1		µg/L	Australian Drin	30	--	--	< 0.2	--	--
	KEBMPE	Bromophos-ethyl (OP)	Bromophos-ethyl	0.1		µg/L	Australian Drin	10	--	--	< 0.2	--	--
	KECADS	Cadusafos (OP)	Cadusafos	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KECARP	Carbophenothion (OP)	Carbophenothion	0.1		µg/L	Australian Drin	0.5	--	--	< 0.2	--	--
	KECHFV	Chlorfenvinphos (OP)	Chlorfenvinphos	0.1		µg/L	Australian Drin	2	--	--	< 0.2	--	--
	KECHP	Chlorpyrifos (OP)	Chlorpyrifos	0.1		µg/L	Australian Drin	10	--	--	< 0.2	--	--
	KECHPO	Chlorpyrifos oxon (OP)	Chlorpyrifos oxon	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KECHPM	Chlorpyrifos-methyl (OP)	Chlorpyrifos-methyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KECOUM	Coumaphos (OP)	Coumaphos	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEDEOM	Demeton-O-methyl	Demeton-O-methyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEDEMT	Demeton-S 16315	Demeton-S	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEDESM	Demeton-S-methyl (OP)	Demeton-S-methyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEDIAZ	Diazinon (OP)	Diazinon	0.1		µg/L	Australian Drin	4	--	--	< 0.2	--	--
	KEDICH	Dichlorvos (OP)	Dichlorvos	0.1		µg/L	Australian Drin	5	--	--	< 0.2	--	--
	KEDIME	Dimethoate (OP)	Dimethoate	0.1		µg/L	Australian Drin	7	--	--	< 0.2	--	--
	KEDIOX	Dioxathion (OP)	Dioxathion	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEDIS	Disulfoton (OP)	Disulfoton	0.1		µg/L	Australian Drin	4	--	--	< 0.2	--	--
	KEETHI	Ethion (OP)	Ethion	0.1		µg/L	Australian Drin	4	--	--	< 0.2	--	--
	KEETHP	Ethoprophos (OP)	Ethoprophos	0.1		µg/L	Australian Drin	1	--	--	< 0.2	--	--
	KEETRI	Etrimphos (OP)	Etrimphos	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEFAMP	Famphur (OP)	Famphur	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEFENA	Fenamiphos (OP)	Fenamiphos	0.1		µg/L	Australian Drin	0.5	--	--	< 0.2	--	--
	KEFENC	Fenchlorphos (OP)	Fenchlorphos	0.1		µg/L	Australian Drin	30	--	--	< 0.2	--	--
	KEFENI	Fenitrothion (OP)	Fenitrothion	0.1		µg/L	Australian Drin	7	--	--	< 0.2	--	--
	KEFENM	Fenthion (methyl) (OP)	Fenthion (methyl)	0.1		µg/L	Australian Drin	7	--	--	< 0.2	--	--
	KEFENE	Fenthion-ethyl (OP)	Fenthion-ethyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEISOP	Isofenphos (OP)	Isofenphos	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEMALA	Malathion (OP)	Malathion (Maldison)	0.1		µg/L	Australian Drin	70	--	--	< 0.2	--	--
	KEMETD	Methidathion (OP)	Methidathion	0.1		µg/L	Australian Drin	6	--	--	< 0.2	--	--
	KEMEVI	Mevinphos (OP)	Mevinphos	0.1		µg/L	Australian Drin	5	--	--	< 0.2	--	--
	KEMOCP	Monocrotophos (OP)	Monocrotophos	0.1		µg/L	Australian Drin	2	--	--	< 0.2	--	--
	KEOME	Omethoate (OP)	Omethoate	0.2		µg/L	Australian Drin	1	--	--	< 0.4	--	--
	KELN	Organics Env. Lab #					--	--	--	--		--	--
	KEOXDM	Oxydemeton-methyl (OP)	Oxydemeton-methyl	0.2		µg/L	--	--	--	--	< 0.4	--	--
	KEPARE	Parathion (ethyl) (OP)	Parathion (ethyl)	0.1		µg/L	Australian Drin	20	--	--	< 0.2	--	--
	KEPARM	Parathion-methyl (OP)	Parathion-methyl	0.1		µg/L	Australian Drin	0.7	--	--	< 0.2	--	--
	KEPHOR	Phorate (OP)	Phorate	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEPHOS	Phosmet (OP)	Phosmet	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEPHOP	Phosphamidon (OP)	Phosphamidon	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEPIRM	Pirimiphos-methyl (OP)	Pirimiphos-methyl	0.1		µg/L	Australian Drin	90	--	--	< 0.2	--	--
	KEPROF	Profenofos (OP)	Profenofos	0.1		µg/L	Australian Drin	0.3	--	--	< 0.2	--	--
	KEPROT	Prothiofos (OP)	Prothiofos	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEPYRZ	Pyrazophos (OP)	Pyrazophos	0.1		µg/L	Australian Drin	20	--	--	< 0.2	--	--
	KESUL	Sulprofos (OP)	Sulprofos	0.1		µg/L	Australian Drin	10	--	--	< 0.2	--	--
	KETEME	Temephos (OP)	Temephos	0.1		µg/L	Australian Drin	400	--	--	< 0.2	--	--
	KETERB	Terbufos (OP)	Terbufos	0.1		µg/L	Australian Drin	1	--	--	< 0.2	--	--
	KETCVP	Tetrachlorvinphos (OP)	Tetrachlorvinphos	0.1		µg/L	Australian Drin	100	--	--	< 0.2	--	--
	KEDIMT	Total Dimethoate (OP)	Total Dimethoate	0.3		µg/L	Australian Drin	7	--	--	< 0.7	--	--
	KEOTCG	Oth Compounds GCMS											
	KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.7		µg/L	--	--	--	--	< 1.5	--	--
	KE1HB1	1H-Benzotriazole, 1-methyl (OT	1H-Benzotriazole, 1-methyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KE1HB5	1H-Benzotriazole, 5-methyl (OT	1H-Benzotriazole, 5-methyl	0.2		µg/L	--	--	--	--	< 0.4	--	--
	KE24DT	2,4-Di-t-butylphenol	2,4-Di-t-butylphenol	0.1		µg/L	--	--	--	--		--	--
	KEDTBC	2,6-Di-t-butyl-p-cresol (OTCG)	2,6-Di-t-butyl-p-cresol (BHT)	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEDTBP	2,6-Di-t-butylphenol (OTCG)	2,6-Di-t-butylphenol	0.3		µg/L	--	--	--	--	< 0.2	--	--
	KE2B4C	2-Benzyl-4-chlorophenol	2-Benzyl-4-chlorophenol	0.2		µg/L	--	--	--	--	< 0.4	--	--
	KE2NMX	2-Nitro-m-xylene (SUR)	2-Nitro-m-xylene			%	--	--	--	--	72	--	--
	KECDMP	4-Chloro-3,5-dimethylphenol (	4-Chloro-3,5-dimethylphenol	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEBESA	Benzenesulfonanilide	Benzenesulfonanilide	0.2		µg/L	--	--	--	--	< 0.4	--	--
	KEDCCB	Decachlorobiphenyl (SUR)	Decachlorobiphenyl			%	--	--	--	--	100	--	--
	KEDBBP	Dibromobiphenyl (SUR)	Dibromobiphenyl			%	--	--	--	--	82	--	--
	KEGALA	Galaxolide (OTCG)	Galaxolide	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEICAD	Icaridin	Icaridin	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEMOCL	Moclobemide (OTCG)	Moclobemide	1		µg/L	--	--	--	--	< 2.2	--	--
	KEMSKK	Musk Ketone (OTCG)	Musk Ketone	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEMSKX	Musk Xylene (OTCG)	Musk Xylene	0.1		µg/L	--	--	--	--		--	--
	KENBBS	N-Butylbenzenesulfonamide (O	N-Butylbenzenesulfonamide	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KENBTS	N-Butyltoluenesulfonamide (O	N-Butyltoluenesulfonamide	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KELN	Organics Env. Lab #					--	--	--	--		--	--
	KEPDIO	Pyrene-d10 (SUR)	Pyrene-d10			%	--	--	--	--	85	--	--
	KETONL	Tonalid (OTCG)	Tonalid	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETNBP	Tri-n-butyl phosphate (OTCG)	Tri-n-butyl phosphate	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETRIC	Triclosan (OTCG)	Triclosan	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETCME	Triclosan methyl ether (OTCG)	Triclosan methyl ether	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETEP	Triethyl phosphate (OTCG)	Triethyl phosphate	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEPPTP	Triphenyl phosphate (SUR)	Triphenyl phosphate			%	--	--	--	--	91	--	--
	KETCEP	Tris(chloroethyl) phosphate (OT	Tris(chloroethyl) phosphate	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETCPP	Tris(chloropropyl) phosphate is	Tris(chloropropyl) phosphate is	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETDCP	Tris(dichloropropyl) phosphate	Tris(dichloropropyl) phosphate	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEOTP1	Other Pesticides 1											
	KEBENA	Benalaxyl (OTP)	Benalaxyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEBENC	Bendiocarb (OTP)	Bendiocarb	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEBITE	Bitertanol (OTP)	Bitertanol	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KECAPT	Captan (OTP)	Captan	0.1		µg/L	Australian Drin	400	--	--	< 0.2	--	--
	KECARB	Carbaryl (OTP)	Carbaryl	0.1		µg/L	Australian Drin	30	--	--	< 0.2	--	--
	KEDEET	DEET (OTP)	DEET	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEDIMM	Dimethomorph (OTP)	Dimethomorph	0.2		µg/L	--	--	--	--	< 0.4	--	--
	KEFIPP	Fipronil (OTP)	Fipronil	0.1		µg/L	Australian Drin	0.7	--	--	< 0.2	--	--
	KEFLTF	Flutriafol	Flutriafol	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEFURA	Furalaxyl (OTP)	Furalaxyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEMLAX	Metalaxyl (OTP)	Metalaxyl	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEMETP	Methoprene (OTP)	Methoprene	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KELN	Organics Env. Lab #					--	--	--	--		--	--
	KEOXAD	Oxadiazon (OTP)	Oxadiazon	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEPIPB	Piperonyl butoxide (OTP)	Piperonyl butoxide	0.1		µg/L	Australian Drin	600	--	--	< 0.2	--	--
	KEPIMC	Pirimicarb (OTP)	Pirimicarb	0.2		µg/L	Australian Drin	7	--	--	< 0.4	--	--
	KEPRAQ	Praziquantel	Praziquantel	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEPCYM	Procymidone (OTP)	Procymidone	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEPROG	Propargite (OTP)	Propargite	0.1		µg/L	Australian Drin	7	--	--	< 0.2	--	--
	KEPPIC	Propiconazole (OTP)	Propiconazole	0.1		µg/L	Australian Drin	100	--	--	< 0.2	--	--
	KEPROX	Propoxur (OTP)	Propoxur	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEROTN	Rotenone (OTP)	Rotenone	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETEBU	Tebuconazole (OTP)	Tebuconazole	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETDIF	Tetradifon (OTP)	Tetradifon	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETHIB	Thiabendazole (OTP)	Thiabendazole	0.2		µg/L	--	--	--	--	< 0.4	--	--
	KETTRM	Total Triadimefon (OTP)	Total Triadimefon	0.3		µg/L	Australian Drin	90	--	--	< 0.7	--	--
	KETRIM	Triadimefon (OTP)	Triadimefon	0.1		µg/L	Australian Drin	90	--	--	< 0.2	--	--
	KETRIN	Triadimenol (OTP)	Triadimenol	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEVINC	Vinclozolin (OTP)	Vinclozolin	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KESP1	Syn Pyrethroids 1											
	KEBIFN	Bifenthrin (SP)	Bifenthrin	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KEBIRM	Bioresmethrin (SP)	Bioresmethrin	0.1		µg/L	Australian Drin	100	--	--	< 0.2	--	--
	KECYFL	Cyfluthrin (SP)	Cyfluthrin	0.1		µg/L	Australian Drin	50	--	--	< 0.2	--	--
	KELAMC	Cyhalothrin (SP)	Cyhalothrin	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KECYPM	Cypermethrin (SP)	Cypermethrin	0.1		µg/L	Australian Drin	200	--	--	< 0.2	--	--
	KEDELM	Deltamethrin (SP)	Deltamethrin	0.1		µg/L	Australian Drin	40	--	--	< 0.2	--	--
	KEFENV	Fenvalerate (SP)	Fenvalerate	0.1		µg/L	Australian Drin	60	--	--	< 0.2	--	--
	KEFLUV	Fluvalinate (SP)	Fluvalinate	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KELN	Organics Env. Lab #					--	--	--	--		--	--
	KEPERM	Permethrin (SP)	Permethrin	0.1		µg/L	Australian Drin	200	--	--	< 0.2	--	--
	KEPHEN	Phenothrin (SP)	Phenothrin	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETETM	Tetramethrin (SP)	Tetramethrin	0.1		µg/L	--	--	--	--	< 0.2	--	--
	KETRAF	Transfluthrin (SP)	Transfluthrin	0.1		µg/L	--	--	--	--	< 0.2	--	--

	Lab No.											72387-0653	72387-0662	72387-0671
	Location Number											2017KS759	SS2017MW11888	2017NAB232
	Sample Id											HIN1188	1	HIN1187
	Sample Type											Water	Water	Water
	Sample Source											Ground	Ground	Ground
	Collected Date / Time											24/07/17 10:00	24/07/17 9:50	24/07/17 9:55
	Mnemonic	Test/Panel Description	Analyte	Reporting Limit	Upper LOR	Units	Guideline	Guideline Valu	Accreditation	NATA	Result	Result	Result

Report output for SSP0063810 created on 11:11 04-Apr-19 by MARTHA DUPLESSIS (SS|PUBH) V1

Package No. SSP0063810
Client Hinchinbrook Shire Council - Ingham
Client Project
Client Batch Ref
Order No. FREDERICKS_N
Package Request Date 23-Feb-19
Package Registered D 25-Feb-19

Reported Dates	**26-Feb-19**	**26-Feb-19**	**06-Mar-19**	**06-Mar-19**	**06-Mar-19**	**06-Mar-19**	**07-Mar-19**	**04-Apr-19**	**04-Apr-19**	
Reporting Analyst Names	**KRISTINE MCDONALD (SS|PHLB)**	**KRISTINE MCDONALD (SS|PHLB)**	**BETHANEY POINTON (SS|PH)**	**BETHANEY POINTON (SS|PH)**	**BETHANEY POINTON (SS|PH)**	**BETHANEY POINTON (SS|PH)**	**MATTHEW CROSS (SS|PHLB)**	**MARTHA DUPLESSIS (SS|PUBH)**	**MARTHA DUPLESSIS (SS|PUBH)**	

	Lab No.										99022-7385	99022-7396	99022-7404	99022-7410	99022-7421	99022-7432
	Location Number										2019NA1450	2019KE1959	2019NA1451	2019NA1452	2019NA1453	2019NA1454
	Sample Id										HIN1303	HIN1304	HIN1306	HIN1307	HIN1308	HIN1309
	Sample Type										Water	Water	Water	Water	Water	Water
	Sample Source										Ground	Ground	Ground	Ground	Ground	Ground
	Collected Date / Time										18/02/19 9:15	18/02/19 9:20	18/02/19 9:15	18/02/19 10:10	18/02/19 10:40	18/02/19 11:30
	Mnemonic	Test/Panel Description	Analyte	Reporting Limit	Upper LOR	Units	Guideline	Guideline Valu	Accreditation	NATA	Result	Result	Result	Result	Result	Result
	ALL DEPARTMENTS															
	KEHBG1	Herbs GCMS All														
	KE3400A	3,4-Dichloroaniline	3,4-Dichloroaniline	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEAM1	Ametryn (HBG)	Ametryn	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEAMIT	Amitraz (HBG)	Amitraz	0.1		µg/L	--	--	--	--	--	< 1.1	--	--	--	--
	KEATR1	Atrazine (HBG)	Atrazine	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEBROM	Bromacil (HBG)	Bromacil	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDZ1	Desethyl Atrazine (HBG)	Desethyl Atrazine	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDOZ1	Desisopropyl Atrazine (HBG)	Desisopropyl Atrazine	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDICM	Diclofop-methyl (HBG)	Diclofop-methyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFLZF	Fluazifop-butyl (HBG)	Fluazifop-butyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFLM1	Fluometuron (HBG)	Fluometuron	0.1		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEHOZE	Haloxyfop-2-etotyl (HBG)	Haloxyfop-2-etotyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEHOM	Haloxyfop-methyl (HBG)	Haloxyfop-methyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEHZ1	Hexazinone (HBG)	Hexazinone	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMETC	Metolachlor (HBG)	Metolachlor	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMRB	Metribuzin (HBG)	Metribuzin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMOLN	Molinate (HBG)	Molinate	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KELN	Organics Env. Lab #					--	--	--	--	--		--	--	--	--
	KEOXYF	Oxyfluorfen (HBG)	Oxyfluorfen	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPDM	Pendimethalin (HBG)	Pendimethalin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPM1	Prometryn (HBG)	Prometryn	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPPNL	Propanil (HBG)	Propanil	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPPZN	Propazine (HBG)	Propazine	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KESM1	Simazine (HBG)	Simazine	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETB1	Tebuthiuron (HBG)	Tebuthiuron	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETBTZ	Terbuthylazine (HBG)	Terbuthylazine	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETBTY	Terbutryn (HBG)	Terbutryn	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETRIA	Triallate (HBG)	Triallate	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETRIF	Trifluralin (HBG)	Trifluralin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEOC1	Organochlorine Pest														
	KEALD	Aldrin (OC)	Aldrin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECLDC	Chlordane cis (OC)	Chlordane cis	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECLT	Chlordane Total (OC)	Total Chlordane	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KECLDT	Chlordane trans (OC)	Chlordane trans	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECHL	Chlordene (OC)	Chlordene	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECHLE	Chlordene epoxide (OC)	Chlordene epoxide	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEC1H	Chlordene-1-hydroxy (OC)	Chlordene-1-hydroxy	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEC1H2	Chlordene-1-hydroxy-2,3-epox	Chlordene-1-hydroxy-2,3-epox	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDIEL	Dieldrin (OC) new	Dieldrin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEENDA	Endosulfan Alpha (OC)	<alpha> Endosulfan	0.2		µg/L	--	--	--	--	--	< 0.5	--	--	--	--
	KEENDB	Endosulfan Beta (OC)	<beta> Endosulfan	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEENDE	Endosulfan ether (OC)	Endosulfan ether	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEENDL	Endosulfan lactone (OC)	Endosulfan lactone	0.5		µg/L	--	--	--	--	--	< 0.5	--	--	--	--
	KEENDS	Endosulfan sulfate (OC)	Endosulfan sulfate	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEERIN	Endrin (OC)	Endrin	0.1		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEERIA	Endrin aldehyde (OC)	Endrin aldehyde	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEHCB	HCB (OC)	HCB	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEHCHA	HCH alpha (OC)	<alpha>-HCH	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEHCHB	HCH beta (OC)	<beta>-HCH	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEHCHD	HCH delta (OC)	<delta>-HCH	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECBH	Heptachlor (OC)	Heptachlor	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECBHE	Heptachlor epoxide (OC)	Heptachlor epoxide	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEELD	Lindane (OC)	Lindane (<gamma>-HCH)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMET	Methoxychlor (OC)	Methoxychlor	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KENONC	Nonachlor cis (OC)	Nonachlor cis	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KENONT	Nonachlor trans (OC)	Nonachlor trans	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEODOD	o-p DDD (OC)	DDD (op)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEOODE	o-p DDE (OC)	DDE (op)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEOODT	o-p DDT (OC)	DDT (op)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KELN	Organics Env. Lab #					--	--	--	--	--		--	--	--	--
	KEOXC	Oxychlordane (OC)	Oxychlordane	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPDDD	p-p DDD (OC)	DDD (pp)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPDDE	p-p DDE (OC)	DDE (pp)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPDDT	p-p DDT (OC)	DDT (pp)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETAD	Total Aldrin & Dieldrin (OC)	Total Aldrin & Dieldrin	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEDDT	Total DDT (OC)	Total DDT	0.4		µg/L	--	--	--	--	--	< 0.4	--	--	--	--
	KEDIC	Total Dicofol (OC)	Total Dicofol	1.5		µg/L	--	--	--	--	--	< 1.6	--	--	--	--
	KEEND	Total Endosulfan (OC)	Total Endosulfan	0.6		µg/L	--	--	--	--	--	< 0.8	--	--	--	--
	KETHC	Total Heptachlor (OC)	Total Heptachlor	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEOP1	Organophos Pest 1														
	KEAZPE	Azinphos-ethyl (OP)	Azinphos-ethyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEAZPM	Azinphos-methyl (OP)	Azinphos-methyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEBMPE	Bromophos-ethyl (OP)	Bromophos-ethyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECADS	Cadusafos (OP)	Cadusafos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECARP	Carbophenothion (OP)	Carbophenothion	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECHFV	Chlorfenvinphos (OP)	Chlorfenvinphos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECHP	Chlorpyrifos (OP)	Chlorpyrifos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECHPO	Chlorpyrifos oxon (OP)	Chlorpyrifos oxon	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECHPM	Chlorpyrifos-methyl (OP)	Chlorpyrifos-methyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECOUM	Coumaphos (OP)	Coumaphos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDEOM	Demeton-O-methyl	Demeton-O-methyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDEMT	Demeton-S 16315	Demeton-S	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDESM	Demeton-S-methyl (OP)	Demeton-S-methyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDIAZ	Diazinon (OP)	Diazinon	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDICH	Dichlorvos (OP)	Dichlorvos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDIME	Dimethoate (OP)	Dimethoate	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDIOX	Dioxathion (OP)	Dioxathion	0.1		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEDIS	Disulfoton (OP)	Disulfoton	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEETHI	Ethion (OP)	Ethion	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEETHP	Ethoprophos (OP)	Ethoprophos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEETRI	Etrimphos (OP)	Etrimphos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFAMP	Famphur (OP)	Famphur	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFENA	Fenamiphos (OP)	Fenamiphos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFENC	Fenchlorphos (OP)	Fenchlorphos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFENI	Fenitrothion (OP)	Fenitrothion	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFENM	Fenthion (methly) (OP)	Fenthion (methyl)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFENE	Fenthion-ethyl (OP)	Fenthion-ethyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEISOP	Isofenphos (OP)	Isofenphos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMALA	Malathion (OP)	Malathion (Maldison)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMETD	Methidathion (OP)	Methidathion	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMEVI	Mevinphos (OP)	Mevinphos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMCP	Monocrotophos (OP)	Monocrotophos	0.5		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEOME	Omethoate (OP)	Omethoate	0.5		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KELN	Organics Env. Lab #					--	--	--	--	--		--	--	--	--
	KEOXDM	Oxydemeton-methyl (OP)	Oxydemeton-methyl	0.1		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEPARE	Parathion (ethyl) (OP)	Parathion (ethyl)	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPARM	Parathion-methyl (OP)	Parathion-methyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPHOR	Phorate (OP)	Phorate	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPHOS	Phosmet (OP)	Phosmet	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPHOP	Phosphamidon (OP)	Phosphamidon	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPIRM	Pirimiphos-methyl (OP)	Pirimiphos-methyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPROF	Profenofos (OP)	Profenofos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPROT	Prothiofos (OP)	Prothiofos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPYRZ	Pyrazophos (OP)	Pyrazophos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KESUL	Sulprofos (OP)	Sulprofos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETEME	Temephos (OP)	Temephos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETERB	Terbufos (OP)	Terbufos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETCVP	Tetrachlorvinphos (OP)	Tetrachlorvinphos	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDIMT	Total Dimethoate (OP)	Total Dimethoate	0.6		µg/L	--	--	--	--	--	< 0.3	--	--	--	--
	KEOTCG	Oth Compounds GCMS														
	KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.5		µg/L	--	--	--	--	--	< 0.8	--	--	--	--
	KE1HB1	1H-Benzotriazole, 1-methyl (OT	1H-Benzotriazole, 1-methyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KE1HB4	1H-Benzotriazole, 4-methyl (OT	1H-Benzotriazole, 4-methyl	0.5		µg/L	--	--	--	--	--	< 0.5	--	--	--	--
	KE1HB5	1H-Benzotriazole, 5-methyl (OT	1H-Benzotriazole, 5-methyl	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KE24DT	2,4-Di-t-butylphenol	2,4-Di-t-butylphenol	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDTBC	2,6-Di-t-butyl-p-cresol (OTCG)	2,6-Di-t-butyl-p-cresol (BHT)	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDTBP	2,6-Di-t-butylphenol (OTCG)	2,6-Di-t-butylphenol	0.3		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KE2BAC	2-Benzyl-4-chlorophenol	2-Benzyl-4-chlorophenol	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KE2NMX	2-Nitro-m-xylene (SUR)	2-Nitro-m-xylene			%	--	--	--	--	--	77	--	--	--	--
	KECDMP	4-Chloro-3,5-dimethylphenol (O	4-Chloro-3,5-dimethylphenol	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEBESA	Benzenesulfonanilide	Benzenesulfonanilide	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEDCCB	Decachlorobiphenyl (SUR)	Decachlorobiphenyl			%	--	--	--	--	--	120	--	--	--	--
	KEDBBP	Dibromobiphenyl (SUR)	Dibromobiphenyl			%	--	--	--	--	--	101	--	--	--	--
	KEGALA	Galaxolide (OTCG)	Galaxolide	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEICAD	Icaridin	Icaridin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMOCL	Moclobemide (OTCG)	Moclobemide	1		µg/L	--	--	--	--	--	< 1.1	--	--	--	--
	KEMSKX	Musk Ketone (OTCG)	Musk Ketone	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMSKX	Musk Xylene (OTCG)	Musk Xylene	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KENBBS	N-Butylbenzenesulfonamide (O	N-Butylbenzenesulfonamide	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KENBTS	N-Butyltoluenesulfonamide (O	N-Butyltoluenesulfonamide	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KELN	Organics Env. Lab #					--	--	--	--	--		--	--	--	--
	KEPDIO	Pyrene-d10 (SUR)	Pyrene-d10			%	--	--	--	--	--	103	--	--	--	--
	KETONL	Tonalid (OTCG)	Tonalid	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETNBP	Tri-n-butyl phosphate (OTCG)	Tri-n-butyl phosphate	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETRIC	Triclosan (OTCG)	Triclosan	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETCME	Triclosan methyl ether (OTCG)	Triclosan methyl ether	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETEP	Triethyl phosphate (OTCG)	Triethyl phosphate	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPPTP	Triphenyl phosphate (SUR)	Triphenyl phosphate			%	--	--	--	--	--	107	--	--	--	--
	KETCEP	Tris(chloroethyl) phosphate (O	Tris(chloroethyl) phosphate	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETCPP	Tris(chloropropyl) phosphate i	Tris(chloropropyl) phosphate i	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETDCP	Tris(dichloropropyl) phosphate	Tris(dichloropropyl) phosphate	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEOTP1	Other Pesticides 1														
	KEBENA	Benalaxyl (OTP)	Benalaxyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEBENC	Bendiocarb (OTP)	Bendiocarb	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEBITE	Bitertanol (OTP)	Bitertanol	0.1		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KECAPT	Captan (OTP)	Captan	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECARB	Carbaryl (OTP)	Carbaryl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDEET	DEET (OTP)	DEET	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDIMM	Dimethomorph (OTP)	Dimethomorph	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEWFIP	Fipronil (OTP)	Fipronil	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFLTF	Flutriafol	Flutriafol	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFURA	Furalaxyl (OTP)	Furalaxyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMLAX	Metalaxyl (OTP)	Metalaxyl	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEMETP	Methoprene (OTP)	Methoprene	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KELN	Organics Env. Lab #					--	--	--	--	--		--	--	--	--
	KEOXAD	Oxadiazon (OTP)	Oxadiazon	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPIPB	Piperonyl butoxide (OTP)	Piperonyl butoxide	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPIMC	Pirimicarb (OTP)	Pirimicarb	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KEPRAQ	Praziquantel	Praziquantel	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPCYM	Procymidone (OTP)	Procymidone	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPROG	Propargite (OTP)	Propargite	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPPIC	Propiconazole (OTP)	Propiconazole	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPROX	Propoxur (OTP)	Propoxur	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEROTN	Rotenone (OTP)	Rotenone	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETEBU	Tebuconazole (OTP)	Tebuconazole	0.1		µg/L	--	--	--	--	--	< 0.5	--	--	--	--
	KETDIF	Tetradifon (OTP)	Tetradifon	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETHIB	Thiabendazole (OTP)	Thiabendazole	0.2		µg/L	--	--	--	--	--	< 0.2	--	--	--	--
	KETTRM	Total Triadimefon (OTP)	Total Triadimefon	0.4		µg/L	--	--	--	--	--	< 0.3	--	--	--	--
	KETRIM	Triadimefon (OTP)	Triadimefon	0.3		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETRIN	Triadimenol (OTP)	Triadimenol	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEVINC	Vinclozolin (OTP)	Vinclozolin	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KESP1	Syn Pyrethroids 1														
	KEBIFN	Bifenthrin (SP)	Bifenthrin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEBIRM	Bioresmethrin (SP)	Bioresmethrin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECYFL	Cyfluthrin (SP)	Cyfluthrin	0.7		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KELAMC	Cyhalothrin (SP)	Cyhalothrin	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KECYPM	Cypermethrin (SP)	Cypermethrin	0.5		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEDELM	Deltamethrin (SP)	Deltamethrin	1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFENV	Fenvalerate (SP)	Fenvalerate	0.5		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEFLUV	Fluvalinate (SP)	Fluvalinate	0.5		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KELN	Organics Env. Lab #					--	--	--	--	--		--	--	--	--
	KEPERM	Permethrin (SP)	Permethrin	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KEPHEN	Phenothrin (SP)	Phenothrin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETETM	Tetramethrin (SP)	Tetramethrin	0.2		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	KETRAF	Transfluthrin (SP)	Transfluthrin	0.1		µg/L	--	--	--	--	--	< 0.1	--	--	--	--
	INORGANICS (PH)															
	PHPMN	PH Package - Inorg														
	PHPIR	PH Priority					--	--	--	--	--		--	--	--	--
	PHRI	PH Report Issued Date - Inorganics					--	--	--	--	07-Mar-19	--	--	--	--	--
	PHSTAN	PH Status - Inorganics					--	--	--	--	Report Issued	--	--	--	--	--
	SWAF	SWA Further Info														
	ACCIM	Actual Imbalance					--	--	--	--	0.29	--	0.36	0.31	0.31	0.31

