Oxley Highway to Kempsey Upgrade Project

Operational water quality monitoring report year 3 – 30 March 2020 to 29 March 2021

Transport for NSW | November 2021

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Document control

File name	2021-11-10 - OWQ-3_OH2K_Rev4-0.docx
Report name	Oxley Highway to Kempsey upgrade Operational water quality monitoring report 3
Document version	Revision 4-0
Date	10 November 2021

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1 Introduction

1.1 The project

On behalf of the Australian and NSW governments, Transport for NSW (formerly Roads and Maritime Services) completed construction of the Oxley Highway to Kempsey Pacific Highway Upgrade (the project) in March 2018. The project is 37 kilometres in length, commencing about 700 metres north of the Oxley Highway interchange and continuing northwards to tie in with the dual carriageways of the Kempsey to Eungai Pacific Highway Upgrade. The project included the duplication of the existing highway, except for sections in the vicinity of the Hastings River and Wilsons River that deviate from the existing highway, and a bypass of Telegraph Point. The existing highway has been retained wherever possible for use as a service road or local road connection. Figure 1-1 shows the location of the project.

Transport for NSW has constructed and open the project in stages. The stages of the project are:

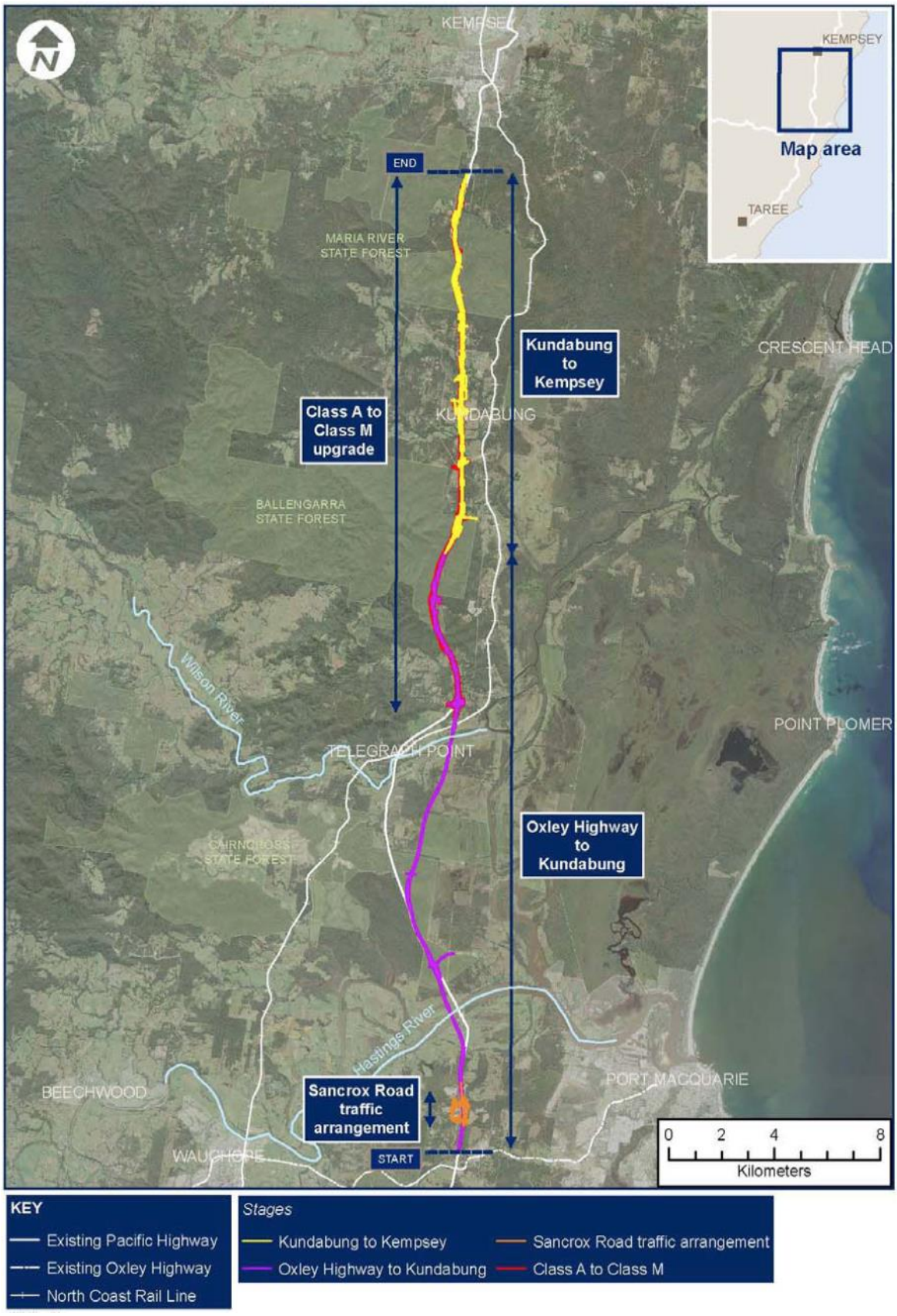
- Stage 1 - The Sancrox Traffic Arrangement works located about two kilometres north of the Oxley Highway / Pacific Highway intersection. This section of the project opened to traffic on 30 November 2015
- Stage 2 - Kundabung to Kempsey Stage consisting of about 14 kilometres of dual carriageway, commencing north of Barrys Creek near Kundabung (chainage 24,000) and connecting to the Kempsey Bypass at Stumpy Creek (Chainage 37,800). This stage of the project opened to traffic on 31 October 2017.
- Stage 3 - Oxley Highway to Kundabung Stage consisting of about 24 kilometres of dual carriageway, commencing just north of the Oxley Highway / Pacific Highway intersection (chainage 700) and connecting with the Kundabung to Kempsey stage just north of Barrys Creek (chainage 24,000). This stage of the project opened to traffic in two parts initially on 17 November 2017 and finally in its entirety on 29 March 2018.

1.2 Project approval

On 8 December 2006, the project was declared by the then Minister for Planning to be a project to which Part 3A of the *Environmental Planning and Assessment Act 1979* applies. An environmental assessment was prepared and placed on public exhibition for 30 days between September and October 2010. Following consideration of submissions made during the exhibition period, the submissions report, including changes to the proposal following consideration of submissions, was submitted to the Minister for Planning and Infrastructure seeking approval. Approval of the project was granted on 8 February 2012, subject to a number of Conditions of Approval (MCoA). At the request of Roads and Maritime, the Minister modified the approval on two further occasions.

Under MCoA B17, Transport for NSW must prepare