	Lab No.										99022-7385	99022-7396	99022-7404	99022-7410	99022-7421	99022-7432
	Location Number										2019NA1450	2019KE1959	2019NA1451	2019NA1452	2019NA1453	2019NA1454
	Sample Id										HIN1303	HIN1304	HIN1306	HIN1307	HIN1308	HIN1309
	Sample Type										Water	Water	Water	Water	Water	Water
	Sample Source										Ground	Ground	Ground	Ground	Ground	Ground
	Collected Date / Time										18/02/19 9:15	18/02/19 9:20	18/02/19 9:15	18/02/19 10:10	18/02/19 10:40	18/02/19 11:30
	Mnemonic	Test/Panel Description	Analyte	Reporting Limi	Upper LOR	Units	Guideline	Guideline Valu	Accreditation	NATA	Result	Result	Result	Result	Result	Result
	MSIS	Ionic Strength					--	--	--	--	0.0016	--	0.0035	0.002	0.0021	0.002
	KEQ	K meq					--	--	--	--	0.02	--	0.07	0.04	0.03	0.03
	MGEQ	Mg meq					--	--	--	--	0.37	--	0.09	0.22	0.26	0.28
	NAMEQ	Na Meq					--	--	--	--	0.65	--	1.84	0.9	0.96	0.89
	NAHC	NaHCO3 - calculated					--	--	--	--	10.89	--	0	11	16.14	16.73
	NO3EQ	NO3 meq					--	--	--	--	<0.01	--	0.2	0.14	0.23	0.23
	OHEQ	OH meq					--	--	--	--	0	--	0	0	0	0
	SO4EQ	SO4 meq					--	--	--	--	<0.01	--	0.37	0.16	0.09	0.09
	SUMA	Sum Anions	Sum Anions				--	--	--	--	1.28	--	2.86	1.62	1.71	1.62
	SUMC	Sum Cations	Sum Cations				--	--	--	--	1.26	--	2.85	1.6	1.67	1.57
	SUMTE	Sum Total Entries	Sum Total Entries				--	--	--	--	291	--	577	345	365	347
	SWIC	SW I/C					--	--	--	--	0.49	--	0.53	0.54	0.55	0.55

Report output for SSP0064256 created on 12:02 23-Apr-19 by RENU PATEL (SS|PHLB) V1

Package No. SSP0064256
Client Hinchinbrook Shire Council - Ingham
Client Project
Client Batch Ref
Order No. FREDERICKS_N
Package Request Date 20-Mar-19
Package Registered D 22-Mar-19
Reported Dates 23-Apr-19
Reporting Analyst RENU PATEL (SS|PHLB)
Names

	Lab No.										99242-8310	99242-8321	99242-8332	99242-8343	99242-8359
	Location Number										2019KE2898	2019KE2899	2019KE2900	2019KE2901	2019KE2902
	Sample Id										HIN1327	HIN1328	HIN1329	HIN1330	HIN1331
	Sample Type										Water	Water	Water	Water	Water
	Sample Source										Ground	Ground	Ground	Ground	Ground
	Collected Date / Time										20/03/19 9:15	20/03/19 9:30	20/03/19 9:50	20/03/19 10:12	20/03/19 10:32
	Mnemonic	Test/Panel Description	Analyte	Reporting Limit	Upper LOR	Units	Guideline	Guideline Value	Accreditation	NATA	Result	Result	Result	Result	Result
	ALL DEPARTMENTS														
	KEHBG1	Herbs GCMS All													
	KE3ADA	3,4-Dichloroaniline	3,4-Dichloroaniline	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEAM1	Ametryn (HBG)	Ametryn	0.1		µg/L	Australian Drinking Water Guidelines	70	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEAMIT	Amitraz (HBG)	Amitraz	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEATR1	Atrazine (HBG)	Atrazine	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEBROM	Bromacil (HBG)	Bromacil	0.1		µg/L	Australian Drinking Water Guidelines	400	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDZ1	Desethyl Atrazine (HBG)	Desethyl Atrazine	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDOZ1	Desisopropyl Atrazine (HBG)	Desisopropyl Atrazine	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDICM	Diclofop-methyl (HBG)	Diclofop-methyl	0.1		µg/L	Australian Drinking Water Guidelines	5	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFLZF	Fluazifop-butyl (HBG)	Fluazifop-butyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFLM1	Fluometuron (HBG)	Fluometuron	0.1		µg/L	Australian Drinking Water Guidelines	70	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEHOZE	Haloxyfop-2-etotyl (HBG)	Haloxyfop-2-etotyl	0.1		µg/L	Australian Drinking Water Guidelines	1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEHOM	Haloxyfop-methyl (HBG)	Haloxyfop-methyl	0.1		µg/L	Australian Drinking Water Guidelines	1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEHZ1	Hexazinone (HBG)	Hexazinone	0.1		µg/L	Australian Drinking Water Guidelines	400	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMETC	Metolachlor (HBG)	Metolachlor	0.1		µg/L	Australian Drinking Water Guidelines	300	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMRB	Metribuzin (HBG)	Metribuzin	0.1		µg/L	Australian Drinking Water Guidelines	70	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMOLN	Molinate (HBG)	Molinate	0.1		µg/L	Australian Drinking Water Guidelines	4	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KELN	Organics Env. Lab #													
	KEOXYF	Oxyfluorfen (HBG)	Oxyfluorfen	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPDM	Pendimethalin (HBG)	Pendimethalin	0.1		µg/L	Australian Drinking Water Guidelines	400	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPM1	Prometryn (HBG)	Prometryn	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPPNL	Propanil (HBG)	Propanil	0.1		µg/L	Australian Drinking Water Guidelines	700	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPPZN	Propazine (HBG)	Propazine	0.1		µg/L	Australian Drinking Water Guidelines	50	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KESM1	Simazine (HBG)	Simazine	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETB1	Tebuthiuron (HBG)	Tebuthiuron	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETBTZ	Terbuthylazine (HBG)	Terbuthylazine	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETBTY	Terbutryn (HBG)	Terbutryn	0.1		µg/L	Australian Drinking Water Guidelines	400	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETRIA	Triallate (HBG)	Triallate	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETRIF	Trifluralin (HBG)	Trifluralin	0.1		µg/L	Australian Drinking Water Guidelines	90	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEOC1	Organochlorine Pest													
	KEALD	Aldrin (OC)	Aldrin	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECLDC	Chlordane cis (OC)	Chlordane cis	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECLT	Chlordane Total (OC)	Total Chlordane	0.2		µg/L	Australian Drinking Water Guidelines	2	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KECLDT	Chlordane trans (OC)	Chlordane trans	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECHL	Chlordene (OC)	Chlordene	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECHLE	Chlordene epoxide (OC)	Chlordene epoxide	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEC1H	Chlordene-1-hydroxy (OC)	Chlordene-1-hydroxy	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEC1H2	Chlordene-1-hydroxy-2,3-epox	Chlordene-1-hydroxy-2,3-epox	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDIEL	Dieldrin (OC) new	Dieldrin	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEENDA	Endosulfan Alpha (OC)	<alpha> Endosulfan	0.5		µg/L	Australian Drinking Water Guidelines	20	--	--	<0.6	<0.5	<0.6	<0.6	<0.5
	KEENDB	Endosulfan Beta (OC)	<beta> Endosulfan	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEENDE	Endosulfan ether (OC)	Endosulfan ether	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEENDL	Endosulfan lactone (OC)	Endosulfan lactone	0.5		µg/L	--	--	--	--	<0.6	<0.5	<0.6	<0.6	<0.5
	KEENDS	Endosulfan sulfate (OC)	Endosulfan sulfate	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEERIN	Endrin (OC)	Endrin	0.2		µg/L	--	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KEERIA	Endrin aldehyde (OC)	Endrin aldehyde	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEHCB	HCB (OC)	HCB	0.2		µg/L	--	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KEHCHA	HCH alpha (OC)	<alpha> HCH	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEHCHB	HCH beta (OC)	<beta> HCH	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEHCHD	HCH delta (OC)	<delta> HCH	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECBH	Heptachlor (OC)	Heptachlor	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECBHE	Heptachlor epoxide (OC)	Heptachlor epoxide	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEELD	Lindane (OC)	Lindane (<gamma>-HCH)	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMET	Methoxychlor (OC)	Methoxychlor	0.1		µg/L	Australian Drinking Water Guidelines	300	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KENONC	Nonachlor cis (OC)	Nonachlor cis	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KENONT	Nonachlor trans (OC)	Nonachlor trans	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEODDD	o-p DDD (OC)	DDD (op)	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEODDE	o-p DDE (OC)	DDE (op)	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEODDT	o-p DDT (OC)	DDT (op)	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KELN	Organics Env. Lab #					--	--	--	--					
	KEOXC	Oxychlordane (OC)	Oxychlordane	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPDDD	p-p DDD (OC)	DDD (pp)	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPDDE	p-p DDE (OC)	DDE (pp)	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPDDT	p-p DDT (OC)	DDT (pp)	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETAD	Total Aldrin & Dieldrin (OC)	Total Aldrin & Dieldrin	0.2		µg/L	Australian Drinking Water Guidelines	0.3	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KEDDT	Total DDT (OC)	Total DDT	0.4		µg/L	Australian Drinking Water Guidelines	9	--	--	<0.5	<0.4	<0.5	<0.4	<0.4
	KEDIC	Total Dicofol (OC)	Total Dicofol	1.5		µg/L	Australian Drinking Water Guidelines	4	--	--	< 1.7	< 1.6	< 1.7	< 1.7	< 1.6
	KEEND	Total Endosulfan (OC)	Total Endosulfan	0.7		µg/L	Australian Drinking Water Guidelines	20	--	--	<0.8	<0.7	<0.8	<0.8	<0.7
	KETHC	Total Heptachlor (OC)	Total Heptachlor	0.2		µg/L	Australian Drinking Water Guidelines	0.3	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KEOP1	Organophos Pest 1													
	KEAZPE	Azinphos-ethyl (OP)	Azinphos-ethyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEAZPM	Azinphos-methyl (OP)	Azinphos-methyl	0.1		µg/L	Australian Drinking Water Guidelines	30	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEBMPE	Bromophos-ethyl (OP)	Bromophos-ethyl	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECADS	Cadusafos (OP)	Cadusafos	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECARP	Carbophenothion (OP)	Carbophenothion	0.1		µg/L	Australian Drinking Water Guidelines	0.5	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECHFV	Chlorfenvinphos (OP)	Chlorfenvinphos	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECHP	Chlorpyrifos (OP)	Chlorpyrifos	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECHPO	Chlorpyrifos oxon (OP)	Chlorpyrifos oxon	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECHPM	Chlorpyrifos-methyl (OP)	Chlorpyrifos-methyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECOUM	Coumaphos (OP)	Coumaphos	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDEOM	Demeton-O-methyl	Demeton-O-methyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDEMT	Demeton-S 1631S	Demeton-S	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDESM	Demeton-S-methyl (OP)	Demeton-S-methyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDIAZ	Diazinon (OP)	Diazinon	0.1		µg/L	Australian Drinking Water Guidelines	4	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDICH	Dichlorvos (OP)	Dichlorvos	0.1		µg/L	Australian Drinking Water Guidelines	5	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDIME	Dimethoate (OP)	Dimethoate	0.1		µg/L	Australian Drinking Water Guidelines	7	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDIOX	Dioxathion (OP)	Dioxathion	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDIS	Disulfoton (OP)	Disulfoton	0.1		µg/L	Australian Drinking Water Guidelines	4	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEETHI	Ethion (OP)	Ethion	0.1		µg/L	Australian Drinking Water Guidelines	4	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEETHP	Ethoprophos (OP)	Ethoprophos	0.1		µg/L	Australian Drinking Water Guidelines	1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEETRI	Etrimphos (OP)	Etrimphos	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFAMP	Famphur (OP)	Famphur	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFENA	Fenamiphos (OP)	Fenamiphos	0.1		µg/L	Australian Drinking Water Guidelines	0.5	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFENC	Fenchlorphos (OP)	Fenchlorphos	0.1		µg/L	Australian Drinking Water Guidelines	30	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFENI	Fenitrothion (OP)	Fenitrothion	0.1		µg/L	Australian Drinking Water Guidelines	7	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFENM	Fenthion (methly) (OP)	Fenthion (methyl)	0.1		µg/L	Australian Drinking Water Guidelines	7	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFENE	Fenthion-ethyl (OP)	Fenthion-ethyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEISOP	Isofenphos (OP)	Isofenphos	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMALA	Malathion (OP)	Malathion (Maldison)	0.1		µg/L	Australian Drinking Water Guidelines	70	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMETD	Methidathion (OP)	Methidathion	0.1		µg/L	Australian Drinking Water Guidelines	6	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMEVI	Mevinphos (OP)	Mevinphos	0.1		µg/L	Australian Drinking Water Guidelines	5	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMCP	Monocrotophos (OP)	Monocrotophos	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEOME	Omethoate (OP)	Omethoate	0.2		µg/L	Australian Drinking Water Guidelines	1	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KELN	Organics Env. Lab #					--	--	--	--					
	KEOXDM	Oxydemeton-methyl (OP)	Oxydemeton-methyl	0.2		µg/L	--	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KEPARE	Parathion (ethyl) (OP)	Parathion (ethyl)	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPARM	Parathion-methyl (OP)	Parathion-methyl	0.1		µg/L	Australian Drinking Water Guidelines	0.7	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPHOR	Phorate (OP)	Phorate	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPHOS	Phosmet (OP)	Phosmet	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPHOP	Phosphamidon (OP)	Phosphamidon	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPIRM	Pirimiphos-methyl (OP)	Pirimiphos-methyl	0.1		µg/L	Australian Drinking Water Guidelines	90	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPROF	Profenofos (OP)	Profenofos	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPROT	Prothiofos (OP)	Prothiofos	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPYRZ	Pyrazophos (OP)	Pyrazophos	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KESUL	Sulprofos (OP)	Sulprofos	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETEME	Temephos (OP)	Temephos	0.1		µg/L	Australian Drinking Water Guidelines	400	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETERB	Terbufos (OP)	Terbufos	0.1		µg/L	Australian Drinking Water Guidelines	1	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETCVP	Tetrachlorvinphos (OP)	Tetrachlorvinphos	0.1		µg/L	Australian Drinking Water Guidelines	100	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDIMT	Total Dimethoate (OP)	Total Dimethoate	0.3		µg/L	Australian Drinking Water Guidelines	7	--	--	<0.3	<0.3	<0.3	<0.3	<0.3
	KEOTCG	Oth Compounds GCMS													
	KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.7		µg/L	--	--	--	--	<0.8	<0.7	<0.8	<0.8	<0.7
	KE1HB1	1H-Benzotriazole, 1-methyl (OT	1H-Benzotriazole, 1-methyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KE1HB4	1H-Benzotriazole, 4-methyl (OT	1H-Benzotriazole, 4-methyl	0.5		µg/L	--	--	--	--	<0.6	<0.5	<0.6	<0.6	<0.5
	KE1HB5	1H-Benzotriazole, 5-methyl (OT	1H-Benzotriazole, 5-methyl	0.2		µg/L	--	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KE24DT	2,4-Di-t-butylphenol	2,4-Di-t-butylphenol	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDTBC	2,6-Di-t-butyl-p-cresol (OTCG)	2,6-Di-t-butyl-p-cresol (BHT)	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDTBP	2,6-Di-t-butylphenol (OTCG)	2,6-Di-t-butylphenol	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KE2B4C	2-Benzyl-4-chlorophenol	2-Benzyl-4-chlorophenol	0.2		µg/L	--	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KE2NMX	2-Nitro-m-xylene (SUR)	2-Nitro-m-xylene			%	--	--	--	--	29	0	89	0	103
	KECOMP	4-Chloro-3,5-dimethylphenol ((	4-Chloro-3,5-dimethylphenol	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEBESA	Benzenesulfonanilide	Benzenesulfonanilide	0.2		µg/L	--	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KEDCCB	Decachlorobiphenyl (SUR)	Decachlorobiphenyl			%	--	--	--	--	88	80	112	97	93
	KEDBBP	Dibromobiphenyl (SUR)	Dibromobiphenyl			%	--	--	--	--	90	77	91	79	88
	KEGALA	Galaxolide (OTCG)	Galaxolide	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEICAD	Icaridin	Icaridin	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMOCL	Moclobemide (OTCG)	Moclobemide	1		µg/L	--	--	--	--	<1.1	<1.1	<1.1	<1.1	<1.1
	KEMSKX	Musk Ketone (OTCG)	Musk Ketone	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMSKX	Musk Xylene (OTCG)	Musk Xylene	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KENBBS	N-Butylbenzenesulfonamide (O	N-Butylbenzenesulfonamide	0.1		µg/L	--	--	--	--	<0.1	6.9	<0.1	22	<0.1
	KENBTS	N-Butyltoluenesulfonamide (O	N-Butyltoluenesulfonamide	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KELN	Organics Env. Lab #					--	--	--	--					
	KEPDIO	Pyrene-d10 (SUR)	Pyrene-d10			%	--	--	--	--	82	75	84	74	83
	KETONL	Tonalid (OTCG)	Tonalid	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETNBP	Tri-n-butyl phosphate (OTCG)	Tri-n-butyl phosphate	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETRIC	Triclosan (OTCG)	Triclosan	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETCME	Triclosan methyl ether (OTCG)	Triclosan methyl ether	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETEP	Triethyl phosphate (OTCG)	Triethyl phosphate	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPPTP	Triphenyl phosphate (SUR)	Triphenyl phosphate			%	--	--	--	--	84	69	84	74	79
	KETCEP	Tris(chloroethyl) phosphate (O	Tris(chloroethyl) phosphate	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETCPP	Tris(chloropropyl) phosphate (	Tris(chloropropyl) phosphate	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KETDCP	Tris(dichloropropyl) phosphate	Tris(dichloropropyl) phosphate	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEOTP1	Other Pesticides 1													
	KEBENA	Benalaxyl (OTP)	Benalaxyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEBENC	Bendiocarb (OTP)	Bendiocarb	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEBITE	Bitertanol (OTP)	Bitertanol	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECAPT	Captan (OTP)	Captan	0.1		µg/L	Australian Drinking Water Guidelines	400	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KECARB	Carbaryl (OTP)	Carbaryl	0.1		µg/L	Australian Drinking Water Guidelines	30	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDEET	DEET (OTP)	DEET	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEDIMM	Dimethomorph (OTP)	Dimethomorph	0.2		µg/L	--	--	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KEWFIP	Fipronil (OTP)	Fipronil	0.1		µg/L	Australian Drinking Water Guidelines	0.7	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFLTF	Flutriafol	Flutriafol	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEFURA	Furalaxyl (OTP)	Furalaxyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMLAX	Metalaxyl (OTP)	Metalaxyl	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEMETP	Methoprene (OTP)	Methoprene	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KELN	Organics Env. Lab #					--	--	--	--					
	KEOXAD	Oxadiazon (OTP)	Oxadiazon	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPIPB	Piperonyl butoxide (OTP)	Piperonyl butoxide	0.1		µg/L	Australian Drinking Water Guidelines	600	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPIMC	Pirimicarb (OTP)	Pirimicarb	0.2		µg/L	Australian Drinking Water Guidelines	7	--	--	<0.2	<0.2	<0.2	<0.2	<0.2
	KEPRAQ	Praziquantel	Praziquantel	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPCYM	Procymidone (OTP)	Procymidone	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPROG	Propargite (OTP)	Propargite	0.1		µg/L	Australian Drinking Water Guidelines	7	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPPYC	Propiconazole (OTP)	Propiconazole	0.1		µg/L	Australian Drinking Water Guidelines	100	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEPROX	Propoxur (OTP)	Propoxur	0.1		µg/L	--	--	--	--	<0.1	<0.1	<0.1	<0.1	<0.1
	KEROTN	Rotenone (OTP)	Rotenone	0

	Lab No.											99242-8310	99242-8321	99242-8332	99242-8343	99242-8359
	Location Number											2019KE2898	2019KE2899	2019KE2900	2019KE2901	2019KE2902
	Sample Id											HIN1327	HIN1328	HIN1329	HIN1330	HIN1331
	Sample Type											Water	Water	Water	Water	Water
	Sample Source											Ground	Ground	Ground	Ground	Ground
	Collected Date / Time											20/03/19 9:15	20/03/19 9:30	20/03/19 9:50	20/03/19 10:12	20/03/19 10:32
	Mnemonic	Test/Panel Description	Analyte	Reporting Limit	Upper LOR	Units	Guideline	Guideline Value	Accreditation	NATA	Result	Result	Result	Result	Result	Result
	KEH070	Bromoxynil (DI)	Bromoxynil	0.02		µg/L	Australian Drinking Water Guidelines	10	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH071	Carbaryl (DI)	Carbaryl	0.1		µg/L	Australian Drinking Water Guidelines	30	--	--						
	KEH072	Carfentrazone (acid) (DI)	Carfentrazone (acid)	1		µg/L	Australian Drinking Water Guidelines	100	--	--						
	KEH010	Chlorpyrifos (DI)	Chlorpyrifos	0.02		µg/L	Australian Drinking Water Guidelines	10	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH011	Chlorpyrifos oxon (DI)	Chlorpyrifos oxon	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH012	Clomazone (DI)	Clomazone	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH013	Clothianidin (DI)	Clothianidin	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH014	Cyanazine (DI)	Cyanazine	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH073	Dalapon (2,2-DPA) (DI)	Dalapon (2,2-DPA)	0.2		µg/L	Australian Drinking Water Guidelines	500	--	--	0.4	< 0.20	< 0.20	0.2	< 0.20	< 0.20
	KEH015	DCPMU (DI)	DCPMU	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH016	DCPU (DI)	DCPU	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH017	Desethyl Atrazine (DI)	Desethyl Atrazine	0.01		µg/L	--	--	--	--	< 0.01	0.01	< 0.01	< 0.01	0.01	0.01
	KEH018	Desisopropyl Atrazine (DI)	Desisopropyl Atrazine	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH019	Diazinon (DI)	Diazinon	0.01		µg/L	Australian Drinking Water Guidelines	4	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH074	Dicamba (DI)	Dicamba	0.05		µg/L	Australian Drinking Water Guidelines	100	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH075	Dinotefuran (DI)	Dinotefuran	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH020	Diuron (DI)	Diuron	0.02		µg/L	Australian Drinking Water Guidelines	20	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH021	Ethametsulfuron methyl (DI)	Ethametsulfuron methyl	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH076	Ethoxysulfuron (DI)	Ethoxysulfuron	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH022	Fipronil (DI)	Fipronil	0.02		µg/L	Australian Drinking Water Guidelines	0.7	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH077	Fipronil Desulfinyl (DI)	Fipronil Desulfinyl	0.01		µg/L	Australian Drinking Water Guidelines	0.7	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH024	Fipronil sulfide (DI)	Fipronil sulfide	0.01		µg/L	Australian Drinking Water Guidelines	0.7	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH023	Fipronil sulfone (DI)	Fipronil sulfone	0.01		µg/L	Australian Drinking Water Guidelines	0.7	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH078	Flamprop-methyl (DI)	Flamprop-methyl	0.01		µg/L	Australian Drinking Water Guidelines	4	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH079	Fluazifop (acid) (DI)	Fluazifop (acid)	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH025	Fluometuron (DI)	Fluometuron	0.01		µg/L	Australian Drinking Water Guidelines	70	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH026	Fluroxypyr (DI)	Fluroxypyr	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH027	Flusilazole (DI)	Flusilazole	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH080	Flutriafol (DI)	Flutriafol	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH028	Halosulfuron methyl (DI)	Halosulfuron methyl	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH029	Haloxyfop (acid) (DI)	Haloxyfop (acid)	0.02		µg/L	Australian Drinking Water Guidelines	1	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH030	Hexazinone (DI)	Hexazinone	0.01		µg/L	Australian Drinking Water Guidelines	400	--	--	< 0.01	0.04	< 0.01	0.01	0.03	
	KEH031	Imazapic (DI)	Imazapic	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH032	Imazapyr (DI)	Imazapyr	0.02		µg/L	Australian Drinking Water Guidelines	9000	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH033	Imazethapyr (DI)	Imazethapyr	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH034	Imidacloprid (DI)	Imidacloprid	0.02		µg/L	--	--	--	--	< 0.02	0.12	< 0.02	0.03	0.1	
	KEH035	Imidacloprid metabolites (DI)	Imidacloprid metabolites	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH081	Ioxynil (DI)	Ioxynil	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH036	Isoxaflutole metabolite (DKN)	Isoxaflutole metabolite (DKN)	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH037	MCPA (DI)	MCPA	0.01		µg/L	Australian Drinking Water Guidelines	40	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH038	MCPB (DI)	MCPB	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH039	Mecoprop (DI)	Mecoprop	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH040	Mesosulfuron methyl (DI)	Mesosulfuron methyl	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH041	Methoxyfenozide (DI)	Methoxyfenozide	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH042	Metolachlor (DI)	Metolachlor	0.01		µg/L	Australian Drinking Water Guidelines	300	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH043	Metolachlor-OXA (DI)	Metolachlor-OXA	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH044	Metribuzin (DI)	Metribuzin	0.02		µg/L	Australian Drinking Water Guidelines	70	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH045	Metsulfuron methyl (DI)	Metsulfuron methyl	0.02		µg/L	Australian Drinking Water Guidelines	40	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH082	Molinate (DI)	Molinate	0.02		µg/L	Australian Drinking Water Guidelines	4	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH047	N-Desmethyl Acetamiprid (DI)	N-Desmethyl Acetamiprid	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH046	Napropamide (DI)	Napropamide	0.01		µg/L	Australian Drinking Water Guidelines	400	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KELN	Organics Env. Lab #							--	--						
	KEH083	Pendimethalin (DI)	Pendimethalin	0.02		µg/L	Australian Drinking Water Guidelines	400	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH084	Picloram (DI)	Picloram	0.2		µg/L	Australian Drinking Water Guidelines	300	--	--	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	KEH048	Prometryn (DI)	Prometryn	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH049	Propachlor (DI)	Propachlor	0.02		µg/L	Australian Drinking Water Guidelines	70	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH050	Propazin-2-hydroxy (DI)	Propazin-2-hydroxy	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH085	Propoxur (DI)	Propoxur	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH051	Sethoxydim	Sethoxydim	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH052	Simazine (DI)	Simazine	0.01		µg/L	Australian Drinking Water Guidelines	20	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH053	Sulfosulfuron (DI)	Sulfosulfuron	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH054	Tebuthiuron (DI)	Tebuthiuron	0.01		µg/L	--	--	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH055	Terbuthylazine (DI)	Terbuthylazine	0.01		µg/L	Australian Drinking Water Guidelines	10	--	--	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	KEH056	Terbuthylazine desethyl (DI)	Terbuthylazine desethyl	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH057	Terbutryn (DI)	Terbutryn	0.02		µg/L	Australian Drinking Water Guidelines	400	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH058	Thiacloprid (DI)	Thiacloprid	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH059	Thiamethoxam (DI)	Thiamethoxam	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KEH060	Total Acetamiprid (DI)	Total Acetamiprid	0.02		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
	KEH061	Total Diuron (DI)	Total Diuron	0.06		µg/L	Australian Drinking Water Guidelines	20	--	--	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
	KEH062	Total Fipronil (DI)	Total Fipronil	0.05		µg/L	--	--	--	--	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
	KERPT	KE Environ. Reporting														
	CAOP	Carbamate Operator	HPLC Analyst				--	--	--	--		--	--	--	--	
	KEGIDE	Flag to turn Water Guidelines off					--	--	--	--		--	--	--	--	
	GCOP	GC/LC Operator	GCMS/LCMS Analyst				--	--	--	--		--	--	--	--	
	KECP	KE Cover Page	Cover Page Only (y)				--	--	--	--		--	--	--	--	
	PHCP2C	KE Organic Chemistry Reason for Analysis					--	--	--	--	33963 - Herbicides in Water by Direct Injection LCMSMS 16315 - OC, OP, Synthetic Pyrethroids, Urea, Triazine Herbicides, PCBs in Water by GCMS/LCMS	--	--	--	--	
	KERCOM	Organic Chemistry Remarks					--	--	--	--	16315 - The Reporting Limits are based on the extraction and concentration of clean water under optimum conditions. The results for each sample have been calculated to account for varying initial and final volumes. *Note: There was low or no recovery of the first surrogate, 2-Nitro-m-Xylene in samples 19KE2898,19KE2899 and 19KE2901 is low which may indicate some losses of more volatile compounds. Please note that QIS 16315 consistently gives low recoveries for 1H-Benzotriazole, 2,6-t-Butyl-p-cresol (BHT), 2,6-Di-t-butylphenol, Aldrin, Chlordene, HCB, Moclobemide, Monocrotophos, Omethoate, Oxydemeton-methyl and Pirimicarb. 33963 - Note: Pendimethalin consistently gives low recovery for QIS method 33963. Limits of reporting have been raised for some analytes due to sample interferences. Results in this report have been authorised for release by Martha du Plessis.	--	--	--	--	
	PHOAR	Organics - Analysis Requested					--	--	--	--	Pesticide Residue Analysis	--	--	--	--	
	PHOCD	Organics Completed Date	Completed Date				--	--	--	--		--	--	--	--	
	OTOP	Other Operator	Other Analyst				--	--	--	--		--	--	--	--	
	PHDSO	PH Date started - Organics					--	--	--	--	25-Mar-19	--	--	--	--	
	PHSCO	PH Organics Analyst					--	--	--	--	Stewart Carswell	--	--	--	--	
	PHSCO3	PH Organics Chemist 3	Chemist				--	--	--	--	Renu Patel	--	--	--	--	
	PHRIO	PH Report Issued Date - Organics					--	--	--	--	23-Apr-19	--	--	--	--	
	PHOP	Phenoxy Operator	Phenox. Herb. Analyst				--	--	--	--		--	--	--	--	
	ORLOR	Report LOR					--	--	--	--		--	--	--	--	
	ORGMAN	Organic Pkg Mgmt														
	PHDDO	PH Due Date - Organics					--	--	--	--		--	--	--	--	
	PHECDO	PH Est Date Completion - Organics					--	--	--	--		--	--	--	--	
	PHPR	PH Priority					--	--	--	--		--	--	--	--	
	PHSTAO	PH Status - Organics					--	--	--	--	Report Issued	--	--	--	--	
	KWP	Water Pest GCMS														
	KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.7		µg/L	--	--	--	--	< 0.8	< 0.7	< 0.8	< 0.8	< 0.7	
	KEALD	Aldrin (OC)	Aldrin	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	KEAMRT	Amitraz (HBG)	Amitraz	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	KEAZPE	Azinphos-ethyl (OP)	Azinphos-ethyl	0.1		µg/L	--	--	--	--	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
	KEBENA	Benalaxyl (OTP)	Benalaxyl	0.1		µg/L	--	--	--	--	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	

Report output for SSP0069421 created on 10:17 12-May-20 by MARTHA DUPLESSIS (SS|PUBH) V1

Package No. SSP0069421
Client Minchinbrook Shire Council - Ingham
Client Project
Client Batch Ref
Order No. FREDERICKS_N
Package Request Date 25-Mar-20
Package Registered D 27-Mar-20

Reported Dates	30-Mar-20	30-Mar-20	30-Mar-20	30-Mar-20	28-Apr-20	28-Apr-20	28-Apr-20	28-Apr-20	29-Apr-20	12-May-20	12-May-20
Reporting Analyst	KRISTINE MCDONALD	KRISTINE MCDONALD	KRISTINE	KRISTINE	NIGEL	NIGEL	NIGEL	NIGEL	NIGEL	MARTHA	MARTHA
Names	(SS|PHLB)	(SS|PHLB)	MCDONALD	MCDONALD	GOLDTHORPE	GOLDTHORPE	GOLDTHORPE	GOLDTHORPE	GOLDTHORPE	DUPLESSIS	DUPLESSIS
			(SS|PHLB)	(SS|PHLB)	(SS|PH)	(SS|PH)	(SS|PH)	(SS|PH)	(SS|PH)	(SS|PUBH)	(SS|PUBH)

	Lab No.											20899-92469	20899-92477	20899-92483	20899-92498	20899-92502	20899-92516	20899-92528	20899-92537	20899-92543
	Location Number											2020KE3764	2020KE3765	2020KE3766	2020KE3767	2020NA2814	2020NA2815	2020NA2816	2020NA2817	2020NA2818
	Sample Id											HIN_1378	HIN_1379	HIN_1380	HIN_1381	HIN_1373	HIN_1374	HIN_1375	HIN_1376	HIN_1377
	Sample Type											Water	Water	Water	Water	Water	Water	Water	Water	Water
	Sample Source											Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
	Collected Date / Time											25/03/20 9:54	25/03/20 10:17	25/03/20 10:39	25/03/20 10:50	25/03/20 9:28	25/03/20 9:52	25/03/20 10:15	25/03/20 10:37	25/03/20 10:47
	Mnemonic	Test/Panel Description	Analyte	Reporting Limit	Upper LOR	Units	Guideline	Guideline Value	Accreditation	NATA		Result	Result	Result	Result	Result	Result	Result	Result	Result
	ALL DEPARTMENTS																			
	KEHBG1	Herbs GCMS All																		
	KE3ADA	3,4-Dichloroaniline	3,4-Dichloroaniline	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEAM1	Ametryn (HBG)	Ametryn	0.1		µg/L	Australian Drin	70	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEAMIT	Amitraz (HBG)	Amitraz	0.1		µg/L	Australian Drin	9	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEATR1	Atrazine (HBG)	Atrazine	0.1		µg/L	Australian Drin	20	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEBROM	Bromacil (HBG)	Bromacil	0.1		µg/L	Australian Drin	400	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDZ1	Desethyl Atrazine (HBG)	Desethyl Atrazine	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDOZ1	Desisopropyl Atrazine (HBG)	Desisopropyl Atrazine	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDICM	Diclofop-methyl (HBG)	Diclofop-methyl	0.1		µg/L	Australian Drin	5	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEFLZF	Fluazifop-butyl (HBG)	Fluazifop-butyl	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEFLM1	Fluometuron (HBG)	Fluometuron	0.1		µg/L	Australian Drin	70	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KEHOZE	Haloxyfop-2-etotyl (HBG)	Haloxyfop-2-etotyl	0.1		µg/L	Australian Drin	1	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEHOM	Haloxyfop-methyl (HBG)	Haloxyfop-methyl	0.1		µg/L	Australian Drin	1	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEHZ1	Hexazinone (HBG)	Hexazinone	0.1		µg/L	Australian Drin	400	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMETC	Metolachlor (HBG)	Metolachlor	0.1		µg/L	Australian Drin	300	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMRB	Metribuzin (HBG)	Metribuzin	0.1		µg/L	Australian Drin	70	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMOLN	Molinate (HBG)	Molinate	0.1		µg/L	Australian Drin	4	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KELN	Organics Env. Lab #							--	--										
	KEOXYF	Oxyfluorfen (HBG)	Oxyfluorfen	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPDM	Pendimethalin (HBG)	Pendimethalin	0.1		µg/L	Australian Drin	400	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPM1	Prometryn (HBG)	Prometryn	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPPNL	Propanil (HBG)	Propanil	0.1		µg/L	Australian Drin	700	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPPZN	Propazine (HBG)	Propazine	0.1		µg/L	Australian Drin	50	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KESM1	Simazine (HBG)	Simazine	0.1		µg/L	Australian Drin	20	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETB1	Tebuthiuron (HBG)	Tebuthiuron	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETBTZ	Terbuthylazine (HBG)	Terbuthylazine	0.1		µg/L	Australian Drin	10	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETBTY	Terbutryn (HBG)	Terbutryn	0.1		µg/L	Australian Drin	400	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETRIA	Trialiate (HBG)	Trialiate	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETRIF	Trifluralin (HBG)	Trifluralin	0.1		µg/L	Australian Drin	90	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEOC1	Organochlorine Pest																		
	KEALD	Aldrin (OC)	Aldrin	0.1		µg/L	Australian Drin	0.3	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECLDC	Chlordane cis (OC)	Chlordane cis	0.1		µg/L	Australian Drin	2	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECLT	Chlordane Total (OC)	Total Chlordane	0.2		µg/L	Australian Drin	2	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KECLDT	Chlordane trans (OC)	Chlordane trans	0.1		µg/L	Australian Drin	2	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECHL	Chlordene (OC)	Chlordene	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECHLE	Chlordene epoxide (OC)	Chlordene epoxide	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECLH	Chlordene-1-hydroxy (OC)	Chlordene-1-hydroxy	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECLH2	Chlordene-1-hydroxy-2,3-epox	Chlordene-1-hydroxy-2,3-epox	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDIEL	Dieldrin (OC) new	Dieldrin	0.1		µg/L	Australian Drin	0.3	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEENDA	Endosulfan Alpha (OC)	<alpha> Endosulfan	0.5		µg/L	Australian Drin	20	--	--		< 0.5	< 0.5	< 0.5	< 0.5	--	--	--	--	--
	KEENDB	Endosulfan Beta (OC)	<beta> Endosulfan	0.1		µg/L	Australian Drin	20	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEENDE	Endosulfan ether (OC)	Endosulfan ether	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEENDL	Endosulfan lactone (OC)	Endosulfan lactone	0.5		µg/L	--	--	--	--		< 0.5	< 0.5	< 0.5	< 0.5	--	--	--	--	--
	KEENDS	Endosulfan sulfate (OC)	Endosulfan sulfate	0.1		µg/L	Australian Drin	20	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEERIN	Endrin (OC)	Endrin	0.2		µg/L	--	--	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KEERIA	Endrin aldehyde (OC)	Endrin aldehyde	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEHCB	HCB (OC)	HCB	0.2		µg/L	--	--	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KEHCHA	HCH alpha (OC)	<alpha> HCH	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEHCHB	HCH beta (OC)	<beta> HCH	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEHCHD	HCH delta (OC)	<delta> HCH	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECBH	Heptachlor (OC)	Heptachlor	0.1		µg/L	Australian Drin	0.3	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECBHE	Heptachlor epoxide (OC)	Heptachlor epoxide	0.1		µg/L	Australian Drin	0.3	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEELD	Lindane (OC)	Lindane (<gamma>-HCH)	0.1		µg/L	Australian Drin	10	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMET	Methoxychlor (OC)	Methoxychlor	0.1		µg/L	Australian Drin	300	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KENONC	Nonachlor cis (OC)	Nonachlor cis	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KENONT	Nonachlor trans (OC)	Nonachlor trans	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEODDD	o-p DDD (OC)	DDD (op)	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEODDE	o-p DDE (OC)	DDE (op)	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEODDT	o-p DDT (OC)	DDT (op)	0.1		µg/L	Australian Drin	9	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KELN	Organics Env. Lab #							--	--										
	KEOXC	Oxychlordane (OC)	Oxychlordane	0.1		µg/L	Australian Drin	2	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPDDD	p-p DDD (OC)	DDD (pp)	0.1		µg/L	Australian Drin	9	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPDDE	p-p DDE (OC)	DDE (pp)	0.1		µg/L	Australian Drin	9	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPDDT	p-p DDT (OC)	DDT (pp)	0.1		µg/L	Australian Drin	9	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETAD	Total Aldrin & Dieldrin (OC)	Total Aldrin & Dieldrin	0.2		µg/L	Australian Drin	0.3	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KEDDT	Total DDT (OC)	Total DDT	0.4		µg/L	Australian Drin	9	--	--		< 0.4	< 0.4	< 0.4	< 0.4	--	--	--	--	--
	KEDIC	Total Dicofol (OC)	Total Dicofol	1.5		µg/L	Australian Drin	4	--	--		< 1.6	< 1.6	< 1.6	< 1.6	--	--	--	--	--
	KEEND	Total Endosulfan (OC)	Total Endosulfan	0.7		µg/L	Australian Drin	20	--	--		< 0.7	< 0.7	< 0.8	< 0.7	--	--	--	--	--
	KETHC	Total Heptachlor (OC)	Total Heptachlor	0.2		µg/L	Australian Drin	0.3	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KEOP1	Organophos Pest 1																		
	KEAZPE	Azinphos-ethyl (OP)	Azinphos-ethyl	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEAZPM	Azinphos-methyl (OP)	Azinphos-methyl	0.1		µg/L	Australian Drin	30	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEBMPE	Bromophos-ethyl (OP)	Bromophos-ethyl	0.1		µg/L	Australian Drin	10	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECADS	Cadusafos (OP)	Cadusafos	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECARP	Carbophenothion (OP)	Carbophenothion	0.1		µg/L	Australian Drin	0.5	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECHFV	Chlorfenvinphos (OP)	Chlorfenvinphos	0.1		µg/L	Australian Drin	2	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECHP	Chlorpyrifos (OP)	Chlorpyrifos	0.1		µg/L	Australian Drin	10	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECHPO	Chlorpyrifos oxon (OP)	Chlorpyrifos oxon	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECHPM	Chlorpyrifos-methyl (OP)	Chlorpyrifos-methyl	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KECOUM	Coumaphos (OP)	Coumaphos	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDEOM	Demeton-O-methyl	Demeton-O-methyl	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDEMT	Demeton-S 16315	Demeton-S	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDESM	Demeton-S-methyl (OP)	Demeton-S-methyl	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDIAZ	Diazinon (OP)	Diazinon	0.1		µg/L	Australian Drin	4	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDICH	Dichlorvos (OP)	Dichlorvos	0.1		µg/L	Australian Drin	5	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDIME	Dimethoate (OP)	Dimethoate	0.1		µg/L	Australian Drin	7	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDIOX	Dioxathion (OP)	Dioxathion	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDIS	Disulfoton (OP)	Disulfoton	0.1		µg/L	Australian Drin	4	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEETHI	Ethion (OP)	Ethion	0.1		µg/L	Australian Drin	4	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEETHP	Ethoprophos (OP)	Ethoprophos	0.1		µg/L	Australian Drin	1	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEETRI	Etrimphos (OP)	Etrimphos	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEFAMP	Famphur (OP)	Famphur	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEFENA	Fenamiphos (OP)	Fenamiphos	0.1		µg/L	Australian Drin	0.5	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEFENC	Fenchlorphos (OP)	Fenchlorphos	0.1		µg/L	Australian Drin	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEFENI	Fenitrothion (OP)	Fenitrothion	0.1		µg/L	Australian Drin	7	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEFENM	Fenthion (methly) (OP)	Fenthion (methyl)	0.1		µg/L	Australian Drin	7	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEFENE	Fenthion-ethyl (OP)	Fenthion-ethyl	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEISOP	Isofenphos (OP)	Isofenphos	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMALA	Malathion (OP)	Malathion (Maldison)	0.1		µg/L	Australian Drin	70	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMETD	Methidathion (OP)	Methidathion	0.1		µg/L	Australian Drin	6	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMEVI	Mevinphos (OP)	Mevinphos	0.1		µg/L	Australian Drin	5	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMCP	Monocrotophos (OP)	Monocrotophos	0.1		µg/L	Australian Drin	2	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEOME	Omethoate (OP)	Omethoate	0.2		µg/L	Australian Drin	1	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KELN	Organics Env. Lab #							--	--										
	KEOXDM	Oxydemeton-methyl (OP)	Oxydemeton-methyl	0.2		µg/L	--	--	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KEPARE	Parathion (ethyl) (OP)	Parathion (ethyl)	0.1		µg/L	Australian Drin	20	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPARM	Parathion-methyl (OP)	Parathion-methyl	0.1		µg/L	Australian Drin	0.7	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPHOR	Phorate (OP)	Phorate	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPHOS	Phosmet (OP)	Phosmet	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPHOP	Phosphamidon (OP)	Phosphamidon	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPIRM	Pirimiphos-methyl (OP)	Pirimiphos-methyl	0.1		µg/L	Australian Drin	90	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPROF	Profenofos (OP)	Profenofos	0.1		µg/L	Australian Drin	0.3	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPROT	Prothiofos (OP)	Prothiofos	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPYRZ	Pyrazophos (OP)	Pyrazophos	0.1		µg/L	Australian Drin	20	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KESUL	Sulprofos (OP)	Sulprofos	0.1		µg/L	Australian Drin	10	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETEME	Temephos (OP)	Temephos	0.1		µg/L	Australian Drin	400	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETERB	Terbufos (OP)	Terbufos	0.1		µg/L	Australian Drin	0.9	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETCVP	Tetrachlorvinphos (OP)	Tetrachlorvinphos	0.1		µg/L	Australian Drin	100	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDIMT	Total Dimethoate (OP)	Total Dimethoate	0.3		µg/L	Australian Drin	7	--	--		< 0.3	< 0.3	< 0.3	< 0.3	--	--	--	--	--
	KEOTCG	Oth Compounds GCMS																		
	KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.7		µg/L	--	--	--	--		< 0.7	< 0.7	< 0.8	< 0.7	--	--	--	--	--
	KE1HB1	1H-Benzotriazole, 1-methyl (OT	1H-Benzotriazole, 1-methyl	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KE1HB4	1H-Benzotriazole, 4-methyl (OT	1H-Benzotriazole, 4-methyl	0.5		µg/L	--	--	--	--		< 0.5	< 0.5	< 0.5	< 0.5	--	--	--	--	--
	KE1HB5	1H-Benzotriazole, 5-methyl (OT	1H-Benzotriazole, 5-methyl	0.2		µg/L	--	--	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KE2ADT	2,4-Di-t-butylphenol	2,4-Di-t-butylphenol	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDTBC	2,6-Di-t-butyl-p-cresol (OTCG)	2,6-Di-t-butyl-p-cresol (BHT)	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEDTBP	2,6-Di-t-butylphenol (OTCG)	2,6-Di-t-butylphenol	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KE2BAC	2-Benzyl-4-chlorophenol	2-Benzyl-4-chlorophenol	0.2		µg/L	--	--	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KE2NMX	2-Nitro-m-xylene (SUR)	2-Nitro-m-xylene			%	--	--	--	--		69	72	71	73	--	--	--	--	--
	KECDMP	4-Chloro-3,5-dimethylphenol (	4-Chloro-3,5-dimethylphenol	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEBESA	Benzenesulfonanilide	Benzenesulfonanilide	0.2		µg/L	--	--	--	--		< 0.2	< 0.2	< 0.2	< 0.2	--	--	--	--	--
	KEDCCB	Decachlorobiphenyl (SUR)	Decachlorobiphenyl			%	--	--	--	--		89	75	78	73	--	--	--	--	--
	KEDBBP	Dibromobiphenyl (SUR)	Dibromobiphenyl			%	--	--	--	--		95	88	90	88	--	--	--	--	--
	KEGALA	Galaxolide (OTCG)	Galaxolide	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEICAD	Icaridin	Icaridin	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMOCL	Moclobemide (OTCG)	Moclobemide	1		µg/L	--	--	--	--		< 1.1	< 1.1	< 1.1	< 1.1	--	--	--	--	--
	KEMSKX	Musk Ketone (OTCG)	Musk Ketone	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEMSKX	Musk Xylene (OTCG)	Musk Xylene	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KENBBS	N-Butylbenzenesulfonamide (O	N-Butylbenzenesulfonamide	0.1		µg/L	--	--	--	--		< 0.1	0.4	< 0.1	< 0.1	--	--	--	--	--
	KENBTS	N-Butyltoluenesulfonamide (O	N-Butyltoluenesulfonamide	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KELN	Organics Env. Lab #					--	--	--	--										
	KEPDIO	Pyrene-d10 (SUR)	Pyrene-d10			%	--	--	--	--		95	88	92	88	--	--	--	--	--
	KETONL	Tonalid (OTCG)	Tonalid	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETNBP	Tri-n-butyl phosphate (OTCG)	Tri-n-butyl phosphate	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETRIC	Triclosan (OTCG)	Triclosan	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETCME	Triclosan methyl ether (OTCG)	Triclosan methyl ether	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KETEP	Triethyl phosphate (OTCG)	Triethyl phosphate	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	--	--	--
	KEPPTP	Triphenyl phosphate (SUR)	Triphenyl phosphate			%	--	--	--	--		92	82	88	80	--	--	--	--	--
	KETCEP	Tris(chloroethyl) phosphate (O	Tris(chloroethyl) phosphate	0.1		µg/L	--	--	--	--		< 0.1	< 0.1	< 0.1	< 0.1	--	--	-

	Lab No.											20899-92469	20899-92477	20899-92483	20899-92498	20899-92502	20899-92516	20899-92528	20899-92537	20899-92543
	Location Number											2020KE3764	2020KE3765	2020KE3766	2020KE3767	2020NA2814	2020NA2815	2020NA2816	2020NA2817	2020NA2818
	Sample Id											HIN_1378	HIN_1379	HIN_1380	HIN_1381	HIN_1373	HIN_1374	HIN_1375	HIN_1376	HIN_1377
	Sample Type											Water	Water	Water	Water	Water	Water	Water	Water	Water
	Sample Source											Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground	Ground
	Collected Date / Time											25/03/20 9:54	25/03/20 10:17	25/03/20 10:39	25/03/20 10:50	25/03/20 9:28	25/03/20 9:52	25/03/20 10:15	25/03/20 10:37	25/03/20 10:47
	Mnemonic	Test/Panel Description	Analyte	Reporting Limit	Upper LOR	Units	Guideline	Guideline Value	Accreditation	NATA		Result	Result	Result	Result	Result	Result	Result	Result	Result
	MSIS	Ionic Strength					--	--	--	--		--	--	--	--	0.0009	0.0024	0.002	0.0021	0.0021
	KEQ	K meq					--	--	--	--		--	--	--	--	0.14	0.04	0.05	0.03	0.03
	MGEQ	Mg meq					--	--	--	--		--	--	--	--	0.07	0.26	0.21	0.26	0.28
	NAMEQ	Na Meq					--	--	--	--		--	--	--	--	0.44	1.13	0.92	0.96	0.95
	NAHC	NaHCO3 - calculated					--	--	--	--		--	--	--	--	14.96	5.07	14.2	15.1	15.1
	NO3EQ	NO3 meq					--	--	--	--		--	--	--	--	0.04	0.23	0.14	0.24	0.23
	OHEQ	OH meq					--	--	--	--		--	--	--	--	0	0	0	0	0
	SO4EQ	SO4 meq					--	--	--	--		--	--	--	--	0.18	0.22	0.2	0.11	0.13
	SUMA	Sum Anions	Sum Anions				--	--	--	--		--	--	--	--	0.79	1.93	1.63	1.77	1.74
	SUMC	Sum Cations	Sum Cations				--	--	--	--		--	--	--	--	0.73	1.86	1.54	1.7	1.67
	SUMTE	Sum Total Entries	Sum Total Entries				--	--	--	--		--	--	--	--	241	403	348	374	369
	SWIC	SW I/C					--	--	--	--		--	--	--	--	0.55	0.56	0.55	0.55	0.55
	SWACOM	SWA Comment					--	--	--	--		--	--	--	--	Fine particles (< 0.45 micrometre) may cause elevated metal and true colour results.				
	SWNS	SWA Non-Standard test Flag					--	--	--	--		--	--	--	--					
	SWAHN	SWA Health Report																		
	MSALK1	Alkalinity	Alkalinity	2		mg CaCO^^3/L	--	--	--	--		--	--	--	--	16	37	38	44	44
	MSAL1	Aluminium	Aluminium	0.05		mg/L	--	--	--	--		--	--	--	--	0.37	< 0.03	< 0.03	< 0.03	< 0.03
	NAHCO3	Bicarbonate*	Bicarbonate*	2		mg/L	--	--	--	--		--	--	--	--	19	46	46	54	53
	MSB1	Boron	Boron	0.02		mg/L	--	--	--	--		--	--	--	--	< 0.02	0.02	0.02	< 0.02	< 0.02
	MSCA1	Calcium	Calcium	0.1		mg/L	--	--	--	--		--	--	--	--	1.4	8.7	7.5	9	8.4
	CO3	Carbonate*	Carbonate*			mg/L	--	--	--	--		--	--	--	--	0	0	0	0	0.1
	MSCL1	Chloride	Chloride			mg/L	--	--	--	--		--	--	--	--	9.1	26	19	19	18
	MSCND1	Conductivity @ 25<deg>C	Conductivity @ 25<deg>C	1		µs/cm	--	--	--	--		--	--	--	--	87	203	169	183	180
	MSCOP1	Copper	Copper	0.03		mg/L	--	--	--	--		--	--	--	--	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003
	FIGOM	Figure of Merit*	Figure of Merit Ratio*				--	--	--	--		--	--	--	--	0.3	0.6	0.6	0.7	0.7
	MSF1	Fluoride	Fluoride	0.05		mg/L	--	--	--	--		--	--	--	--	< 0.02	0.06	0.06	0.06	0.06
	H	Hydrogen*	Hydrogen*			mg/L	--	--	--	--		--	--	--	--	0	0	0	0	0
	OH	Hydroxide*	Hydroxide*			mg/L	--	--	--	--		--	--	--	--	0	0	0	0	0
	MSFE1	Iron	Iron	0.01		mg/L	--	--	--	--		--	--	--	--	0.13	< 0.01	0.25	0.02	< 0.01
	MSMG1	Magnesium	Magnesium	0.1		mg/L	--	--	--	--		--	--	--	--	0.87	3.1	2.5	3.2	3.4
	MSMN1	Manganese	Manganese	0.01		mg/L	--	--	--	--		--	--	--	--	0.003	< 0.001	0.002	0.001	< 0.001
	MOLER	Mole Ratio*	Mole Ratio*				--	--	--	--		--	--	--	--	3.7	3.2	2.9	2.9	2.7
	MSNO31	Nitrate	Nitrate	0.5		mg/L	--	--	--	--		--	--	--	--	2.3	14	8.5	15	14
	MSPH1	pH	pH	1			--	--	--	--		--	--	--	--	6.5	7.08	7.2	7.15	7.32
	PHS	pH (Saturation)*	pH Sat.* (calc. for CaCO^^3)				--	--	--	--		--	--	--	--	10.1	8.9	9	8.9	8.9
	PHSCN1	PH Inorganics Chemist 1	Chemist				--	--	--	--		--	--	--	--	Nigel Goldthorpe	Nigel Goldthorpe	Nigel Goldthorpe	Nigel Goldthorpe	Nigel Goldthorpe
	PHSBN	PH SWA Batch Number					--	--	--	--		--	--	--	--	B35429	B35430	B35431	B35432	B35433
	MSK1	Potassium	Potassium	0.1		mg/L	--	--	--	--		--	--	--	--	5.7	1.5	1.9	1	1
	RFA	Reason for Analysis	Reason for Analysis				--	--	--	--		--	--	--	--	Human Consumption	Human Consumption	Human Consumption	Human Consumption	Human Consumption
	RESA	Residual Alkalinity*	Residual Alkalinity*			meq/L	--	--	--	--		--	--	--	--	0.2	0.1	0.2	0.2	0.2
	SPT	Sample Point	Sample Point				--	--	--	--		--	--	--	--	A Spampinato 1039 Hawkins Creek Rd	Halifax Tower SP30	Forrest Beach Tower SP27	Tokalon Tower SP22	Ingham Tower SP21
	SAS	Sample Source	Sample Source				--	--	--	--		--	--	--	--	Ground	Ground	Ground	Ground	Ground
	SATI	Saturation Index*	Saturation Index*				--	--	--	--		--	--	--	--	-3.6	-1.9	-1.8	-1.7	-1.6
	MSSIO2	Silica	Silica			mg/L	--	--	--	--		--	--	--	--	30	41	37	44	44
	MSNA1	Sodium	Sodium	1		mg/L	--	--	--	--		--	--	--	--	10	26	21	22	22
	MSNAAR	Sodium Absorp. Ratio*	Sodium Absorpt. Ratio*	0.1			--	--	--	--		--	--	--	--	1.7	1.9	1.7	1.6	1.6
	MSSO41	Sulphate	Sulphate	1		mg/L	--	--	--	--		--	--	--	--	8.5	11	9.5	5.5	6.1
	SWACOM	SWA Comment					--	--	--	--		--	--	--	--	Fine particles (< 0.45 micrometre) may cause elevated metal and true colour results.				
	SWDET	SWA Details	Details				--	--	--	--		--	--	--	--	--	Cl2 0.86, pH 7.68	Cl2 0.77, pH 7.33	Cl2 0.37, pH 7.47	Cl2 1.21, pH 6.98
	SWLN	SWA Lab #					--	--	--	--		--	--	--	--					
	SWOWN	SWA Owner	Owner				--	--	--	--		--	--	--	--					
	SWACD	SWA Report Date	Report Date				--	--	--	--		--	--	--	--	29-Apr-20	29-Apr-20	29-Apr-20	29-Apr-20	29-Apr-20
	SWATYP	SWA Type					--	--	--	--		--	--	--	--	HD	HD	HD	HD	HD
	TEMPP	Temperature	Temperature			°C	--	--	--	--		--	--	--	--	21	21	21	21	21
	TEMH	Temporary Hardness*	Temporary Hardness*			mg CaCO^^3/L	--	--	--	--		--	--	--	--	7	34	29	35	35
	TDI	Total Dissolved Ions*	Total Dissolved Ions*			mg/L	--	--	--	--		--	--	--	--	58	136	116	129	126
	TDS	Total Dissolved Solids*	Total Dissolved Solids*			mg/L	--	--	--	--		--	--	--	--	77	154	130	144	143
	TOTH	Total Hardness*	Total Hardness*			mg CaCO^^3/L	--	--	--	--		--	--	--	--	7	34	29	35	35
	MSTCL1	True Colour (Hazen)	True Colour	1		Hazen	--	--	--	--		--	--	--	--	17	2	5	1	<1
	MSTRB1	Turbidity (NTU)	Turbidity	1	5000	NTU	--	--	--	--		--	--	--	--	25	1	<1	<1	<1
	H2OT	Water Treatment	Water Treatment				--	--	--	--		--	--	--	--	Chlorinated	Chlorinated	HL	Chlorinated	Chlorinated
	MSZN	Zinc	Zinc	0.01		mg/L	--	--	--	--		--	--	--	--	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06
	ORGANICS (PH)																			
	KWHP03	Compounds by DI (P3)	Compounds by DI (ug/L) Page 3																	
	KEH086	24ST (DI)	2,4,5-T	0.01		µg/L	Australian Drin	100	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH063	Total Imidacloprid (DI)	Total Imidacloprid	0.04		µg/L	--		--	--		0.08	0.05	0.08	0.17	--	--	--	--	--
	KEH064	Triclopyr (DI)	Triclopyr	0.05		µg/L	Australian Drin	20	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH065	Trifloxysulfuron (DI)	Trifloxysulfuron	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH066	Trinexapac (acid) (DI)	Trinexapac (acid)	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KWHPDI	Compounds by DI ug/L	Compounds by DI (ug/L)																	
	KEH001	2,4-D (DI)	2,4-D	0.02		µg/L	Australian Drin	30	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH002	2,4-DB (DI)	2,4-DB	0.05		µg/L	--		--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH067	2,4-DP (DI)	2,4-DP (Dichlorprop)	0.05		µg/L	Australian Drin	100	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH003	3,4-Dichloroaniline (DI)	3,4-Dichloroaniline	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH004	Acetamiprid (DI)	Acetamiprid	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH005	Acifluorfen (DI)	Acifluorfen	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH006	Ametryn (DI)	Ametryn	0.01		µg/L	Australian Drin	70	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH068	Amicarbazone (DI)	Amicarbazone	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH069	Asulam (DI)	Asulam	0.02		µg/L	Australian Drin	70	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH007	Atrazine (DI)	Atrazine	0.02		µg/L	Australian Drin	20	--	--		< 0.02	< 0.02	< 0.02	0.02	--	--	--	--	--
	KEH008	Atrazine, 2-hydroxy (DI)	Atrazine, 2-hydroxy	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH009	Bromacil (DI)	Bromacil	0.02		µg/L	Australian Drin	400	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH070	Bromoxynil (DI)	Bromoxynil	0.02		µg/L	Australian Drin	10	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH071	Carbaryl (DI)	Carbaryl	0.1		µg/L	Australian Drin	30	--	--						--	--	--	--	--
	KEH072	Carfentrazone (acid) (DI)	Carfentrazone (acid)	1		µg/L	Australian Drin	100	--	--						--	--	--	--	--
	KEH010	Chlorpyrifos (DI)	Chlorpyrifos	0.02		µg/L	Australian Drin	10	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH011	Chlorpyrifos oxon (DI)	Chlorpyrifos oxon	0.01		µg/L	--		--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH012	Clomazone (DI)	Clomazone	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH013	Clothianidin (DI)	Clothianidin	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH014	Cyanazine (DI)	Cyanazine	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH073	Dalapon (2,2-DPA) (DI)	Dalapon (2,2-DPA)	0.2		µg/L	Australian Drin	500	--	--		< 0.20	< 0.20	< 0.20	< 0.20	--	--	--	--	--
	KEH015	DCPMU (DI)	DCPMU	0.02		µg/L	--		--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH016	DCPU (DI)	DCPU	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH017	Desethyl Atrazine (DI)	Desethyl Atrazine	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH018	Desisopropyl Atrazine (DI)	Desisopropyl Atrazine	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH019	Diazinon (DI)	Diazinon	0.01		µg/L	Australian Drin	4	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH074	Dicamba (DI)	Dicamba	0.05		µg/L	Australian Drin	100	--	--		< 0.10	< 0.10	< 0.10	< 0.10	--	--	--	--	--
	KEH075	Dinotefuran (DI)	Dinotefuran	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH020	Diuron (DI)	Diuron	0.02		µg/L	Australian Drin	20	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH021	Ethametsulfuron methyl (DI)	Ethametsulfuron methyl	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH076	Ethoxysulfuron (DI)	Ethoxysulfuron	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH022	Fipronil (DI)	Fipronil	0.02		µg/L	Australian Drin	0.7	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH077	Fipronil Desulfinyl (DI)	Fipronil Desulfinyl	0.01		µg/L	Australian Drin	0.7	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH024	Fipronil sulfide (DI)	Fipronil sulfide	0.01		µg/L	Australian Drin	0.7	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH023	Fipronil sulfone (DI)	Fipronil sulfone	0.01		µg/L	Australian Drin	0.7	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH078	Flamprop-methyl (DI)	Flamprop-methyl	0.01		µg/L	Australian Drin	4	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH079	Fluazifop (acid) (DI)	Fluazifop (acid)	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH025	Fluometuron (DI)	Fluometuron	0.01		µg/L	Australian Drin	70	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH026	Fluroxypyr (DI)	Fluroxypyr	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH027	Flusilazole (DI)	Flusilazole	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH080	Flutriafol (DI)	Flutriafol	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH028	Halosulfuron methyl (DI)	Halosulfuron methyl	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH029	Haloxyfop (acid) (DI)	Haloxyfop (acid)	0.02		µg/L	Australian Drin	1	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH030	Hexazinone (DI)	Hexazinone	0.01		µg/L	Australian Drin	400	--	--		0.03	0.02	0.04	0.05	--	--	--	--	--
	KEH031	Imazapic (DI)	Imazapic	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH032	Imazapyr (DI)	Imazapyr	0.02		µg/L	Australian Drin	9000	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH033	Imazethapyr (DI)	Imazethapyr	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH034	Imidacloprid (DI)	Imidacloprid	0.02		µg/L	--	--	--	--		0.08	0.05	0.08	0.17	--	--	--	--	--
	KEH035	Imidacloprid metabolites (DI)	Imidacloprid metabolites	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH081	Ioxynil (DI)	Ioxynil	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH036	Isoxaflutole metabolite (DKN)	Isoxaflutole metabolite (DKN)	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH037	MCPA (DI)	MCPA	0.01		µg/L	Australian Drin	40	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH038	MCPB (DI)	MCPB	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH039	Mecoprop (DI)	Mecoprop	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH040	Mesosulfuron methyl (DI)	Mesosulfuron methyl	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH041	Methoxyfenozide (DI)	Methoxyfenozide	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH042	Metolachlor (DI)	Metolachlor	0.01		µg/L	Australian Drin	300	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH043	Metolachlor-OXA (DI)	Metolachlor-OXA	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH044	Metribuzin (DI)	Metribuzin	0.02		µg/L	Australian Drin	70	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH045	Metsulfuron methyl (DI)	Metsulfuron methyl	0.02		µg/L	Australian Drin	40	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH082	Molinate (DI)	Molinate	0.02		µg/L	Australian Drin	4	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH047	N-Desmethyl Acetamiprid (DI)	N-Desmethyl Acetamiprid	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH046	Napropamide (DI)	Napropamide	0.01		µg/L	Australian Drin	400	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KELN	Organics Env. Lab #					--	--	--	--										
	KEH083	Pendimethalin (DI)	Pendimethalin	0.02		µg/L	Australian Drin	400	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH084	Picloram (DI)	Picloram	0.2		µg/L	Australian Drin	300	--	--		< 0.20	< 0.20	< 0.20	< 0.20	--	--	--	--	--
	KEH048	Prometryn (DI)	Prometryn	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH049	Propachlor (DI)	Propachlor	0.02		µg/L	Australian Drin	70	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH050	Propazin-2-hydroxy (DI)	Propazin-2-hydroxy	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH085	Propoxur (DI)	Propoxur	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH051	Sethoxydim	Sethoxydim	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH052	Simazine (DI)	Simazine	0.01		µg/L	Australian Drin	20	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH053	Sulfosulfuron (DI)	Sulfosulfuron	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH054	Tebuthiuron (DI)	Tebuthiuron	0.01		µg/L	--	--	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH055	Terbuthylazine (DI)	Terbuthylazine	0.01		µg/L	Australian Drin	10	--	--		< 0.01	< 0.01	< 0.01	< 0.01	--	--	--	--	--
	KEH056	Terbuthylazine desethyl (DI)	Terbuthylazine desethyl	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH057	Terbutryn (DI)	Terbutryn	0.02		µg/L	Australian Drin	400	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH058	Thiacloprid (DI)	Thiacloprid	0.02		µg/L	--	--	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH059	Thiamethoxam (DI)	Thiamethoxam	0.05		µg/L	--	--	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KEH060	Total Acetamiprid (DI)	Total Acetamiprid	0.02		µg/L	Australian Drin	20	--	--		< 0.02	< 0.02	< 0.02	< 0.02	--	--	--	--	--
	KEH061	Total Diuron (DI)	Total Diuron	0.06		µg/L	Australian Drin	20	--	--		< 0.06	< 0.06	< 0.06	< 0.06	--	--	--	--	--
	KEH062	Total Fipronil (DI)	Total Fipronil	0.05		µg/L	Australian Drin	0.7	--	--		< 0.05	< 0.05	< 0.05	< 0.05	--	--	--	--	--
	KERPT	KE Environ. Reporting																		
	CAOP	Carbamate Operator	HPLC Analyst				--	--	--	--			--	--	--	--	--	--	--	--
	KEGIDE	Flag to turn Water Guidelines off					--	--	--	--			--	--	--	--	--	--	--	--
	GCOP	GC/LC Operator	GCMS/LCMS Analyst				--	--	--	--			--	--	--	--	--	--	--	--
	KECP	KE Cover Page	Cover Page Only (y)				--	--	--	--			--	--	--	--	--	--	--	--
	PHCP2C	KE Organic Chemistry Reason for Analysis					--	--	--	--		33963 - Herbicides in Water by Direct Injection	--	--	--	--	--	--	--	--
	KERCOM	Organic Chemistry Remarks					--	--	--	--		Pendimethalin gives a low recovery for QIS method 33963. Limits of reporting have been raised for some analytes due to sample interferences. 16315- The gas chromatography mass spectrometry screen indicated the presence of bis(2-ethylhexyl)phthalate in sample 20KE3764. Please note that this is a	--	--	--	--	--	--	--	--
	PHOAR	Organics - Analysis Requested					--	--	--	--		Pesticide Residue	--	--	--	--	--	--	--	--
	PHOCD	Organics Completed Date	Completed Date				--	--	--	--			--	--	--	--	--	--	--	--
	OTOP	Other Operator	Other Analyst				--	--	--	--			--	--	--	--	--	--	--	--
	PHDSO	PH Date started - Organics					--	--	--	--		30-Mar-20	--	--	--	--	--	--	--	--
	PHSCO	PH Organics Analyst					--	--	--	--		Stewart Carswe	--	--	--	--	--	--	--	--
	PHSCO3	PH Organics Chemist 3	Chemist				--	--	--	--		Martha du Pless	--	--	--	--	--	--	--	--
	PHRIO	PH Report Issued Date - Organics					--	--	--	--		12-May-20	--	--	--	--	--	--	--	--
	PHOP	Phenoxy Operator	Phenox. Herb. Analyst				--	--	--	--			--	--	--	--	--	--	--	--
	ORLOR	Report LOR					--	--	--	--			--	--	--	--	--	--	--	--
	ORGMAN	Organic Pkg Mgmt																		
	PHDDO	PH Due Date - Organics					--	--	--	--			--	--	--	--	--	--	--	--
	PHECDO	PH Est Date Completion - Organics					--	--	--	--			--	--	--	--	--	--	--	--
	PHSTAO	PH Status - Organics					--	--	--	--		Report Issued	--	--	--	--	--	--	--	--
	KWP	Water Pest GCMS																		
	KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.7		µg/L	--	--	--	--

Package No. **SSP00S8287**
Client **Hinchinbrook Shire Council - Ingham**
Client Project
Client Batch Ref
Order No. **Fredericks_N**
Package Request Date **11-Jan-18**
Package Registered D **16-Jan-18**
Reported Dates **29-Jan-18**
Reporting Analyst Names **LORINDA SWANN (SS|PHLB)**

	Lab No.										72694-4061	72694-4070	72694-4084	72694-4093
	Location Number										2018KE245	2018KE246	2018KE247	2018KE248
	Sample Id										HIN1211	HIN1212	HIN1213	HIN1214
	Sample Type										Water	Water	Water	Water
	Sample Source										Ground	Ground	Ground	Ground
	Collected Date / Time										11/01/18 8:20	11/01/18 9:45	11/01/18 9:58	11/01/18 14:20
	Mnemonic	Test/Panel Description	Analyte	Reporting Limit	Upper LOR	Units	Guideline	Guideline Value	Accreditation	NATA	Result	Result	Result	Result
	ALL DEPARTMENTS													
	KEHBL1	Herbicides LCMS 1												
	KEAMET	Ametryn (HBL)	Ametryn	0.01		µg/L	Australian Drinking Water Guidelines	70	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KEATRZ	Atrazine (HBL)	Atrazine	0.01		µg/L	Australian Drinking Water Guidelines	20	--	--	< 0.02	< 0.02	0.02	< 0.02
	KEBRM1	Bromacil (HBL)	Bromacil	0.01		µg/L	Australian Drinking Water Guidelines	400	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KEDEAZ	Desethyl Atrazine (HBL)	Desethyl Atrazine	0.01		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KEDOAZ	Desisopropyl Atrazine (HBL)	Desisopropyl Atrazine	0.02		µg/L	--	--	--	--	< 0.04	< 0.04	< 0.04	< 0.05
	KEDIRN	Diuron (HBL)	Diuron	0.01		µg/L	Australian Drinking Water Guidelines	20	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KEFLMT	Fluometuron (HBL)	Fluometuron	0.02		µg/L	Public Health Regulation Std	70	--	--	< 0.04	< 0.04	< 0.04	< 0.05
	KEHEXZ	Hexazinone (HBL)	Hexazinone	0.01		µg/L	Australian Drinking Water Guidelines	400	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KEIMID	Imidacloprid (HBL)	Imidacloprid	0.01		µg/L	--	--	--	--	< 0.02	0.03	0.03	< 0.02
	KEMTC1	Metolachlor (HBL)	Metolachlor	0.01		µg/L	Australian Drinking Water Guidelines	300	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KELN	Organics Env. Lab #					--	--	--	--				
	KEPMTY	Prometryn (HBL)	Prometryn	0.01		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KESIMZ	Simazine (HBL)	Simazine	0.01		µg/L	Public Health Regulation Std	20	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KETEBT	Tebuthiuron (HBL)	Tebuthiuron	0.01		µg/L	--	--	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KETEB1	Terbutryn (HBL)	Terbutryn	0.01		µg/L	Public Health Regulation Std	400	--	--	< 0.02	< 0.02	< 0.02	< 0.02
	KEHBG2	Herbs GCMS only												
	KE34DA	3,4-Dichloroaniline	3,4-Dichloroaniline	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEAMIT	Amitraz (HBG)	Amitraz	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDICM	Diclofop-methyl (HBG)	Diclofop-methyl	0.1		µg/L	Australian Drinking Water Guidelines	5	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEFLZF	Fluazifop-butyl (HBG)	Fluazifop-butyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEHOZE	Haloxyfop-2-etotyl (HBG)	Haloxyfop-2-etotyl	0.1		µg/L	Australian Drinking Water Guidelines	1	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEHOM	Haloxyfop-methyl (HBG)	Haloxyfop-methyl	0.1		µg/L	Australian Drinking Water Guidelines	1	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMRB	Metribuzin (HBG)	Metribuzin	0.1		µg/L	Australian Drinking Water Guidelines	70	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMOLN	Molinate (HBG)	Molinate	0.1		µg/L	Australian Drinking Water Guidelines	4	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KELN	Organics Env. Lab #					--	--	--	--				
	KEOXYF	Oxyfluorfen (HBG)	Oxyfluorfen	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPDIM	Pendimethalin (HBG)	Pendimethalin	0.1		µg/L	Australian Drinking Water Guidelines	400	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPPNL	Propanil (HBG)	Propanil	0.1		µg/L	Australian Drinking Water Guidelines	700	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPPZN	Propazine (HBG)	Propazine	0.1		µg/L	Australian Drinking Water Guidelines	50	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETBTZ	Terbuthylazine (HBG)	Terbuthylazine	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETRIA	Triallate (HBG)	Triallate	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETRIF	Trifluralin (HBG)	Trifluralin	0.1		µg/L	Australian Drinking Water Guidelines	90	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEOC1	Organochlorine Pest												
	KEALD	Aldrin (OC)	Aldrin	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECLDC	Chlordane cis (OC)	Chlordane cis	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECLT	Chlordane Total (OC)	Total Chlordane	0.2		µg/L	Australian Drinking Water Guidelines	2	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KECLDT	Chlordane trans (OC)	Chlordane trans	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECHL	Chlordene (OC)	Chlordene	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECHLE	Chlordene epoxide (OC)	Chlordene epoxide	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECLH	Chlordene-1-hydroxy (OC)	Chlordene-1-hydroxy	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECLH2	Chlordene-1-hydroxy-2,3-epox	Chlordene-1-hydroxy-2,3-epox	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDIC	Dicofol (OC)	Dicofol	1.5		µg/L	Australian Drinking Water Guidelines	4	--	--	< 3.3	< 3.2	< 3.1	< 3.4
	KEDIEL	Dieldrin (OC) new	Dieldrin	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEENDA	Endosulfan Alpha (OC)	<alpha> Endosulfan	0.5		µg/L	Australian Drinking Water Guidelines	20	--	--	< 1.1	< 1.1	< 1.0	< 1.1
	KEENDB	Endosulfan Beta (OC)	<beta> Endosulfan	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEENDE	Endosulfan ether (OC)	Endosulfan ether	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEENDL	Endosulfan lactone (OC)	Endosulfan lactone	0.5		µg/L	--	--	--	--	< 1.1	< 1.1	< 1.0	< 1.1
	KEENDS	Endosulfan sulfate (OC)	Endosulfan sulfate	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEERIN	Endrin (OC)	Endrin	0.2		µg/L	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KEERIA	Endrin aldehyde (OC)	Endrin aldehyde	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEHCB	HCB (OC)	HCB	0.2		µg/L	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KEHCHA	HCH alpha (OC)	<alpha> HCH	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEHCHB	HCH beta (OC)	<beta> HCH	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEHCHD	HCH delta (OC)	<delta> HCH	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECBH	Heptachlor (OC)	Heptachlor	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECBHE	Heptachlor epoxide (OC)	Heptachlor epoxide	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEELD	Lindane (OC)	Lindane (<gamma> HCH)	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMET	Methoxychlor (OC)	Methoxychlor	0.1		µg/L	Australian Drinking Water Guidelines	300	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KENONC	Nonachlor cis (OC)	Nonachlor cis	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KENONT	Nonachlor trans (OC)	Nonachlor trans	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEODDD	o-p DDD (OC)	DDD (op)	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEODDE	o-p DDE (OC)	DDE (op)	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEODDT	o-p DDT (OC)	DDT (op)	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KELN	Organics Env. Lab #					--	--	--	--				
	KEOXC	Oxychlordane (OC)	Oxychlordane	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPDDD	p-p DDD (OC)	DDD (pp)	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPDDE	p-p DDE (OC)	DDE (pp)	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPDDT	p-p DDT (OC)	DDT (pp)	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETAD	Total Aldrin & Dieldrin (OC)	Total Aldrin & Dieldrin	0.2		µg/L	Australian Drinking Water Guidelines	0.3	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KEDDT	Total DDT (OC)	Total DDT	0.4		µg/L	Australian Drinking Water Guidelines	9	--	--	< 0.9	< 0.8	< 0.8	< 0.9
	KEEND	Total Endosulfan (OC)	Total Endosulfan	0.7		µg/L	Australian Drinking Water Guidelines	20	--	--	< 1.5	< 1.4	< 1.4	< 1.6
	KETHC	Total Heptachlor (OC)	Total Heptachlor	0.2		µg/L	Australian Drinking Water Guidelines	0.3	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KEOP1	Organophos Pest 1												
	KEAZPE	Azinphos-ethyl (OP)	Azinphos-ethyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEAZPM	Azinphos-methyl (OP)	Azinphos-methyl	0.1		µg/L	Australian Drinking Water Guidelines	30	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEBMPE	Bromophos-ethyl (OP)	Bromophos-ethyl	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECADS	Cadusafos (OP)	Cadusafos	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECARP	Carbophenothion (OP)	Carbophenothion	0.1		µg/L	Australian Drinking Water Guidelines	0.5	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECHFV	Chlorfenvinphos (OP)	Chlorfenvinphos	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECHP	Chlorpyrifos (OP)	Chlorpyrifos	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECHPO	Chlorpyrifos oxon (OP)	Chlorpyrifos oxon	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECHPM	Chlorpyrifos-methyl (OP)	Chlorpyrifos-methyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECOUM	Coumaphos (OP)	Coumaphos	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDEOM	Demeton-O-methyl	Demeton-O-methyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDEMT	Demeton-S 16315	Demeton-S	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDESM	Demeton-S-methyl (OP)	Demeton-S-methyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDIAZ	Diazinon (OP)	Diazinon	0.1		µg/L	Australian Drinking Water Guidelines	4	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDICH	Dichlorvos (OP)	Dichlorvos	0.1		µg/L	Australian Drinking Water Guidelines	5	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDIME	Dimethoate (OP)	Dimethoate	0.1		µg/L	Australian Drinking Water Guidelines	7	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDIOX	Dioxathion (OP)	Dioxathion	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDIS	Disulfoton (OP)	Disulfoton	0.1		µg/L	Australian Drinking Water Guidelines	4	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEETHI	Ethion (OP)	Ethion	0.1		µg/L	Australian Drinking Water Guidelines	4	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEETHP	Ethoprophos (OP)	Ethoprophos	0.1		µg/L	Australian Drinking Water Guidelines	1	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEETRI	Etrimphos (OP)	Etrimphos	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEFAMP	Famphur (OP)	Famphur	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEFENA	Fenamiphos (OP)	Fenamiphos	0.1		µg/L	Australian Drinking Water Guidelines	0.5	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEFENC	Fenchlorphos (OP)	Fenchlorphos	0.1		µg/L	Australian Drinking Water Guidelines	30	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEFENI	Fenitrothion (OP)	Fenitrothion	0.1		µg/L	Australian Drinking Water Guidelines	7	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEFENM	Fenthion (methyl) (OP)	Fenthion (methyl)	0.1		µg/L	Australian Drinking Water Guidelines	7	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEFENE	Fenthion-ethyl (OP)	Fenthion-ethyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEISOP	Isofenphos (OP)	Isofenphos	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMALA	Malathion (OP)	Malathion (Maldison)	0.1		µg/L	Australian Drinking Water Guidelines	70	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMETD	Methidathion (OP)	Methidathion	0.1		µg/L	Australian Drinking Water Guidelines	6	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMEVI	Mevinphos (OP)	Mevinphos	0.1		µg/L	Australian Drinking Water Guidelines	5	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMCP	Monocrotophos (OP)	Monocrotophos	0.1		µg/L	Australian Drinking Water Guidelines	2	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEOME	Omethoate (OP)	Omethoate	0.2		µg/L	Australian Drinking Water Guidelines	1	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KELN	Organics Env. Lab #					--	--	--	--				
	KEOXDM	Oxydemeton-methyl (OP)	Oxydemeton-methyl	0.2		µg/L	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KEPARE	Parathion (ethyl) (OP)	Parathion (ethyl)	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPARM	Parathion-methyl (OP)	Parathion-methyl	0.1		µg/L	Australian Drinking Water Guidelines	0.7	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPHOR	Phorate (OP)	Phorate	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPHOS	Phosmet (OP)	Phosmet	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPHOP	Phosphamidon (OP)	Phosphamidon	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPIRM	Pirimiphos-methyl (OP)	Pirimiphos-methyl	0.1		µg/L	Australian Drinking Water Guidelines	90	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPROF	Profenofos (OP)	Profenofos	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPROT	Prothiofos (OP)	Prothiofos	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPYRZ	Pyrazophos (OP)	Pyrazophos	0.1		µg/L	Australian Drinking Water Guidelines	20	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KESUL	Sulprofos (OP)	Sulprofos	0.1		µg/L	Australian Drinking Water Guidelines	10	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETEME	Temephos (OP)	Temephos	0.1		µg/L	Australian Drinking Water Guidelines	400	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETERB	Terbufos (OP)	Terbufos	0.1		µg/L	Australian Drinking Water Guidelines	1	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETCVP	Tetrachlorvinphos (OP)	Tetrachlorvinphos	0.1		µg/L	Australian Drinking Water Guidelines	100	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDIMT	Total Dimethoate (OP)	Total Dimethoate	0.3		µg/L	Australian Drinking Water Guidelines	7	--	--	< 0.7	< 0.6	< 0.6	< 0.7
	KEOTCG	Oth Compounds GCMS												
	KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.7		µg/L	--	--	--	--	< 1.5	< 1.5	< 1.4	< 1.6
	KE1HB1	1H-Benzotriazole, 1-methyl (OT	1H-Benzotriazole, 1-methyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KE1HB5	1H-Benzotriazole, 5-methyl (OT	1H-Benzotriazole, 5-methyl	0.2		µg/L	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KE24DT	2,4-Di-t-butylphenol	2,4-Di-t-butylphenol	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDTBC	2,6-Di-t-butyl-p-cresol (OTCG)	2,6-Di-t-butyl-p-cresol (BHT)	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDTBP	2,6-Di-t-butylphenol (OTCG)	2,6-Di-t-butylphenol	0.3		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KE2B4C	2-Benzyl-4-chlorophenol	2-Benzyl-4-chlorophenol	0.2		µg/L	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KE2NMX	2-Nitro-m-xylene (SUR)	2-Nitro-m-xylene			%	--	--	--	--	70	77	71	78
	KECDMP	4-Chloro-3,5-dimethylphenol (	4-Chloro-3,5-dimethylphenol	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEBESA	Benzenesulfonanilide	Benzenesulfonanilide	0.2		µg/L	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KEDCCB	Decachlorobiphenyl (SUR)	Decachlorobiphenyl			%	--	--	--	--	74	89	85	97
	KEDBBP	Dibromobiphenyl (SUR)	Dibromobiphenyl			%	--	--	--	--	75	79	77	86
	KEGALA	Galaxolide (OTCG)	Galaxolide	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEICAD	Icaridin	Icaridin	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMOCL	Moclobemide (OTCG)	Moclobemide	1		µg/L	--	--	--	--	< 2.2	< 2.1	< 2.0	< 2.3
	KEMSKK	Musk Ketone (OTCG)	Musk Ketone	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMSKX	Musk Xylene (OTCG)	Musk Xylene	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KENBBS	N-Butylbenzenesulfonamide (O	N-Butylbenzenesulfonamide	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KENBTS	N-Butyltoluenesulfonamide (O	N-Butyltoluenesulfonamide	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KELN	Organics Env. Lab #					--	--	--	--				
	KEPDIO	Pyrene-d10 (SUR)	Pyrene-d10			%	--	--	--	--	76	85	81	86
	KETONL	Tonalid (OTCG)	Tonalid	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETNBP	Tri-n-butyl phosphate (OTCG)	Tri-n-butyl phosphate	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETRIC	Triclosan (OTCG)	Triclosan	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETCME	Triclosan methyl ether (OTCG)	Triclosan methyl ether	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETEP	Triethyl phosphate (OTCG)	Triethyl phosphate	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPPTP	Triphenyl phosphate (SUR)	Triphenyl phosphate			%	--	--	--	--	79	85	79	90
	KETCEP	Tris(chloroethyl) phosphate (OT	Tris(chloroethyl) phosphate	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETCPP	Tris(chloropropyl) phosphate is	Tris(chloropropyl) phosphate is	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETDCP	Tris(dichloropropyl) phosphate	Tris(dichloropropyl) phosphate	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEOTP1	Other Pesticides 1												
	KEBENA	Benalaxyl (OTP)	Benalaxyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEBENC	Bendiocarb (OTP)	Bendiocarb	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEBITE	Bitertanol (OTP)	Bitertanol	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECAPT	Captan (OTP)	Captan	0.1		µg/L	Australian Drinking Water Guidelines	400	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KECARB	Carbaryl (OTP)	Carbaryl	0.1		µg/L	Australian Drinking Water Guidelines	30	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDEET	DEET (OTP)	DEET	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEDIMM	Dimethomorph (OTP)	Dimethomorph	0.2		µg/L	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KEWFIP	Fipronil (OTP)	Fipronil	0.1		µg/L	Australian Drinking Water Guidelines	0.7	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEFLTF	Flutriafol	Flutriafol	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEFURA	Furalaxyl (OTP)	Furalaxyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMLAX	Metalaxyl (OTP)	Metalaxyl	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEMETP	Methoprene (OTP)	Methoprene	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KELN	Organics Env. Lab #					--	--	--	--				
	KEOXAD	Oxadiazon (OTP)	Oxadiazon	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPIPB	Piperonyl butoxide (OTP)	Piperonyl butoxide	0.1		µg/L	Australian Drinking Water Guidelines	600	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPIMC	Pirimicarb (OTP)	Pirimicarb	0.2		µg/L	Australian Drinking Water Guidelines	7	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KEPRAQ	Praziquantel	Praziquantel	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPCYM	Procymidone (OTP)	Procymidone	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPROG	Propargite (OTP)	Propargite	0.1		µg/L	Australian Drinking Water Guidelines	7	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPPIC	Propiconazole (OTP)	Propiconazole	0.1		µg/L	Australian Drinking Water Guidelines	100	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEPROX	Propoxur (OTP)	Propoxur	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KEROTN	Rotenone (OTP)	Rotenone	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETEBU	Tebuconazole (OTP)	Tebuconazole	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETDIF	Tetradifon (OTP)	Tetradifon	0.1		µg/L	--	--	--	--	< 0.2	< 0.2	< 0.2	< 0.2
	KETHIB	Thiabendazole (OTP)	Thiabendazole	0.2		µg/L	--	--	--	--	< 0.4	< 0.4	< 0.4	< 0.5
	KETTRM	Total Triadimefon (

	Lab No.											72694-4061	72694-4070	72694-4084	72694-4093
	Location Number											2018KE245	2018KE246	2018KE247	2018KE248
	Sample Id											HIN1211	HIN1212	HIN1213	HIN1214
	Sample Type											Water	Water	Water	Water
	Sample Source											Ground	Ground	Ground	Ground
	Collected Date / Time											11/01/18 8:20	11/01/18 9:45	11/01/18 9:58	11/01/18 14:20
	Mnemonic	Test/Panel Description	Analyte	Reporting Limit	Upper LOR	Units	Guideline	Guideline Value	Accreditation	NATA		Result	Result	Result	Result
	ORGMAN	Organic Pkg Mgmt													
	PHDDO	PH Due Date - Organics					--	--	--	--			--	--	--
	PHECDO	PH Est Date Completion - Organics					--	--	--	--			--	--	--
	PHPR	PH Priority					--	--	--	--			--	--	--
	PHSTAO	PH Status - Organics					--	--	--	--		Report Issued	--	--	--
	KWPH	Water Pest,Herb GC+LC													
	KE1HBZ	1H-Benzotriazole (OTCG)	1H-Benzotriazole	0.7		µg/L	--	--	--	--		< 1.5	< 1.5	< 1.4	< 1.6
	KEALD	Aldrin (OC)	Aldrin	0.1		µg/L	Australian Drinking Water Guidelines	0.3	--	--		< 0.2	< 0.2	< 0.2	< 0.2
	KEAMET	Ametryn (HBL)	Ametryn	0.01		µg/L	Australian Drinking Water Guidelines	70	--	--		< 0.02	< 0.02	< 0.02	< 0.02
	KEAMIT	Amitraz (HBG)	Amitraz	0.1		µg/L	Australian Drinking Water Guidelines	9	--	--		< 0.2	< 0.2	< 0.2	< 0.2
	KEAZPE	Azinphos-ethyl (OP)	Azinphos-ethyl	0.1		µg/L	--	--	--	--		< 0.2	< 0.2	< 0.2	< 0.2
	KEBENA	Benalaxyl (OTP)	Benalaxyl	0.1		µg/L	--	--	--	--		< 0.2	< 0.2	< 0.2	< 0.2

APPENDIX E – BORE LOGS

Scheme 1 – Ingham Water Supply

Tokalon Well 3

INGHAM DRILLING PTY LTD LOG FOR BORE TEST HOLE NUMBER Next to well

DATE COMMENCED: _____ DATE COMPLETED: 8 August 1996 LICENCE No.: _____

LAST NAME: _____ FIRST NAME: _____

COMPANY NAME: Hinchinbrook Shire Council PH. NO.: _____

ADDRESS: _____ POSITION: _____

LOCATION: Townsville Rd., Ingham. PROPERTY: _____

INGHAM DRILLING Pty Ltd ATF Norman Bliesner Family Trust ABN 29 034 841 036 ACN 083 107 108
PO Box 1115 Ingham 4850 Phone (07) 47772717; Fax (07) 47772774; Mobile 0418777174 Email: inghamdrilling@hotmail.com

FROM	TO	TYPE	DESCRIPTION	COLOUR
0.0	0.3	soil	top	
0.3	2.0	clay	silty	brown
2.0	5.0	SILT	CLAYEY	brown
5.0	10.5	sand & gravel	medium to coarse	
10.5	17.0	clay	sandy	grey & brown
17.0	20.0	sand	very clayey	
20.0	24.0	clay		khaki
24.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				

CASING DETAILS BIT SIZE: 300 mm to bottom

LENGTH	I.D	DIAM.	THICKNESS	FROM	TO
10.9 m	mm	200 mm	Class 9	0 m	10.6 m
m	mm	32 mm	Class 12	0 m	10.55 m
m	mm	mm	Class	m	m
m	mm	mm	Class	m	m

SLOTS

DIAMETER	APERTURE	FROM	TO
200 mm	4 mm	8 m	10.5 m
mm	mm	m	m
mm	mm	m	m
mm	mm	m	m

Standing Water Level 3.70m Pump Test Rate ____ L/S 2,700 G.P.H Duration of Test 20.0 min
Drawdown From Surface 4.25 m Actual Drawdown 0.55 m Total Dissolved Solids ____ PPM
Size of Gravel Packing 10 mm Bottom Capped? yes PH: ____ Fe: ____ PPM
Annular Cement Grouted From ____ m to ____ m From: ____ m to: ____ m, ____ m to ____ m, ____ m To ____ m
Annular Bentonite Seal From ____ m To ____ m ____ m To ____ m ____ m To ____ m, ____ m To ____ m
Estimated Supply From 8 m is ____ L/S 14,000 GPH Set Pump Suction At 9.00 m

COMMENTS: _____

ALL MEASUREMENTS FROM GOUND LEVEL

SIGNATURE OF LICENSEE: _____ DRILLERS SIGNATURE: _____ D.N.R. Lic. No. 2870

Como Road Bore 4

INGHAM DRILLING PTY LTD LOG FOR BORE TEST HOLE NUMBER _____

DATE COMMENCED: _____ DATE COMPLETED: 7 August 1996 LICENCE No.: _____

LAST NAME: _____ FIRST NAME: _____

COMPANY NAME: Hinchinbrook Shire Council PH. NO.: _____

ADDRESS: Ingham POSITION: _____

LOCATION: Townville Rd., Ingham PROPERTY: _____

INGHAM DRILLING Pty Ltd ATF Norman Bliesner Family Trust ABN 29 034 841 036 ACN 083 107 108
PO Box 1115 Ingham 4850 Phone (07) 47772717; Fax (07) 47772774; Mobile 0418777174 Email: inghamdrilling@hotmail.com

FROM	TO	TYPE	DESCRIPTION	COLOUR
0.0	2.0	clay	sandy	grey & brown
2.0	11.5	sand & gravel	fine to coarse	
11.5	16.0	clay	silty	grey
16.0	18.0	sand & gravel	very clayey	
18.0	22.0	clay		grey & brown
22.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				

CASING DETAILS BIT SIZE: 300 mm to bottom

LENGTH	I.D	DIAM.	THICKNESS	FROM	TO
12.1 m	mm	200 mm	Class 9	0 m	11.7 m
m	mm	32 mm	Class 12	0 m	11.65 m
m	mm	mm	Class	m	m
m	mm	mm	Class	m	m

SLOTS

DIAMETER	APERTURE	FROM	TO
200 mm	4 mm	8.1 m	11.6 m
mm	mm	m	m
mm	mm	m	m
mm	mm	m	m

Standing Water Level 3.05m Pump Test Rate ____ L/S 3,000 G.P.H Duration of Test 20.0 min

Drawdown From Surface 3.33 m Actual Drawdown 0.28 m Total Dissolved Solids 80 PPM

Size of Gravel Packing 10 mm Bottom Capped? yes PH: ____ Fe: ____ PPM

Annular Cement Grouted From ____ m to ____ m From: ____ m to: ____ m ____ m to ____ m, ____ m To ____ m

Annular Bentonite Seal From ____ m To ____ m ____ m To ____ m ____ m To ____ m, ____ m To ____ m

Estimated Supply From 8 m is ____ L/S 25,000 GPH Set Pump Suction At 10.00 m

COMMENTS: 32mm pipe joins into 200mm casing at bottom with an elbow

ALL MEASUREMENTS FROM GOUND LEVEL

SIGNATURE OF LICENSEE: _____ DRILLERS SIGNATURE: _____ D.N.R. Lic. No. 2870

Como Road Bore 5

INGHAM DRILLING PTY LTD LOG FOR BORE TEST HOLE NUMBER 5

DATE COMMENCED: _____ DATE COMPLETED: 26 September 1996 LICENCE No.: _____

LAST NAME: _____ FIRST NAME: _____

COMPANY NAME: Hinchinbrook Shire Council PH. NO.: _____

ADDRESS: _____ POSITION: _____

LOCATION: Townsville Road PROPERTY: _____

INGHAM DRILLING Pty Ltd ATF Norman Bliesner Family Trust ABN 29 034 841 035 ACN 083 107 108
PO Box 1115 Ingham 4850 Phone (07) 47772717; Fax (07) 47772774; Mobile 0418777174 Email: inghamdrilling@hotmail.com

FROM	TO	TYPE	DESCRIPTION	COLOUR
0.0	0.3	soil	top	brown
0.3	1.5	clay	silty	grey and brown
1.5	3.5	silt		brown
3.5	9.0	sand and gravel	fine to coarse	brown
9.0	10.0	silt	very clayey	brown
10.0	24.0	sand and gravel	medium to coarse and large	
24.0	25.0	clay		bluey grey
25.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				

CASING DETAILS BIT SIZE: 450 mm to bottom

LENGTH	I.D	DIAM.	THICKNESS	FROM	TO
24.3 m	mm	300 mm	Class 12	0 m	23.9 m
m	mm	mm	Class	m	m
m	mm	mm	Class	m	m
m	mm	mm	Class	m	m

Slots

DIAMETER	APERTURE	FROM	TO
300 mm	4 mm	8 m	23.9 m
mm	mm	m	m
mm	mm	m	m
mm	mm	m	m

Standing Water Level 4.20m Pump Test Rate _____ L/S 4,700 G.P.H Duration of Test 60.0 min

Drawdown From Surface 4.3 m Actual Drawdown 0.1 m Total Dissolved Solids 90 PPM

Size of Gravel Packing 10 mm Bottom Capped? ____ yes ____ PH: _____ Fe: _____ PPM

Annular Cement Grouted From ____ m to ____ m From: ____ m to: ____ m ____ m to ____ m, ____ m To ____ m

Annular Bentonite Seal From ____ m To ____ m ____ m To ____ m ____ m To ____ m, ____ m To ____ m

Estimated Supply From 7 m is _____ L/S 50,000 GPH Set Pump Suction At ____ m: _____

COMMENTS: estimated from 20 metres is 100,000gph

ALL MEASUREMENTS FROM GOUND LEVEL

SIGNATURE OF LICENSEE: _____ DRILLERS SIGNATURE: _____ D.N.R. Lic. No. 2870

Scheme 2 – Lower Herbert Water Supply

Halifax Well 2

INGHAM DRILLING PTY LTD LOG FOR BORE TEST HOLE NUMBER Halifax 2 Poduction

DATE COMMENCED: 24 September 2002 DATE COMPLETED: 25-9-2002

LAST NAME: FIRST NAME:

COMPANY NAME: Hinchinbrook Shire Council PH. NO.:

ADDRESS: POSITION: 045345 7946184

LOCATION: Lucinda Rd., Halifax PROPERTY:

INGHAM DRILLING Pty Ltd Norman Bliesner Family Trust ABN 29 034 841 036 ACN 083 107 108

PO Box 1115 Ingham 4850 Phone (07) 47772717; Fax (07) 47772774; Mobile 0418777174 Email: inghamdrilling@hotmail.com

FROM	TO	TYPE	DESCRIPTION	COLOUR
0.0	3.0	loam	clayey	brown
3.0	6.0	sand & gravel***	0.5 to 4mm	brown
6.0	7.9	sand & gravel***	1 to 4mm	brown & grey
7.9	11.0	mud		dark grey
11.0	12.0	clay		grey & khaki
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				

CASING DETAILS BIT SIZE: 330 mm to 10 metres, 156 mm to bottom

LENGTH	Actual I.D	Nominal DIAM.	THICKNESS	FROM	TO
6.2 m	200mm	200 mm	Class 12	-0.2 m	6 m
monitor 7.7 m	50mm	50 mm	Class 12	-0.2 m	7.5 m
gravel feed m	80mm	80 mm	Class 9	m	5 m
m	mm	mm	Class	m	m

304 Stainless Steel Screan

DIAMETER	APERTURE	FROM	TO
200 mm	4 mm	6 m	8 m
mm	mm	m	m
mm	mm	m	m
mm	mm	m	m

Standing Water Level 3.30m Pump Test Rate 3.6 L/S 2,851 G.P.H Duration of Test 20.0 min

Drawdown From Surface 3.6 m Actual Drawdown 0.3 m Total Dissolved Solids 180 PPM

Size of Gravel Packing 10 mm Bottom Capped? yes PH: 6.3 Total Iron: 0.3 PPM

Annular Cement Grouted From 0.5m to 4.5 m From: m to: m, m to m, m to m

Annular Bentonite Seal From m to m, m to m, m to m, m to m

Estimated Supply From 7 m is 11 L/S 8,712 GPH Set Pump Suction At 7.00 m

COMMENTS:

ALL MEASUREMENTS FROM GOUND LEVEL

SIGNATURE OF LICENSEE:

DRILLERS SIGNATURE: D.N.R. Lic. No. 2870

Halifax Well 4

INGHAM DRILLING PTY LTD LOG FOR BORE TEST HOLE NUMBER Halifax No. 4

DATE COMMENCED: 24 July 1998 DATE COMPLETED: 24 July 1998 LICENCE No.:

LAST NAME: FIRST NAME:

COMPANY NAME: Hinchinbrook Shire Council PH. NO.:

ADDRESS: PO Box 366, Ingham 4850 POSITION: 0425772 7946105

LOCATION: Lucinda Rd Halifax PROPERTY: Halifax Water Treatment Plant Compo

INGHAM DRILLING Pty Ltd ATF Norman Bliesner Family Trust ABN 29 034 841 036 ACN 083 107 108
PO Box 1115 Ingham 4850 Phone (07) 47772717; Fax (07) 47772774; Mobile 0418777174 Email: inghamdrilling@hotmail.com

FROM	TO	TYPE	DESCRIPTION	COLOUR
0.0	0.8	sand	fill	brown
0.8	1.5	soil	top, very silty	"
1.5	8.8	sand & gravel	medium to coarse & small	"
8.8	9.5	mud		black
9.5	10.0	clay	some cemented	greenish grey
10.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				

CASING DETAILS BIT SIZE: 300 mm to bottom

LENGTH	I.D	DIAM.	THICKNESS	FROM	TO
10.1 m	mm	200 mm	Class 9	0 m	10 m
m	mm	mm	Class	m	m
m	mm	mm	Class	m	m
m	mm	mm	Class	m	m

SLOTTED CASING

DIAMETER	APERTURE	FROM	TO
200 mm	3 mm	7.2 m	9 m
mm	mm	m	m
mm	mm	m	m
mm	mm	m	m

Standing Water Level 2.30m Pump Test Rate 3.85 L/S 3,049 G.P.H Duration of Test 30.0 min

Drawdown From Surface 2.45 m Actual Drawdown 0.15 m Total Dissolved Solids 600 PPM

Size of Gravel Packing 3mm to mm Bottom Capped? yes PH: Fe: PPM

Annular Cement Grouted From 1m to 3 m From: m to: m m to m, m To m

Annular Bentonite Seal From m To m m To m m To m, m To m

Estimated Supply From 8.5 m is 25 L/S 19,800 GPH Set Pump Suction At 8.50 m

COMMENTS:

ALL MEASUREMENTS FROM GOUND LEVEL

SIGNATURE OF LICENSEE: DRILLERS SIGNATURE: D.N.R. Lic. No. 2870

Halifax Bore 5

INGHAM DRILLING PTY LTD LOG FOR BORE TEST HOLE NUMBER Halifax A Productior

DATE COMMENCED: 25 September 2002 DATE COMPLETED: 26-09-2002

LAST NAME: FIRST NAME:

COMPANY NAME: Hinchinbrook Shire Council PH. NO.:

ADDRESS: POSITION: 0425709 7946137

LOCATION: 100 Lucinda Rd., Halifax PROPERTY:

INGHAM DRILLING Pty Ltd Norman Bliesner Family Trust ABN 29 034 841 036 ACN 083 107 108

PO Box 1115 Ingham 4850 Phone (07) 47772717; Fax (07) 47772774; Mobile 0418777174 Email: inghamdrilling@hotmail.com

FROM	TO	TYPE	DESCRIPTION	COLOUR
0.0	5.0	sand & gravel	.5 to 3mm	grey & brown
5.0	8.8	sand & gravel***	0.5 to 12mm	grey & brown
8.8	9.3	mud		dark grey
9.3	11.0	clay		khaki green
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				

CASING DETAILS BIT SIZE: 330mm to 9 metres, 156 mm to bottom

LENGTH	Actual I.D	Nominal DIAM.	THICKNESS	FROM	TO
6.7 m	200mm	200 mm	Class 12	-0.3 m	6.4 m
Gravel feed m	80mm	80 mm	Class 12	0 m	5.1 m
Monitor m	50mm	50 mm	Class 12	0 m	8.6 m
m	mm	mm	Class	m	m

304 Stainless Steel Screen

DIAMETER	APERTURE	FROM	TO
200 mm	4 mm	6.4 m	8.9 m
mm	mm	m	m
mm	mm	m	m
mm	mm	m	m

Standing Water Level 3.20m Pump Test Rate 3.86 L/S 3,057 G.P.H Duration of Test 20.0 min

Drawdown From Surface 3.3 m Actual Drawdown 0.1 m Total Dissolved Solids 620 PPM

Size of Gravel Packing 10 mm Bottom Capped? yes PH: 6.9 Total Iron: 0.4 PPM

Annular Cement Grouted From 0.5m to 4.5 m From: m to: m, m to m, m to m

Annular Bentonite Seal From m to m, m to m, m to m, m to m, m to m

Estimated Supply From 8 m is 20 L/S 15,840 GPH Set Pump Suction At 8.00 m

COMMENTS:

ALL MEASUREMENTS FROM GOUND LEVEL

SIGNATURE OF LICENSEE:

DRILLERS SIGNATURE: D.N.R. Lic. No. 2870

Macknade Bore 5

INGHAM DRILLING PTY LTD LOG FOR BORE TEST HOLE NUMBER Macknade new Bore

DATE COMMENCED: 26 September 2002 DATE COMPLETED: 27-09-2002

LAST NAME: FIRST NAME:

COMPANY NAME: Hinchinbrook Shire Council PH. NO.:

ADDRESS: POSITION: 0421400 9545706

LOCATION: Bemerside Rd., Halifax PROPERTY: Marbelli's

INGHAM DRILLING Pty Ltd Norman Bliesner Family Trust ABN 29 034 841 036 ACN 083 107 108

PO Box 1115 Ingham 4850 Phone (07) 47772717; Fax (07) 47772774; Mobile 0418777174 Email: inghamdrilling@hotmail.com

FROM	TO	TYPE	DESCRIPTION	COLOUR
0.0	1.0	clay	silty	brown
1.0	5.0	sand	0.1 to 2mm	brown
5.0	8.0	sand& gravel***	0.5 to 4mm	brown
8.0	9.0	sand, gravel & mud*	0.5 to 4mm	grey
9.0	9.5	sand & gravel	0.5 to 4mm	grey
9.5	10.0	clay	silty	grey
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				

CASING DETAILS BIT SIZE: 330 mm to bottom

LENGTH	Actual I.D	Nominal DIAM.	THICKNESS	FROM	TO
6.9 m	200mm	200 mm	Class 12	-0.3 m	6.6 m
gravel feed m	80mm	80 mm	Class 12	m	5 m
monitor m	50mm	50 mm	Class 12	m	8.7 m
m	mm	mm	Class	m	m

304 stainless steel screen

DIAMETER	APERTURE	FROM	TO
200 mm	4 mm	6.6 m	9.6 m
mm	mm	m	m
mm	mm	m	m
mm	mm	m	m

Standing Water Level 2.70m Pump Test Rate 3.4 L/S 2,693 G.P.H Duration of Test 15.0 min

Drawdown From Surface 2.85 m Actual Drawdown 0.15 m Total Dissolved Solids 90 PPM

Size of Gravel Packing 10 mm Bottom Capped? yes PH: 6.2 Total Iron: 0.8 PPM

Annular Cement Grouted From 0.5m to 4.5 m From: m to: m, m to m, m to m

Annular Bentonite Seal From m to m, m to m, m to m, m to m

Estimated Supply From 8.5 m is 20 L/S 15,840 GPH Set Pump Suction At 8.50 m

COMMENTS:

ALL MEASUREMENTS FROM GOUND LEVEL

SIGNATURE OF LICENSEE:

DRILLERS SIGNATURE: D.N.R. Lic. No. 2870

Scheme 3 – Forrest Beach Water Supply

Forrest Beach – Bore 6

INGHAM DRILLING PTY LTD LOG FOR BORE TEST HOLE NUMBER 7 Production

DATE COMMENCED: 20 October 2005 DATE COMPLETED 21 October 2005 LICENCE No.:

LAST NAME: FIRST NAME:

COMPANY NAME: Hinchinbrook Shire Council PH. NO.:

ADDRESS: PO Box 336, Ingham 4850 POSITION: 0424075 7932145 WSG 842

LOCATION: Forrest Beach Water Supply Treatment Plant. PROPERTY:

INGHAM DRILLING Pty Ltd Norman Bliesner Family Trust ABN 29 034 841 036 ACN 083 107 108

PO Box 1115 Ingham 4850 Phone (07) 47772717; Fax (07) 47772774; Mobile 0418777174 Email: inghamdrilling@hotmail.com

FROM	TO	TYPE	DESCRIPTION	COLOUR
0.0	1.0	clay	sandy	brown
1.0	6.0	sand****	fine to coarse	grey & brown
6.0	7.5	sand**	fine to medium	grey
7.5	9.0	mud		black
9.0	11.5	clay		grey & yellow
11.5	15.0	sand*	1 l/s, 3,000 ppm tds	grey
15.0	16.0	clay		
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				

CASING DETAILS BIT SIZE: 335mm to 8 metres, 200 mm to bottom

LENGTH	Actual I.D	Nominal DIAM.	THICKNESS	FROM	TO
8 m	202 mm	200 mm	Class 12	-0.2 m	7.8 m
m	mm	mm	Class	m	m
7.95 m	50 mm	50 mm	Class 12	-0.2 m	7.75 m
m	mm	mm	Class	m	m

slotted casing

DIAMETER	No. per M	Length	Width	FROM	TO
200 mm	108	150	4 mm	4.8 m	7.7 m
mm			mm	m	m
mm			mm	m	m
mm			mm	m	m

Standing Water Level 2.60m Pump Test Rate 7.4 L/S 5,861 G.P.H Duration of Test 30.0 min

Drawdown From Surface 3.2 m Actual Drawdown 0.6 m Total Dissolved Solids 310 PPM

Size of Gravel Packing 6 mm to 10 mm Bottom Capped? yes PH: 5.6 Total Iron: 8 PPM

Annular Cement Grouted From 0m to 3 m From: m to: m, m to m, m to m

Annular Bentonite Seal From m to m, m to m, m to m, m to m, m to m

Estimated Supply From 7 m is 15 L/S 11,880 GPH Set Pump Suction At 7.00 m

COMMENTS: The test hole has a bentonite plug from 11m to 11.5m and a cement plug from 8m to 11m.

ALL MEASUREMENTS FROM GOUND LEVEL

SIGNATURE OF LICENSEE:

DRILLERS SIGNATURE: D.N.R. Lic. No. 2870

Forrest Beach – Bore 7

INGHAM DRILLING PTY LTD LOG FOR BORE TEST HOLE NUMBER New 5 Production

DATE COMMENCED: 23 September 2002 DATE COMPLETED: 24-09-2002

LAST NAME: FIRST NAME:

COMPANY NAME: Hinchinbrook Shire Council PH. NO.:

ADDRESS: POSITION: 0423918 7931968

LOCATION: Forrest Beach Rd., Alingham PROPERTY:

INGHAM DRILLING Pty Ltd Norman Bliesner Family Trust ABN 29 034 841 036 ACN 083 107 108

PO Box 1115 Ingham 4850 Phone (07) 47772717; Fax (07) 47772774; Mobile 0418777174 Email: inghamdrilling@hotmail.com

FROM	TO	TYPE	DESCRIPTION	COLOUR
0.0	0.4	top soil	sandy	brown
0.4	1.5	clay	very silty	yellow & grey
1.5	3.0	sand & gravel	1 to 6mm	orange
3.0	6.0	sand & gravel***	1 to 4mm	grey
6.0	9.0	sand ***	1 to 2.5mm	grey
9.0	9.7	mud	silty	dark grey
9.7	11.5	sand & gravel***	2 to 20mm	grey
11.5	12.0	clay	sandy	grey
12.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				
0.0				

CASING DETAILS BIT SIZE: 450 mm to bottom

LENGTH	Actual I.D	Nominal DIAM.	THICKNESS	FROM	TO
8.3 m	262mm	300 mm	Class 12	-0.3 m	8 m
monitor m	50mm	50 mm	Class 12	0 m	11 m
gravel feed m	80mm	80 mm	Class 9	0 m	5.7 m
m	mm	mm	Class	m	m

304 Stainless Steel Screen

DIAMETER	APERTURE	FROM	TO
300 mm	4 mm	8 m	11.5 m
mm	mm	m	m
mm	mm	m	m
mm	mm	m	m

Standing Water Level 3.40m Pump Test Rate 3.9 L/S 3,089 G.P.H Duration of Test 30.0 min

Drawdown From Surface 3.5 m Actual Drawdown 0.1 m Total Dissolved Solids PPM

Size of Gravel Packing mm Bottom Capped? PH: Total Iron: PPM

Annular Cement Grouted From 0.5m to 5.5 m From: m to: m, m to m, m to m

Annular Bentonite Seal From m to m, m to m, m to m, m to m

Estimated Supply From 10 m is 30 L/S 23,760 GPH Set Pump Suction At 10.00 m

COMMENTS: The 80mm pipe is for toping up the gravel pack. The 50mm pipe is to measure the water level.

ALL MEASUREMENTS FROM GOUND LEVEL

SIGNATURE OF LICENSEE:

DRILLERS SIGNATURE: D.N.R. Lic. No. 2870

APPENDIX F – INGHAM PUMP STATION GALLERY

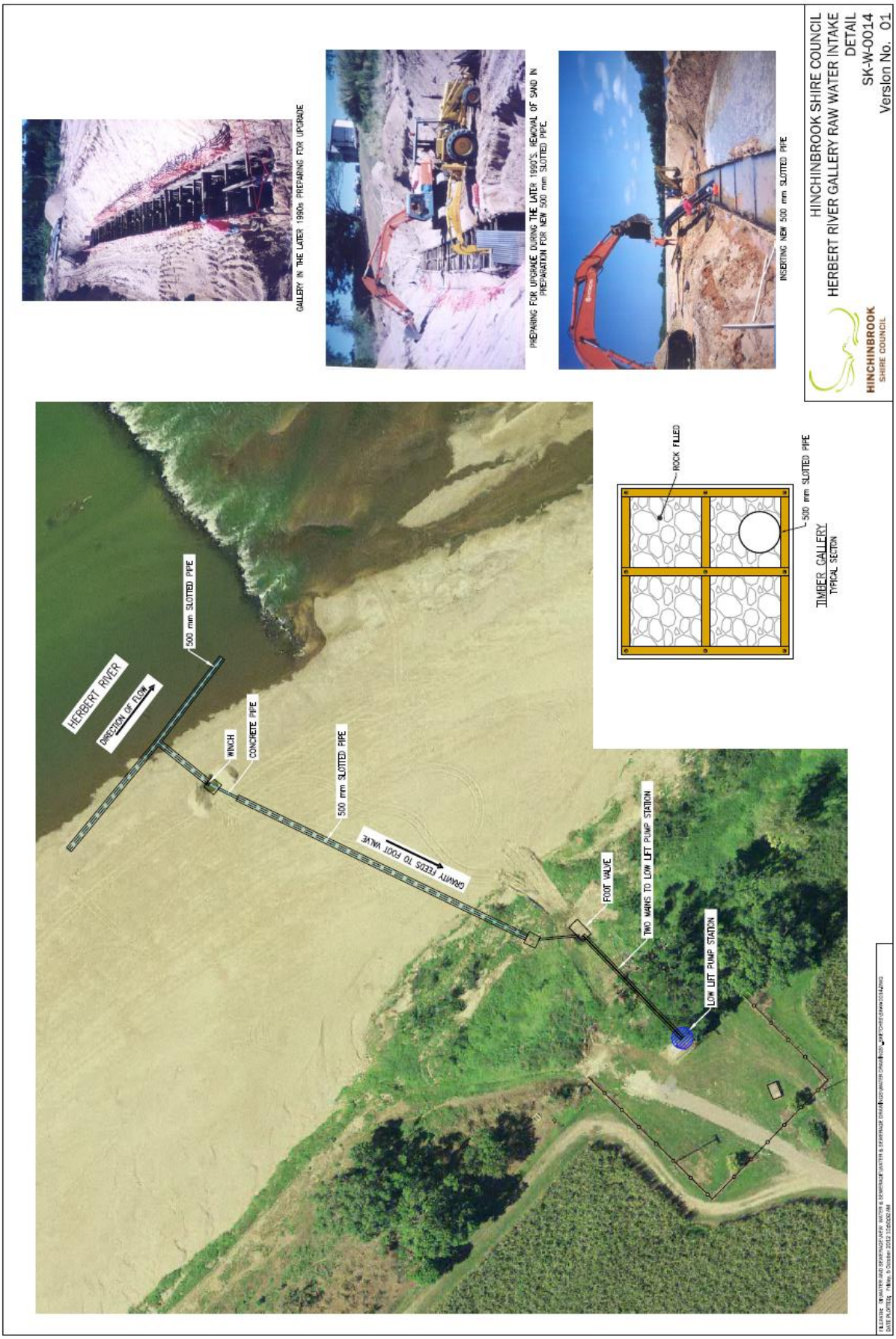

GALLERY IN THE LATER 1990s PREPARING FOR UPGRADE
PREPARING FOR UPGRADE DURING THE LATER 1990'S. REMOVAL OF SAND IN PREPARATION FOR NEW 500 mm SLOTTED PIPE
INSERTING NEW 500 mm SLOTTED PIPE
HINCHINBROOK SHIRE COUNCIL
HERBERT RIVER GALLERY RAW WATER INTAKE
DETAIL
SK-W-0014
Version No. 01
HINCHINBROOK
SHIRE COUNCIL
ROCK FILLED
500 mm SLOTTED PIPE
TIMBER GALLERY
TYPICAL SECTION
500 mm SLOTTED PIPE
HERBERT RIVER
DIRECTION OF FLOW
WINCH
CONCRETE PIPE
500 mm SLOTTED PIPE
GRAVITY FEEDS TO FOOT VALVE
FOOT VALVE
TWO MAINS TO LOW LIFT PUMP STATION
LOW LIFT PUMP STATION

Figure F.1 – Existing gallery originally constructed in 1939

Figure F.2 – Preparing for upgrade during the late 1990's.
Removal of sand in preparation for new 500mm slotted pipe.

Figure F.3 – Preparing for upgrade during the late 1990's.
Removal of sand in preparation for new 500mm slotted pipe.

Figure F.4 –New 500mm slotted pipe

Figure F.5 – Inserting new 500mm slotted pipe.

APPENDIX G – ORDER IN COUNCIL

FACSIMILE TRANSMISSION

Queensland Government
Department of Natural Resources and Mines

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DATE: 4 June 2002
TO: Ross Hogan
FACSIMILE NO.: 47763233
FROM: Ian Baker
SUBJECT: Order in Council
NO. OF PAGES (Inc. Cover) 5

MESSAGE

Ross

Please find attached copy of the Hinchinbrook Shires Authority to remove water from the Herbert River, the notice in the Gazette and the application. Please let me know if this is the latest authority and the allocation is correct.

Regards

Ian Baker

DEPARTMENT OF NATURAL RESOURCES

Enquiries to: Ian Baker
PO Box 1293
Ingham Qld 4850
Telephone: (07) 47772822 Facsimile: (07) 47772863

APPLICATION BY LOCAL AUTHORITY TO UNDERTAKE WATERWORK

REPORT AND RECOMMENDATION		
1.	Application is made by	Hinchinbrook Shire Council
2.	To obtain water from	Herbert River
3.	Location of Intake	Approx. 13 chains upstream from the confluence with Palm Creek
4.	Water to be used for	Ingham Town Water Supply
5.	Quantity of water desired	1,[illegible],000 Galls. Daily Max. 657,000,000 Galls. Yearly Max.
6.	Storage particulars	NIL
7.	Pumping particulars	Two pumps each 50,000 G.P.H. Capacity
8.	Other particulars	

REMARKS:

1. The Chief Engineer, Local Government Department, considers that the Council's requirements are reasonable.
2. The Herbert River has been the sole source of supply of water for Ingham for many years.
3. No licence or Order in Council has ever been issued for this water supply.

RECOMMENDATION:

That the Hinchinbrook Shire Council be authorised to take water from the Herbert River for the Ingham Town Water Supply in accordance with the attached draft Order in Council.

Mr. Gardiner – Noted [illegible] 11.9.67
Plotted A.M.S.M. 80. [illegible] 11.9.67

[illegible]

Commissioner of Irrigation and Water Supply

[illegible] 30.3.67 [illegible]

ORDER IN COUNCIL

At the Executive Buildings, Brisbane, the fifth day of October, 1967

Present:

His Excellency the Governor in Council

WHEREAS by "*The Local Government Acts, 1936 to 1966*," it is amongst other things enacted that—

(i) Subject to the provisions of paragraph (i) of subsection 14 of section 32 of the said Acts, a Local Authority which requires water for the purposes of any undertaking may take water from any river, stream, or creek, whether subject to tidal influence or not, and whether within or without its Area, and for that purpose may construct, maintain, control and operate all such works, including pipe lines, apparatus, appliances, and other matters and things as it deems necessary;

(ii) A Local Authority shall not, at any time after the passing of "*The Local Government Acts Amendment Act of 1946 (No. 2)*," commence to take water from any river, creek, or stream unless and until it has first obtained the consent of the Governor in Council, or, if such consent has been obtained, commence or continue to take water at any time otherwise than subject to and in accordance with the terms and conditions, if any, imposed by the Governor in Council;

(iii) Application for consent shall be made to the Director, who shall refer the matter to the Commissioner of Irrigation and Water Supply for investigation;

(iv.) The said Commissioner shall investigate the application and shall make a report and recommendation for submission by the Minister to the Governor in Council;

(v) The Governor in Council may in his absolute discretion grant or refuse to grant the application and moreover may, if he grants it, give his consent subject to such terms and conditions as he shall fix:

And whereas the Council of the Shire of Hinchinbrook requires water for the purposes of providing a water supply to the township of Ingham, being an undertaking within the meaning of the said Acts, and has made application to the Director on the 18th January, 1967, for the consent of the Governor in Council to take water from the Herbert River for such purpose: And whereas the Director referred the said matter to the Commissioner of Irrigation and Water Supply for investigation: And whereas the said Commissioner having investigated the said application made a report and recommendation for submission by the Minister to the Governor in Council: And whereas the Minister has submitted the said report and recommendation to the Governor in Council who deems it expedient to grant the said application and to give his consent to the Council of the Shire of Hinchinbrook taking water from the Herbert River for the said purpose: Now, therefore, His Excellency the Governor, acting by and with the advice of the Executive Council and in pursuance of the provisions of the said Acts, doth hereby grant the said application and give his consent to the Council of the Shire of Hinchinbrook taking water from the Herbert River for the said purpose subject to the following terms and conditions which are hereby fixed and imposed, namely:—

(1) The location of intake for the supply of water from the Herbert River shall be approximately 15 chains upstream from the confluence of Palm Creek;

(2) The maximum quantity of water which the said Council may take from the Herbert River in any one day shall be 4,050,000 gallons;

(3) The maximum quantity of water the said Council may take from the Herbert River in any one year shall be 657,000,000 gallons;

(4) If at any time the supply of water available from the Herbert River be insufficient, in the opinion of the Commissioner of Irrigation and Water Supply, to afford quantities to which all persons and authorities having claim thereto would, if the supply were sufficient be respectively entitled, or whenever and as often as the Commissioner is satisfied of the actual or approaching insufficiency of such supply, the Commissioner, notwithstanding the terms and conditions specified in paragraphs (2) and (3) hereof may make an order regulating and/or restricting the quantity of water which the said Council may take, pursuant to the provisions hereof, provided that reasonable notice shall be given by the said Commissioner to the said Council of his intention to make such order;

(5) The Council shall forward to the said Commissioner and to the Director at the end of each month, a statement showing the quantity of water taken from the Herbert River during that month.

And the Honourable the Minister for Local Government and Conservation is to give the necessary directions herein accordingly.

C. P. CURTIS
Clerk of the Council.

Queensland Gazette

7 OCT 1967

ORDER IN COUNCIL.

At the Executive Buildings, Brisbane, the day of 1967.

Present:
His Excellency the Governor in Council.

WHEREAS by "The Local Government Acts, 1936 to 1966," it is amongst other things enacted that -

(i) Subject to the provisions of paragraph (i) of subsection 14 of section 32 of the said Acts, a Local Authority which requires water for the purposes of any undertaking may take water from any river, stream, or creek, whether subject to tidal influence or not, and whether within or without its Area, and for that purpose may construct, maintain, control a operate all such works, including pipe lines, apparatus, appliances, and other matters and things as it deems necessary;

(ii) A Local Authority shall not, at any time after the passing of "The Local Government Acts Amendment Act of 1946 (No. 2)," commence to take water from any river, creek, or stream unless and until it has first obtained the consent of the Governor in Council, or, if such consent has been obtained, commence or continue to take water at any time otherwise than subject to and in accordance with the terms and conditions, if any, imposed by the Governor in Council;

(iii) Application for consent shall be made to the Director, who shall refer the matter to the Commissioner of Irrigation and Water Supply for investigation;

(iv) The said Commissioner shall investigat the application and shall make a report and recommendation for submission by the Minister to the Governor in Council;

(v) The Governor in Council may in his absolute discretion grant or refuse to grant the application and moreover may, if he grants it, give his cons subject to such terms and conditions as he shall fix:

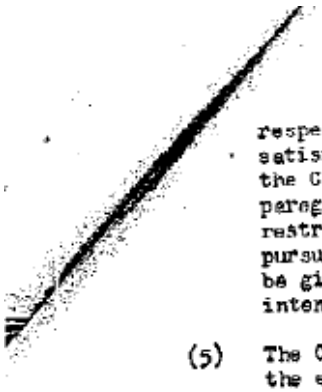
And whereas the Council of the Shire of Hinchinbrook requires water for the purposes of providing a water supply to the township of Ingham, being an undertaking within the meaning of the said Acts, and has made application to the Director on the 18th January, 1967 for the consent of the Governor in Council to take water from the Herbert River for such purpose: And whereas the Director referre the said matter to the Commissioner of Irrigation and Water Supply for investigatior And whereas the said Commissioner having investigated the said application made a report and recommendation for submission by the Minister to the Governor in Council: And whereas the Minister has submitted the said report and recommendation to the Governor in Council who deems it expedient to grant the said application and to give his consent to the Council of the Shire of Hinchinbrook taking water from the Herbert River for the said purpose: Now, therefore, His Excellency the Governor, acting by and with the advice of the Executive Council and in pursuance of the provisions of the said Acts, doth hereby grant the said application and give his consent to the Council of the Shire of Hinchinbrook taking water from the Herber River for the said purpose subject to the following terms and conditions which are hereby fixed and imposed, namely:-

(1) The location of the intake for the supply of water from the Herbert River shall be approximately 15 chains upstream from the confluence of Palm Creek;

(2) The maximum quantity of water which the said Council may take from the Herbert River in any one day shall be 4,050,000gallons;

(3) The maximum quantity of water the said Council may take from the Herbert River in any one year shall be 657,000,000 gallons;

(4) If at any time the supply of water available from the Herbert River be insufficient, in the opinion of the Commissioner of Irrigation and Water Supply, to afford quantities to which all persons and authorities having claim thereto would, if the supply were sufficient be



respectively entitled, or whenever and as often as the Commissioner is satisfied of the actual or approaching insufficiency of such supply, the Commissioner, notwithstanding the terms and conditions specified in paragraphs (2) and (3) hereof may make an order regulating and/or restricting the quantity of water which the said Council may take, pursuant to the provisions hereof, provided that reasonable notice shall be given by the said Commissioner to the said Council of his intention to make such order;

(5) The Council shall forward to the said Commissioner and to the Director at the end of each month, a statement showing the quantity of water taken from the Herbert River during that month.

And the Honourable the Minister for Local Government and Conservation is to give the necessary directions herein accordingly.

Clerk of the Council.

APPENDIX H – LOCAL DISASTER MANAGEMENT PLAN

APPENDIX I – DWQMP REGULAR AUDIT REPORT

DWQMP Regular Audit Report

Hinchinbrook Shire Council

April 2017

VIRIDIS CONSULTANTS

DWQMP Regular Audit Report

Hinchinbrook Shire Council

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Date: 28 April 2017
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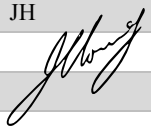
1.0	28/04/2017	James Howey		Final

Author:	Karen Pither
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Executive Summary

Compliance Statement

The auditor believes that Hinchinbrook Shire Council (HSC) has demonstrated a high level of compliance with the regular audit imposed by the *Water Supply (Safety and Reliability) Act 2008* during the audit period.

HSC is generally operating its drinking water service in compliance with its approved Drinking Water Quality Management Plan (DWQMP).

The audit noted one (1) major non-compliance in relation to the relevance of the plan. The Herbert River raw water source is an uncontrolled catchment and therefore has a risk of protozoa. Whilst there may be some filtration through the river bed, this is not a controlled process and there is no further treatment process to manage this risk. There are no defined monitoring protocols, critical limits or process controls to ensure that protozoa risk from this source is addressed.

The audit noted two (2) minor non-compliances in relation to implementation of preventive measures and implementation of risk management improvement program. It was identified that critical limit alarms can be changed by an operator, and there is no process for approving or tracking changes to SCADA alarms. The Risk Management Improvement Plan (RMIP) item of completion and establishment of operational procedures has not been completed.

Audit Conclusions

The audit concluded that HSC:

- provided accurate monitoring and performance data to the regulator
- generally implemented its DWQMP
- would benefit from reviewing the relevance of the plan.

The overall summary of compliance is shown in Table 1. Eleven (11) requirements were audited within the audit areas.

Table 1 Compliance Summary

Compliance Codes		Number of Findings
Compliant	C	8
Minor Non-Compliant	N	2
Major Non-Compliant	M	1

Recommendations have been provided for the minor and major non-compliances. Opportunities for improvement have also been identified, where relevant. An opportunity for improvement does not have an impact on compliance, but may contribute to process improvement and/or the DWQMP. The utility can decide whether to implement an opportunity for improvement, based on its own assessment on whether the improvement is a prudent and efficient way to achieve the intended outcomes.

Recommendations

The recommendations from the audit are as follows:

- Develop a procedure for documenting changes to SCADA alarms, that includes approval and signoff of the changes by a person in a supervisory role. Include a process to regularly review SCADA alarms to ensure they are set at the correct value.
- Progress the establishment of operational procedures, prioritise those procedures noted in the risk assessment that manage significant risks.
- Review flow diagrams to ensure that they accurately reflect the water supply system.

- Review raw water monitoring for the Herbert River supply and set targets and limits for process controls to ensure protozoa control and effectiveness of disinfection – US EPA Surface Water Treatment Rules: Unfiltered Systems).

1 Introduction

Viridis Consultants Pty Ltd (Viridis) was engaged by the Far North Queensland Regional Organisation of Councils (FNQROC), to conduct an audit of Hinchinbrook Shire Council (HSC) service provider identification number 062, to undertake the first regular (external) audit of its Drinking Water Quality Management Plan (DWQMP).

HSC sources, treats and distributes potable drinking water for its customers. The water is sourced from both surface water and ground water. HSC's local government area covers over 2,800 square kilometers and services more than 10,000 people. HSC supplies potable water within its three (3) water supply schemes, which include Ingham, Lower Herbert and Forrest Beach.

As required by the *Water Supply (Safety and Reliability) Act 2008* (the Act), HSC is operating its drinking water service under an approved DWQMP. The approval notice was reissued on 4 November 2016. HSC is required to complete the first regular audit of its approved DWQMP by 30 June 2017.

This report includes the findings and conclusions from the first regular audit of the HSC DWQMP.

1.1 Objectives

The objectives of the audit were to:

- undertake an audit of HSC's DWQMP to fulfil the requirements of the Act and approval notice
- conduct the audit in line with the *Drinking Water Quality Management Plan Review and Audit Guidelines 2013*.

1.2 Regulatory Regime

The statutory requirements for DWQMP regular audits are detailed in the Act. The relevant provisions in the Act for providing audit reports are:

- section 99(2)(c) - if the regulator approves the plan, the notice of the decision or information notice for the decision, will state that if the regulator requires audits of the approved plan – the intervals at which the audits must be conducted
- section 99(4) - the interval for regular audits will not be less than two years
- section 108(1) - the provider must arrange for regular audit reports to be prepared about the provider's plans and compliance with the plans
- section 108(2) - regular audit reports must be prepared in accordance with the notice given by the regulator under section 99
- section 108(3) states that the purpose of the regular audit report for this plan is:
  - to verify the accuracy of the monitoring and performance data provided to the regulator under the plan
  - to assess the service provider's compliance with the plan
  - to assess the relevance of the plan in relation to the provider's drinking water service.
- section 108(6) outlines that the regular audit report for this plan must be prepared by a person, other than an employee of the service provider or someone employed in operating the service provider's infrastructure, who is certified under the Drinking Water Quality Management System Auditor Certification Scheme to conduct an audit of the type to which the report relates, or has a qualification the regulator is satisfied is at least equivalent to this qualification
- section 108(6) also states that the regular audit report must be:
  - prepared in accordance with the guidelines made by the regulator about preparing regular audit reports
  - given to the regulator within 30 business days after its completion
  - made available for inspection and purchase.
- section 575 states that the provider must keep a copy of the audit report available for inspection by the public during office hours on business days at the office of the service provider.

1.3 Audit Scope

The scope of the audit was to:

- verify the accuracy of monitoring and performance data
- assess HSC's compliance with its DWQMP
- assess the relevance of the DWQMP in relation to HSC's drinking water service.

1.4 Audit Criteria

The approved amended DWQMP (revision D) and reissued approval amendment notice dated 04 November 2016.

1.5 Audit Standard

AS/NZS ISO 19011:2014 *Guidelines for Auditing Management Systems* was relied upon to ensure good auditing practices.

2 Audit Method

2.1 Auditor

Karen Pither conducted the audit. Karen is an Exemplar Global Certified Lead Auditor for Drinking Water Quality Management Systems. She is experienced in undertaking audits of drinking water schemes and has extensive knowledge of the operation and regulation of drinking water schemes.

Geraldine Terada-Bellis provided technical support in the audit preparation and report preparation.

The auditor confirms that:

- sufficient evidence has been sighted on which to base audit conclusions
- the audit findings accurately reflect the professional opinion of the auditor
- the audit findings have not been unduly influenced by the auditee and/or any of its associates.

2.2 Audit Agenda

The audit comprised of the following steps:

1. information requests to HSC, identifying necessary information and documentation required to undertake the audit
2. preparation for audit, development of audit checklist
3. on-site audit and verification, including staff interviews
4. audit report preparation.

2.3 Reference Documentation

The key reference documents and evidence relied on for the audit are identified in the detailed audit findings in Appendix A.

2.4 On-site Audit

The on-site visit was undertaken as follows:

- 20 Mar 17 – HSC, 25 Lannercost St, Ingham, opening meeting and overarching DWQMP audit
- 21 March 17 – Ingham Pump Station Water Treatment Plant, Ingham Depot Water Treatment Plant, Ingham Tower, Tokalon Tower: Onsite Verification

The opening and closing meeting participants are identified in Table 2.

Table 2 Audit Participants

Name	Position
Karen Pither	Auditor
Peter Martin	Manager of Water and Sewerage
Monica Accornero	Infrastructure Engineer
Haydn Grazioli	Technical Officer Water and Sewerage
David Lee	W&S Treatment Team Leader
Neil Fredericks	Water Treatment Plant Operator

2.5 Audit Grades

Table 3 identifies the grades used for this audit.

Table 3 Audit Grades

Compliance Codes		Definition
Compliant	C	Indicates compliance of audit findings with reference documentation.
Minor Non-Compliant	N	Does not comply, however, deficiency does not compromise the delivery of products or outcomes and does not compromise the ability to achieve defined objectives.
Major Non-Compliant	M	Does not comply. Deficiency that compromises the delivery of products or outcomes, and the ability to achieve defined objectives.

A recommendation is provided for requirements which do not comply, that is, major or minor non-compliances.

An opportunity for improvement (OFI) is identified for activities which comply but may also be improved. An opportunity for improvement does not have an impact on compliance, but may contribute to process improvement and/or the DWQMP. The utility can decide whether to implement an opportunity for improvement, based on its own assessment on whether the improvement is a prudent and efficient way to achieve the intended outcomes.

2.6 Quality Assurance Process

This audit was carried out in accordance with the Viridis Quality Manual, consistent with ISO 9001:2008. Karen Pither was the Lead Auditor for the audit and responsible for ensuring the quality of the deliverables. Quality assurance activities undertaken during the audit comprised of:

- compliance with the Viridis Quality Manual
- internal peer review of report
- document control and approval processes.

3 Audit Findings

The audit was carried out as described in Section 2. The completed audit checklist is in Appendix A, which includes the detailed findings for the audit. The findings have been summarised in the sections below.

3.1 Summary

HSC demonstrated a high level of compliance with the regular audit imposed by the *Water Supply (Safety and Reliability) Act 2008* during the audit period. The overall summary of compliance is shown in Table 4, eleven (11) requirements were audited.

Table 4 Audit Summary

Compliance Codes		Number of Findings
Compliant	C	8
Minor Non-Compliant	N	2
Major Non-Compliant	M	1

The audit concluded that HSC:

- provided accurate monitoring and performance data to the regulator
- generally implemented its DWQMP
- would benefit from reviewing the relevance of the plan, as the plan does not adequately address protozoa risk in the Herbert River raw water source.

HSC is generally operating its drinking water service in compliance with its approved Drinking Water Quality Management Plan (DWQMP).

The audit noted one (1) major non-compliance in relation to the relevance of the plan. The Herbert River raw water source is an uncontrolled catchment and therefore has a risk of protozoa. Whilst there may be some filtration through the river bed, this is not a controlled process and there is no further treatment process to manage this risk. There are no defined monitoring protocols, critical limits or process controls to ensure that protozoa risk from this source is addressed.

The audit noted two (2) minor non-compliances in relation to implementation of preventive measures and implementation of risk management improvement program. It was identified that critical limit alarms can be changed by an operator, and there is no process for approving or tracking changes to SCADA alarms. The Risk Management Improvement Plan (RMIP) item of completion and establishment of operational procedures has not been completed.

Opportunities for improvement have also been identified, where relevant, to assist with process improvements. These are further discussed in the sections that follow.

3.2 Accuracy of Monitoring and Performance Data

3.2.1 Compliance

The audit was required to *verify the accuracy of monitoring and performance data* supplied to the regulator by HSC under the plan, including data required under any provisions or conditions outlined in the approval notice.

To verify the information in the annual report, water quality data spreadsheets for *Escherichia coli* and the standard water quality analysis, were provided at audit and the data within the spreadsheets was compared with the data reported in the annual report for 2015/2016. The audit confirmed that for the data reviewed, the data in the annual report was accurate. The complaints database and details about exceedances with the water quality criteria were also reviewed and confirmed to be consistent with the data presented in the 15/16 annual report.

The audit verified that the data supplied was accurate and HSC was **compliant** with this audit area.

3.2.2 Recommendations

No recommendations have been made in relation to this audit area.

3.2.3 Opportunity for Improvement

- Consider including an option within the complaints database for recording complaints about taste and odour.

3.3 Compliance with the Plan

3.3.1 Compliance

HSC demonstrated high compliance with this audit area. The auditor assessed the following specific components for compliance with this audit area:

- *Provision and conditions in the approval notice* – HSC was **compliant** with the requirement. The DWQMP annual report for the 2014-15 financial year was prepared and submitted to DEWS, although almost a month outside the due date. An OFI was identified for this area.
- *Implementation of preventive measures* – a **minor non-compliance** was identified with this audit requirement. It was identified that a critical limit alarm had been changed by an operator, and there is no process for approving or tracking changes to SCADA alarms. A recommendation was identified for this area.
- *Implementation of operational and maintenance procedures* – HSC was found to be **compliant** with this requirement as the approved DWQMP accurately identifies that the procedures are in development. The DWQMP includes a list of draft procedures. Finalisation of the procedures is an item in the Risk Management Improvement Plan (RMIP). Draft versions of a sample of the procedures (Responding to an *E coli* detection and Water Quality Sampling) were viewed at audit. Both procedures are still in the process of being written and have not been reviewed or finalised. At audit it was discussed that it is challenging to allocate time to these procedures. OFIs were identified for this audit area.
- *Implementation of process for managing incidents and emergencies* – HSC was **compliant** for this audit requirement. Water quality exceedance records are kept through the records management system –the Enterprise Corporate Management (ECM) record keeping system. The non-compliance folder was shown at audit which included notifications made to the regulator. OFIs were identified for this area.
- *Implementation of operational and verification monitoring programs* – HSC was found to be **compliant** for this audit requirement. The SCADA monitoring described in the DWQMP was confirmed at audit, and the critical limits were reviewed. Critical limit exceedances are recorded on the daily log sheet in the comments column, however there were no exceedances to observe during the audit. The verification monitoring program is captured on a spreadsheet, showing where and when samples are to be taken. Operator Cert II and Cert III training includes taking water quality samples. OFIs were identified for this area.
- *Implementation of the risk management improvement program* – a **minor non-compliance** was identified with this audit requirement. RMIP items were discussed at audit, and it was found that the RMIP is being progressed and actions are being completed, for example, replacement of bore heads is largely completed and the Forest Beach pipeline completed. Completion and establishment of operational procedures has not been completed. A recommendation was identified for this area.
- *Maintaining records* – HSC was found to be **compliant** with this requirement. The record keeping requirements detailed in Table 5-5 were reviewed and confirmed at audit. It was noted that there is no formal process for document management, including identifying current and controlled versions, version control in general or superseding old versions. It was discussed that staff use different and old version of procedures, forms and templates. An OFI was identified for this area.

- *Undertaking regular reviews* – HSC was found to be **compliant** in this audit requirement. According the DWQMP, a review was conducted on the 25 March 2015. Advice was sought from the Regulator regarding the requirements to amend the DWQMP. The decision was made to submit an amendment which was approved on 18 August 2015.

3.3.2 Recommendations

The following recommendations have been made in relation to this audit area:

- Develop a procedure for documenting changes to SCADA alarms, that includes approval and signoff of the changes by a person in a supervisory role. Include a process to regularly review SCADA alarms to ensure they are set at the correct value.
- Progress the establishment of operational procedures, prioritise those procedures noted in the risk assessment that manage significant risks.

3.3.3 Opportunities for Improvement

The following opportunities for improvement has been made in relation to this audit area:

- Ensure that the DWQMP annual report is submitted within the required timeframe of 120 business days from the end of the financial year.
- Document the chemical procurement, delivery and receipt process to ensure relevant risks are managed (e.g. incorrect chemical, incorrect chemical strength, sufficient chemical quantity at hand, stock rotation).
- Review the procedures for calibrating monitoring equipment to ensure that results are reliable. The process should include identification of acceptable variation between hand held and online equipment, to note where full calibration is required, rather than adjustment.
- Ensure the contractor puts calibration stickers on instruments to indicate the date of calibration and next due.
- Document the reservoir inspection and cleaning program, including frequency and records, and ensure that it is implemented.
- Formalise the performance review process to ensure training needs are identified and progressed.
- Consider establishing an incident and emergency response plan, that captures the detail in the DWQMP in a standalone document.
- Formalise record keeping processes for water quality incidents.
- Develop a training module for managing water quality incidents.
- Undertake scenario testing of incident and emergency response and communication protocols to test the procedures and ensure staff understand the incident management processes.
- Develop a process to ensure that the records of CCP SCADA alarms (critical limit exceedances) are being documented.
- Develop formal processes for document control, including version control and ensure only current approved versions of documentation relating to the DWQMP is being used.

3.4 Relevance of the Plan

3.4.1 Compliance

The audit was required to assess the relevance of the DWQMP. The auditor assessed the following components for compliance.

- *Service description and details of infrastructure* – a **major non-compliance** was found with this audit requirement. The audit noted one (1) major non-compliance in relation the relevance of the plan. The Herbert River raw water source is an uncontrolled catchment and therefore has a risk of protozoa. Whilst there may be some filtration through the river bed, this is not a controlled process and there is no further treatment process to manage this risk. There are no defined monitoring protocols, critical limits or process controls to ensure that protozoa risk from this source is addressed. Additionally, it was noted during the site visit that though the schematics generally reflect the water supply system, fluoride dosing is not included in the process flow diagrams in Appendix B of the DWQMP and the detailed WTP schematics in Appendix C of the DWQMP do not show the chlorination and fluoridation dose points. Recommendations have been identified for this area.
- *Catchment characteristics and water quality information* – HSC was found to be **compliant** for this audit requirement. Catchment characteristics observed at audit were consistent with the catchment characteristics noted in the risk assessment and DWQMP.

3.4.2 Recommendations

The following recommendations have been made in relation to this audit area:

- Review flow diagrams to ensure that they accurately reflect the water supply system.
- Review raw water monitoring for the Herbert River supply and set targets and limits for process controls to ensure protozoa control and effectiveness of disinfection – US EPA Surface Water Treatment Rules: Unfiltered Systems.

3.4.3 Opportunity for Improvement

- Develop a drinking water policy and seek endorsement from Council to promote awareness and strengthen HSC's commitment to providing safe drinking water.

Glossary

Word	Description
ADWG	Australian Drinking Water Guidelines
DEWS	Department of Energy and Water Supply
DWQMP	Drinking Water Quality Management Plan
ECM	Enterprise Corporate Management
FNQROC	Far North Queensland Regional Organisation of Councils
HSC	Hinchinbrook Shire Council
OFI	Opportunity for Improvement
RMIP	Risk Management Improvement Plan
SCADA	Supervisory Control and Data Acquisition
WTP	Water Treatment Plant

Appendix A – Audit Checklist

Table 5 Detailed Audit Findings

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
Accuracy of Monitoring and Performance Data – Verify accuracy of monitoring and performance data supplied to the regulator				
• **Accurate Data**	Current Reissued Amendment Approval Notice (4 November 2016) 2014/2015 DWQMP Annual Report 2015/2016 DWQMP Annual Report	Under the current reissued Approval Notice, HSC was required to submit a DWQMP Annual Report to DEWS by 19 December 2016. Water quality data is recorded on spreadsheets, for *Escherichia coli* and the standard water quality analysis. The spreadsheets were provided at audit and the data within the spreadsheets was compared with the data reported in the annual report for 2015/2016. The audit confirmed that for the data reviewed, the data in the annual report was accurate. As a cross check, the entire database is downloaded at the end of the financial year. Instances of non-compliance with the water quality criteria are reported in the annual reports however there were no non-compliance of a health parameter of the water quality criteria in the 2015/2016 financial year. This was consistent with the information available on water quality exceedances. Risk Management Improvement Plan (RMIP) items are included in the annual report. The RMIP is reviewed during the annual report development process, and the annual report includes columns to note the progress in implementing action items. Customer complaints are recorded in the Water and Sewerage Customer Request database. Within the database, there are options for dirty water and low pressure complaints. The database was demonstrated at audit. These is no option for recording taste and odour complaints, which may be a common complaint for drinking water. It was excepted that these would most likely be captured as dirty water complaints, however this could not be confirmed. When a complaint is recorded within the database, an email is sent to the Water and Sewerage Team. HSC is transitioning to a whole of council system for recording complaints. The spreadsheet used to prepare the monthly report to council was shown and the number of dirty water complaints for the financial year was confirmed.	C	*OFI* Consider including an option within the complaints database for recording complaints about taste and odour.

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
Compliance with the plan – Provisions and conditions in the Approval Notice				
• **DWQMP Report submission**	Amendment Approval Notice (4 November 2016) Approval Notice 18 August 2015 Approval Notice 25 March 2013 2013/2014 DWQMP Annual Report 2014/2015 DWQMP Annual Report 2015/2016 DWQMP Annual Report DWQMP Report Submission Email 2015/2016 DWQMP Report Email 2014/2015	The 2015/2016 DWQMP Annual Report submission email was provided as audit evidence, the email time stamp shows that it was submitted on 20 September 2016, before the required date of 19 December 2016. The 2014/2015 DWQMP Annual Report submission email was provided as audit evidence, included in the email is a preceding email from DEWS, asking for the report, which was overdue, on the 15 January 2016. The report was submitted on the 21 January 2016, after the due date (16 December 2015). The annual reports for 13/14, 14/15 and 15/16 financial years are available on the HSC website.	C	*OFI* Ensure that the DWQMP annual report is submitted within the required timeframe of 120 business days from the end of the financial year.

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
Compliance with the plan – Implementation of preventive measures described in the plan				
• **Preventive measures clearly identified** • **Preventive measures implemented**	Current Approved Amended DWQMP (Rev D) Field verification visit	The DWQMP discusses existing preventative measures in section 4.3 and section 5.1.1., listing them in Table 4-6 of the plan. Table 5-1 of the plan provides additional information on each of the existing (and proposed) preventive measures, with focus on those managing high or extreme risks. Table 5-1 describes the hazardous event, the associated preventive measures, which risk/factor the preventive measure helps to mitigate, how effective the measure is, the residual risk, any proposed measures to reach an acceptable residual risk (if required) and the responsible work unit/organisation for the hazardous event. Preventive measures are given in some detail, however there are no documented procedures for the operation of preventive measures. During the field verification visits preventive measures were discussed and observed, such as treatment processes, operational monitoring with alarms and automatic shutdowns and corrective actions. The SCADA system is used to monitor critical limits and send alarms when the critical limit is exceeded. pH was noted in the DWQMP as an operational parameter with a critical limit. It was observed at audit that the alarm limit for pH had been changed in SCADA to a lower limit of 0.0 and an upper limit of 14.0. This indicates that critical limit alarms can be changed by an operator, and there is no process for approving or tracking changes to SCADA alarms.	**N**	*Recommendation* Develop a procedure for documenting changes to SCADA alarms, that includes approval and signoff of the changes by a person in a supervisory role. Include a process to regularly review SCADA alarms to ensure they are set at the correct value.
Compliance with the plan – Implementation of operational and maintenance procedures				
• **Procedures implemented** • **Currency** • **Calibration** • **Maintenance** • **Reservoirs** • **Training and Awareness** • **Chemical procurement and deliveries**	Current Approved Amended DWQMP (Rev D) Daily Log Sheet: • Ingham Depot and Ingham Pump Station • January 2017 and March 2017 Calibration records: 10/08/16 Fluoride meters 24/08/16 Halifax pH,	Operational and maintenance procedures are described in section 5.2 of the DWQMP. The DWQMP states that HSC is in the process of developing procedure and includes a list of draft procedures. This issue has been identified and is an item in the Risk Management Improvement Plan (RMIP). Section 5.2 (page 70) also includes a preliminary list of operation and maintenance procedures that will be developed. The target date for developing the procedures formally is set to 30 June 2016 in the plan. Draft versions of some of the procedures (Responding to an *E coli* detection and Water Quality Sampling) were viewed at audit. Both procedures are still in the process of being written and have not been reviewed or finalised. At audit it was discussed that it is challenging to allocate time to these procedures. Operational procedures have been developed for fluoride dosing management, as shown at audit. It is noted that the water team are experienced operators, with extensive knowledge about operating the system, and that the activities that would be contained within the procedures are being undertaken, albeit informally.	**C**	*OFI* Document the chemical procurement, delivery and receipt process to ensure relevant risks are managed (e.g. incorrect chemical, incorrect chemical strength, sufficient chemical quantity at hand, stock rotation). Review the procedures for calibrating monitoring equipment to ensure that results are reliable. The process should include identification of acceptable variation between hand held and online equipment, to note where full calibration is required, rather than adjustment. Ensure the contractor puts calibration stickers on instruments to indicate the date of calibration and

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
	chlorine depolox 25/08/16 Forest Beach pH, chlorine depolox Site Visit to Ingham Pump Station Site Visit to Depot Treatment Plant	Additionally, there are no Operation and Maintenance (O&M) Manual for the treatment plants. **Chemical procurement and management** The procurement of Sodium hypochlorite is undertaken under the FNQROC procurement procedure. Deliveries are noted on the daily log sheet at each treatment plant by noting a "Y" or 'N" in the appropriate column. The Forest Beach log sheet for January 2017 was viewed at audit, it showed that there had not been any deliveries in January. Fluoride is ordered when the operator fills out a form (a spreadsheet) and sends it to water team. The form was shown at audit WF27 Water Fluoridation – 25 kg NAF Stocktake and Delivery form. The completed form from 17/04/2013 - 15/9/15 was shown at audit. Certificate of analysis all certificates are emailed to the stores manager and recorded in the ECM record keeping database. The fluoride delivery docket from 27/02/2017 and the fluoride certificate of analysis signed 27/2/2017 were shown at audit. There is no formal process for ordering other water treatment chemicals, with the operators arranging for a local supplier to order lime, which is collected by operators. There is no process for evaluating chemicals for suitability for water treatment, certificates of analysis are not collected. **Calibration** Calibration is undertaken using a combination of internal and external calibrations. Operators undertake a check of the online analysers daily and compare the results against the handheld chlorine analyser that is externally calibrated on a 3 monthly basis. The daily log sheet is used to record in-house calibration. It was noted that at times, there was a large variation between the chlorine reading on the online analyser and the handheld device, in this case it is assumed that the online analyser is adjusted. There was no consideration of when a variation is recorded, if it is suitable to adjust rather than undertake full calibration. Calibration was noted as a "y" where adjustment was made. The daily log sheet reviewed at audit noted that the variation can be over 0.5 mg/L at times, often several times in one week, with the online analyser being adjusted rather than recalibrated. **Maintenance** The progress for implementing maintenance processes was discussed at audit. Whilst there is no formal process for undertaking maintenance, HSC has made significant progress by refurbishing reservoirs, water towers and other infrastructure over the last 10 years. This is noted on the RMIP. Additionally, operators undertake daily checks around the plant, and where		next due. Document the reservoir inspection and cleaning program, including frequency and records, and ensure that it is implemented. Formalise the performance review process to ensure training needs are identified and progressed.

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
		possible undertake repairs. Every two or three months the fitters do a check of equipment. Requests can be made through the maintenance database. Water requests are approved by the water team, and actions are allocated to a person to complete. A form is generated, which is filled in once the maintenance is complete and returned to the water team for input into the database. **Reservoirs** The DWQMP states that reservoir visual inspections are undertaken daily. At audit is was discussed that the records of the daily checks are recorded on the daily log sheet, however the log sheet for the Forest Beach High Lift Station did not note any inspections. Also, it was discussed that issues are reported verbally and addressed as needed, either by operators or through the maintenance database request process. **Training and awareness** Competency is evaluated during the recruitment process. There is an informal process for undertaken training or attending conferences. Performance reviews will be rolled out in July 2017, with templates being distributed at present. It is expected that the performance reviews will identify training needs and provide a mechanism for progressing training and awareness.		

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
Compliance with the plan – Implementation of process for managing incidents and emergencies				
• **Process documented** • **Incident management** • **Staff training**	Current Approved Amended DWQMP (Rev D)	Section 5.3 of the plan describes the management of incidents and emergencies. Table 5-2 details the incident and emergency levels, how each level is managed and who is responsible. Table 5-3 describes management of incident and emergencies in detail, as well as corresponding emergency contact details and protocols. The table is organized in levels (corresponding to those described in Table 5-2), with summaries of actions to be taken for each type of incident/emergency listed. Trigger values for *E. coli* detections in the reticulation are also provided. A Local Disaster Management Plan is provided in Appendix G of the plan, and an Evacuation Sub Plan is in Appendix F of the plan, which are both referred to in the incident and emergency table (5-3). The communication protocol for notifying the consumer in case of an incident or emergency is included in section 5.3.1 of the plan. Local radio, newspaper and television station are generally used to communicate with the public. Council is also able to leave SMS messages and recorded phone messages (for landlines) via a Telstra service, in the case of a cyclone. The area of communication is transferred to Telstra using a KML file, produced by HSC's GIS system. In the case of major *E.coli* detection in the reticulation network, it is the intention of HSC to use the same Telstra system to broadcast the required actions. Water quality exceedance records are kept through the records management system – Enterprise Corporate Management (ECM) record keeping system. The non-compliance folder was shown at audit which included Part A – dated 29/7/14 and Part B. Whilst there is no formal record keeping for incidents and emergencies, water quality results are recorded on the spreadsheet. Operators have Cert III and Cert IV training which includes some incident management. There is no formal process for training on water incidents and no drills or testing of emergency scenarios are undertaken.	C	*OFI* Consider establishing an incident and emergency response plan, that captures the detail in the DWQMP in a standalone document. Formalise record keeping processes for water quality incidents Develop a training module for managing water quality incidents Undertake scenario testing of incident and emergency response and communication protocols to test the procedures and ensure staff understand the incident management processes.
Compliance with the plan – Implementation of operational and verification monitoring plan				
• **Operational monitoring plan implementation** • **Verification monitoring plan implementation**	Current Approved Amended DWQMP (Rev D)	The operational and verification monitoring programs undertaken at HSC are described in Section 6 of the DWQMP. **Operational Monitoring** Section 6.1 describes operational monitoring undertaken by HSC. Operational monitoring includes water quality monitoring to assess and confirm the performance of preventative measures. Water quality is monitored online, and data collected is used as a trigger for corrective	C	*OFI* Develop a process to ensure that the records of CCP SCADA alarms (critical limit exceedances) are being documented.

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
• **Targets and limits**		actions to improve drinking water quality. Where possible, operational parameters are monitored online and continuously to detect failures in a timely manner (particularly for critical control points). HSC use SCADA for monitoring specific section of the water supply, chlorine residual, reservoir levels and pump hours and flow rates and daily grab sampling. Table 6-1 describes the operational monitoring for all three HSC schemes, and identifies monitoring location and critical limits. It identifies the parameter monitored, the associated hazard, the sampling frequency, method and analysis, target limits, action if target is exceeded, the critical limit and action if the critical limit is exceeded. Any critical limit exceedances are recorded on the daily log sheet in the comments column, however there were no exceedances to observe during the audit. The SCADA monitoring described in the DWQMP was confirmed at audit, and the critical limits were reviewed. It was noted that mostly, SCADA alarm limits are set to be more conservative than the critical limits in the DWQMP. When reviewing the critical limits for pH, it was noted that the alarm limit for low had been changed to 0.0 and the high was 14.0. It was discussed that all operators can change alarm limits and there was not approval process to evaluate and record changed to SCADA alarms. **Verification** Section 6.2 describes the verification monitoring carried out by HSC. HSC's verification monitoring plan includes monitoring at representative points throughout the supply system. All source waters, treatment processes and distribution system are routinely monitored for a range of parameters, as recommended in the ADWG. Table 6-2 describes the verification monitoring for all schemes. The parameter monitored, the location, the ADWG/regulation value for the parameter, associated hazard, frequency, analysing authority and response to exceedances are described in this table. Table 6-3 describes the verification monitoring locations and associated sample point numbers. The verification sample points have been chosen per areas likely to represent worst case (e.g. low pressure areas, end of reticulation mains). Samples are taken on a rotational basis between these sample locations. All water samples taken by HSC are processed at the Queensland Health laboratory in Brisbane. When immediate results are required (e.g. during flooding), samples processed at the Townsville City Council laboratory. HSC has a draft operating procedure for collecting water samples. This procedure addresses data handling, the monitoring program, communication procedures and transportation of samples.		

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
		Raw water samples are collected from the bore and at the aerator. At the Ingham Pump Station a raw water sample is taken from the river intake. Samples for treated water are taken from reservoirs associated with each treatment plant. Critical points in the reticulation have also been identified as sample locations. Samples are collected by the WTP operator, packed into eskies and sent to Townsville via road freight and then flown to Brisbane overnight to the Queensland Health Laboratory. The verification monitoring program is captured on a spreadsheet, showing where and when samples are to be taken. Operator Cert II and Cert III training includes taking water quality samples. Water quality data is captured in spreadsheets for the three schemes, once the lab reports are received.		
Compliance with the plan – Implementation of risk management improvement program				
• **Improvement program implementation** • **Monitoring progress** • **Continual improvement**	Current Approved Amended DWQMP (Rev D)	The Risk Management Improvement Program (RMIP) is discussed in section 5.4 of the DWQMP. It is included as Table 5-4 of the plan. It aims to manage any unacceptable residual risks identified by the hazard/risk assessment, manage any gaps in the plan, improve part of the plan where deficiencies in information did not allow the criteria to be completely and accurately addressed. Items in the RMIP are prioritised based on the level of risk that is addressed by the item, and the historical performance of the scheme. Priorities are rated from Low, Medium, High and Very High. The RMIP describes the scheme, the hazard/hazardous event the item addressed, priority rating, actions (interim, short-term and long-term), target dates, estimated cost, responsibility and whether its completed. RMIP items were discussed at audit, and it was found that the RMIP is being progressed and actions are being completed, for example, replacement of bore heads is largely completed. The Forest Beach pipeline is also completed. As discussed previously, completion and establishment of operational procedures has not been completed.	**N**	*Recommendation* Progress the establishment of operational procedures, prioritise those procedures noted in the risk assessment that manage significant risks.

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
Compliance with the plan – Maintaining records as described in the plan				
• **Records management**	Current Approved Amended DWQMP (Rev D)	Section 5.5 details information management at HSC. Table 5-5 summarises the water quality management information management. The table includes the information/document title/description, the format, where it is stored, position responsible for the document and any comments. Section 5.5.1 describes the record retention requirements, where all documents related to the operation of the water supply are retained either as hard copy or electronically for as long as possible. Technology One ECM system is the records keeping system, which was demonstrated at audit. The record keeping requirements detailed in Table 5-5 were reviewed and confirmed at audit. It was noted that there is no formal process for document management, including identifying current and controlled versions, version control in general or superseding old versions. It was discussed that staff use different and old version of procedures, forms and templates.	C	*OFI* Develop formal processes for document control, including version control and ensure only current approved versions of documentation relating to the DWQMP is being used.
Compliance with the plan – Undertaking reviews at the frequency specified in the Approval Notice				
• **Review undertaken** • **Review process**	Current Approved Amended DWQMP (Rev D) Current Reissued Amendment Approval Notice (4 November 2016) Email to DEWS submitting a Review Document DWQMP Review Report (2015)	According the DWQMP, a review of the was conducted on the 25 March 2015. A report detailing the amendments to the then DWQMP was also submitted as audit evidence. The review was carried out using question based on prompts from the *DWQMP Review and Audit Guidelines* developed by DEWS. The review questions were divided into sections per the *Review and Audit Guidelines*, then each review question was answered with comments, and whether the DWQMP required amendments. All sections which required amendments were recorded and Section 3 of the Review report details the amendment descriptions and noted the relevant sections of the DWQMP to be amended. Advice was sought from the Regulator regarding the requirements to amend the DWQMP. The decision was made to submit an amendment which was approved on 18 August 2015.	C	NA

Checklist	Evidence	Findings and Discussions	Compliance Grade	Recommendation / OFI
Relevance of the plan – Service description and details of infrastructure reflect current circumstances				
• **Infrastructure** • **Risk management** • **Monitoring**	Site Visit to Ingham Pump Station Site Visit to Depot Treatment Plant	The schematics generally reflect the water supply system; however, it was noted that the fluoride dosing is not noted on the process flow diagrams in Appendix B of the DWQMP. The detailed water treatment plant schematics in Appendix C do not show the chlorination and fluoridation dose points, but do show the analysers. The DWQMP has identified operational monitoring and critical limits, but does not include assessment of critical control points, therefore, it is not clear which operational monitoring is critical to producing safe drinking water. In addition, there are preventive measures that are not clearly documented, for example, the Herbert River supply at the Ingham Pump Station is only used when the raw water turbidity is considered acceptable. The acceptable level is not documented, and the raw water turbidity can vary when pumping. As this treatment system does not include a filtration step, the selective extraction of raw water relies on the turbidity to be of level that can ensure effective disinfection. In addition, the Herbert River raw water source is an uncontrolled catchment and therefore has a risk of *cryptosporidium*. Whilst there may be some filtration through the river bed, this is not a controlled process and there is no treatment process to manage this risk. The acceptable turbidity level should be determined, and the chlorine dose should be set to achieve adequate C.*t.* to ensure adequate disinfection and address *cryptosporidium* risk. It was noted that whilst the DWQMP has been adopted by council, a drinking water quality policy has not been developed or endorsed by HSC.	M	*Recommendation* Review flow diagrams to ensure that they accurately reflect the water supply system. Review raw water monitoring for the Herbert River supply and set targets and limits for process controls to ensure protozoa control and effectiveness of disinfection – US EPA Surface Water Treatment Rules: Unfiltered Systems. *OFI* Develop a drinking water policy and seek endorsement from Council to promote awareness and strengthen HSC's commitment to providing safe drinking water.
Relevance of the plan – Confirm catchment characteristics and water quality information reflect current circumstances				
• **Catchment** • **Water quality information**	Field verification visit to Herbert River intake and Como Road Bore field Microbiology spreadsheet 15/16	Catchment characteristics observed at audit were consistent with the catchment characteristics noted in the risk assessment and DWQMP. The Herbert River supply is highly variable and is only used when water quality is good. This is documented in the DWQMP and was observed at audit, as the water quality in the Herbert was turbid, therefore the river source was not being utilised. *E. coli* is sampled in the raw water sources. The results show instances of *E. coli* in the raw water bore sources. This is captured in the risk assessment. HSC rely on compliance with the plumbing code to protect groundwater sources.	C	NA

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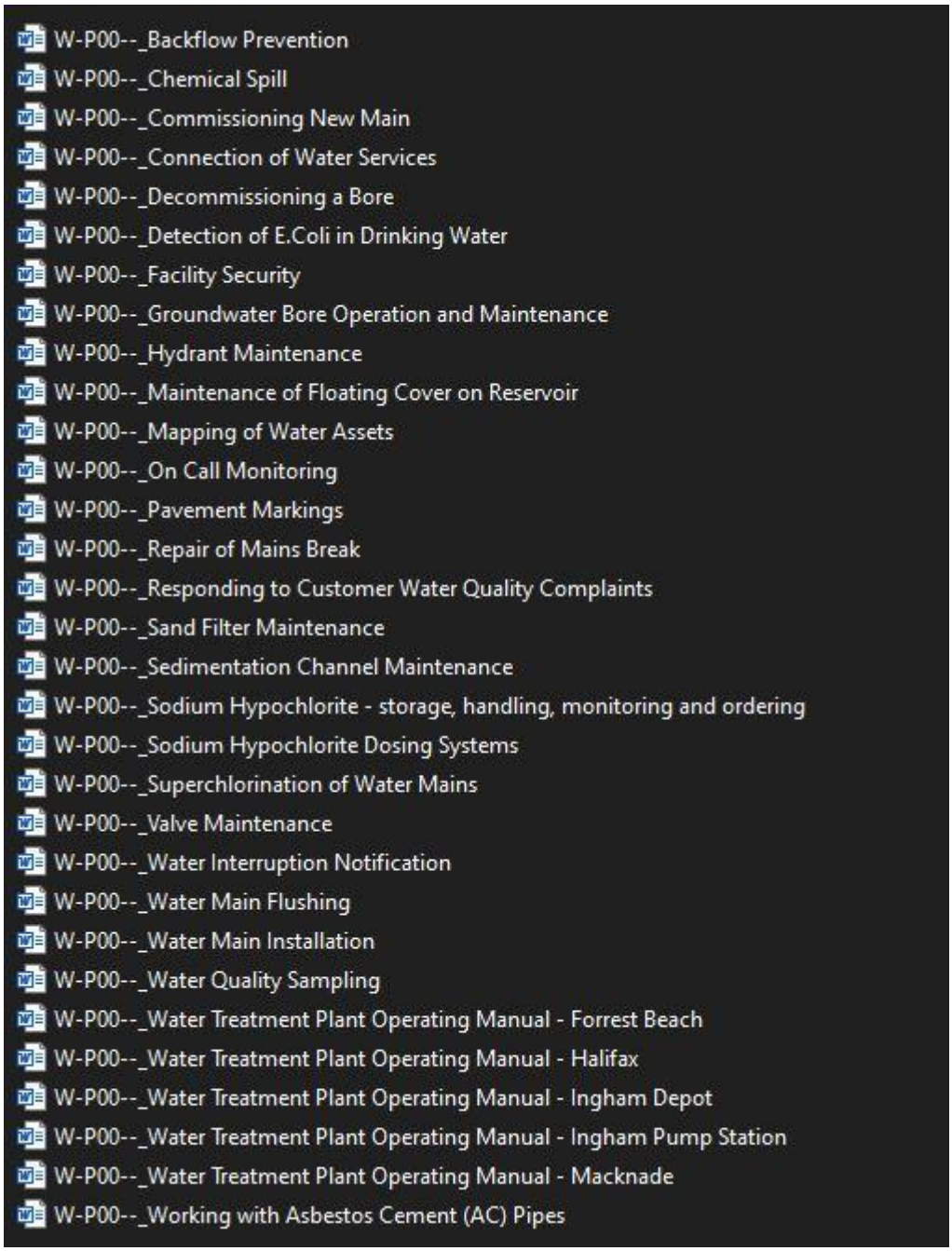
APPENDIX J – OPERATIONAL CHECKLISTS & PROCEDURES LIST



Daily Pre Start Meeting WEEKENDS A WEEK ENDING / /

WORK CREW LEADER:	Treatment ONCALL Officer	WORK CREW:	1.
DATE:	___/___/___ to ___/___/___		2.
SUPERVISOR:	W&S Treatment Team Leader		3.
MANAGER:	W&S Manager	DEPARTMENT:	Infrastructure Delivery Services W&S

Task Discussion Items (Ensure all applicable Items are Checked and Work Process Discussed)

Public Notification	Under Ground Services	Overhead services	Traffic Control
Ground Penetration	Heavy Machinery	Working Near or Over Water	Confined Space
Hydration	Heavy Lifting	PPE	Fall Hazards
Heat	Members of the Public	Rain	Work at Heights
Fire	Excavation/Trench	Live Sewer	Hazardous Substances
Ladders	Working with Cranes	Asbestos	Manual Handling
Pumps	Power Supply - Electrical	Switchboards	High Pressure Cleaning
Mowing	Whippersnipper/ Brushcutter	Dangerous Goods	Sharps/Needle Stick
Lifting Equipment	GAS	Poisoning	Vehicle Operations
TOOLS	SWMS-SWI-JSA-SLAMS	Snakes /Spiders / Insects	

DAILY WORKS - Crew allocations and Tasks for the Day

1. Daily Checks - Sewerage	2. Repair Broken Connections /Mains if required (Addresses)
- *Sewerage Treatment Plants (Ing & Luc)*	
- *Hinchinbrook Community Wetlands*	
3. Cleaning/Washing	4. Sewerage Pumping Station Faults if required (Addresses)
- *Ingham Sewerage Treatment Plant*	
- *Lucinda Sewerage Treatment Plant*	
5. Sampling and Testing of Sewerage/Water	1. Daily Checks – Water Treatment Plants
- *Daily Samples from around Sewerage T/Plant*	*a. Ingham Depot WTP* *d. Macknade WTP*
- *Daily Samples Wetlands*	*b. Como Rd Bores* *e. Forrest Bch WTP*
- *Daily Water Samples (cl2 & pH) & Hypo Levels*	*c. Halifax WTP* *f.*
Feedback Form - Day's Works	Issues Raised By Employees

Name	Signature	Name	Signature

EMERGENCY 000

INCHINBROOK SHIRE COUNCIL - Water and Sewerage Department **ONCALL**

ROUNDS CHECKLIST TREATMENT

Name:

	Date:	Date:

Start		
Finish		

INGHAM SEWERAGE PLANT		
Log on to Elpro Computer		
Check for Alarms/Reset/Fix		
Check for faults		
Record INLET Flow Meter Reading		
Compare Flows		
Record All Wetlands Pumps Hours/Flows		
Record Contact Tank Pump		
Record Auto DO Reading and pH		
Manual Chlorine Reading and pH Test		
Clean rag catcher		
Make Sure ALL Plant is Operating		
Check Main Switchboard Room		
Record All Pump Hours - Main Switchboard		
Check Site		

INGHAM DEPOT TREATMENT WORKS		
Record High Lift Pumps 1 & 2 Hours		
Record Recirculating Pump Hours		
Record Hypo Pump Hours		
Record Flow Meter Reading		
Compare Hours / Flows		
Check Switchboards for Faults		
Record Auto Chlorine Reading and pH		
Manual Chlorine Reading and pH Test		
Check Reservoir Level - Level sensor		
Check Water on Bladder - Drain if Necessary		
Check Hypo Tank Level		
Check Hypo Pump		
Check Sand Filter and Rake if Necessary		
Check Site		

COMO ROAD BORES		
Record Bore Pumps 5 & 6 Hours		
Record Flow Meter Reading		
Compare Hours / Flows		
Check Switchboards for Faults		
Check Site		

HALIFAX WATER TREATMENT PLANT (When Operational)		
Inspect Bore Pump No.4		
Record High Lift Pumps 1 & 2 Hours		
Record Low Lift Pump Hours		
Make Sure the Recirculating Pump is Running		
Is Recirculating Pump Running for the CL2?		
Record Flow Meter Reading		
Compare Hours / Flows		
Check Storage Tank level		
Record Auto Chlorine Reading and pH		
Manual Chlorine and ph Test		
Check Switchboards for Faults		
Check Hypo Tank Level		
Check Hypo Pump		
Check Sand Filter and Rake if Necessary		
Check Site		

COMMENTS:

LUCINDA SEWERAGE TREATMENT PLANT		
Record Sprinkler Pump Hours		
Record Blower Hours		
Record Sump Pump Hours		
Record Ocean Effluent Meter Flow		
Record Irrigation Effluent Meter Flow		
Compare Hours / Flows		
Wash Plant		
Check Switchboards for Faults		
Record Auto DO Reading and pH Outlet		
Manual Chlorine Test		
Check Hypo Tank Level		
Check Hypo Pump		
Check Site		

HINCHINBROOK COMMUNITY WETLANDS		
Record Inflow and OutFlow Meters and compare		
Record Auto DO Reading and pH Outlet		
Manual Do Reading and pH Test inlet		
Manual chlorine reading Outlet		
Check Site		

FORREST BEACH WATER TREATMENT PLANT		
Record Transfer Pump 1& 2 Hours		
Record Low Lift Pump Hours		
Record All Flow Meter Reading		
Record Recirculating Pump Hours		
Is Recirculating Pump Running?		
Compare Hours / Flows		
Record Auto Chlorine Reading and pH		
Manual Chlorine and ph Test		
Check Hypo Tank Level Tanks 1 and 2		
Check Hypo Pump		
Check Lime Hopper - Stir add lime if required		
Check Switchboards for Faults		
Check Sand Filter and Rake if Necessary		
Check Generator		
Check Site		

MACKNADE WATER TREATMENT PLANT		
Record High Lift Pumps 1 & 2 & 3 Hours		
Record Low Lift Pump Hours		
Record Pressure Pumps 1-2-3-4 Hours		
Record Filling Pump Hours		
Make Sure the Recirculating Pump is Running		
Is Recirculating Pump Running for the CL2?		
Record All Flow Meter Reading		
Compare Hours / Flows		
Check Generator		
Record Auto Chlorine Reading and pH		
Manual Chlorine and ph Test		
Check Hypo Tank Level		
Check Hypo Pump		
Check Clear Water Tank Levels		
Check Switchboards for Faults		
Check Sand Filter and Rake if Necessary		
Check Site		

CHECK HYPO on SUNDAY - FORM ON BACK

Signature

Daily Pre Start Meeting **WEEKENDS B** WEEK ENDING / /

WORK CREW LEADER:	Operations ONCALL Officer	WORK CREW:	1.
DATE:	___/___/___ to ___/___/___		2.
SUPERVISOR:	W&S Works Team Leader		3.
MANAGER:	W&S Manager	DEPARTMENT:	Infrastructure Delivery Services W&S

Task Discussion Items (Ensure all applicable Items are Checked and Work Process Discussed)

Public Notification	Under Ground Services	Overhead services	Traffic Control
Ground Penetration	Heavy Machinery	Working Near or Over Water	Confined Space
Hydration	Heavy Lifting	PPE	Fall Hazards
Heat	Members of the Public	Rain	Work at Heights
Fire	Excavation/Trench	Live Sewer	Hazardous Substances
Ladders	Working with Cranes	Asbestos	Manual Handling
Pumps	Power Supply - Electrical	Switchboards	High Pressure Cleaning
Mowing	Whippersnipper/ Brushcutter	Dangerous Goods	Sharps/Needle Stick
Lifting Equipment	GAS	Poisoning	Vehicle Operations
TOOLS	SWMS-SWI-JSA-SLAMS	Snakes /Spiders / Insects	

DAILY WORKS - Crew allocations and Tasks for the Day

1. Daily Checks – Sewerage Pumping Stations *SPS1 - SPS4 - SPS5 - SPS44* *SPS65 - SPS64 - SPS62*	2. Repair Broken Connections if required (Addresses)
3. Repair Broken Water Mains if required (Addresses)	4. Sewerage Pumping Station Faults if required (Addresses)
5. Sampling and Testing of Water - *Daily Water Samples (cl2 & pH) & Hypo Levels*	6. Daily Checks – Water Pumping Stations a. *Ingham HighLift WPS* d. *Washaway BPS* b. *Ingham LowLift WPS* e. *Halifax Depot BPS* c. *Forrest Bch HighLift WPS* f. *Lucinda BPS*
Feedback Form - Day's Works	Issues Raised By Employees

Name	Signature	Name	Signature

EMERGENCY 000

HINCHINBROOK SHIRE COUNCIL - Water and Sewerage Department **ONCALL**

ROUNDS CHECKLIST

Name:

	Date:	Date:

Start		
Finish		

INGHAM HIGH LIFT STATION		
Record High Lift Pumps 1 & 2 & 3 Hours		
Record Recirculating Pump Hours		
Record All Flow Meter Reading		
Record Generator Hours		
Check Switchboards for Faults		
Check and Record Trebonne Pressure Pumps		
Compare Hours / Flows		
Record Auto Chlorine Reading and pH		
Manual Test Chlorine and pH Reading		
Check Storage Tank Water Level - Level Sensor		
Check Hypo Tank Level		
Check Hypo Pump		
Check Site		

INGHAM LOW LIFT STATION		
Record Low Lift Pump 1 & 2 Hours		
Record Vacuum Pump 1& 2 Hours		
If Vacuum or Sump Pumps work for more than 0.5 Hrs call operators		
Record Sump Pump Hours		
Compare Hours		
Check Switchboards for Faults		
Check River Colour/Turbidity (if dirty call operators)		
Check River Height		
Check Dry well for Water		
Record Flow Meters for Bore Pumps		
Record Hour Meters for Bore Pumps		
Check Site		

FORREST BEACH HIGH LIFT STATION		
Record High Lift Pump 1& 2 Hours		
Record Recirculating Pump Hours		
Record All Water Meter Readings		
Check Storage Tank Water Level - Level Sensor		
Compare Hours / Flows		
Check Generator		
Check Switchboards for Faults		
Check Site		
Record Auto CL2 Reading and pH - Ingham Supply		
Manual Test CL2 and pH Reading Ingham Supply		
Record Auto CL2 Reading and pH - FBCH Outlet		
Manual Test CL2 and pH Reading FBCH Outlet		

WASHAWAY BOOSTER STATION		
Record Pressure Pumps 1-2-3-4 Hours		
Compare Hours		
Check Switchboards for Faults		
Check Storage Tank Level		
Check for Leaks		
Check Site		

COMMENTS:

Signature

HALIFAX DEPOT		
Record High Lift Pump 1& 2 Hours - Soft Starters		
Record Water Meter Reading		
Record Recirculating Pump Hours		
Compare Hours / Flows		
Record Auto Chlorine Reading and pH		
Manual Chlorine Reading and pH Test		
Check Reservoir Level - Level sensor		
Check Switchboards for Faults		
Check Water on Bladder -Drain if Necessary		
Check Hypo Tank Level		
Check Hypo Pump		
Check for Leaks		
Check Site		

LUCINDA BOOSTER PUMP STATION		
Record Pressure Pumps 1-2-3-4 Hours		
Record Water Meter Reading		
Record Recirculating Pump Hours		
Compare Hours / Flows		
Check Switchboards for Faults		
Check Storage Tank Water Level - Head Gauge		
Check Site		

SEWERAGE PUMP STATION 65 Caravan Park		
Record Pump Hours for pumps 1& 2		
Compare Hours		
Check Switchboards for Faults		

SEWERAGE PUMP STATION 64 Dungeness		
Record Pump Hours for pumps 1		
Compare Hours		
Check Switchboards for Faults		
Clean Probe if Neccesary		

SEWERAGE PUMP STATION 62 Vass St		
Record Pump Hours for pumps 1		
Compare Hours		
Check Switchboards for Faults		
Clean Probe if Neccesary		

SEWERAGE PUMP STATION 1		
Record Pump Hours for pumps 1& 2 & 3		
Compare Hours		
Check Switchboards for Faults		
Check Dry well for Water		
Check Site		

SEWERAGE PUMP STATION 4		
Record Pump Hours for pumps 1& 2 & 3		
Compare Hours		
Check Switchboards for Faults		
Check Dry well for Water		
Check Site		

SEWERAGE PUMP STATION 5		
Record Pump Hours for pumps 1& 2		
Compare Hours		
Check Switchboards for Faults		
Check Dry well for Water		
Check Site		

SEWERAGE PUMP STATION 44 MAIN STN TREBONNE		
Record Pump Hours for pumps 1& 2		
Compare Hours		
Check Switchboards for Faults		

CHECK HYPO on SUNDAY - FORM ON BACK		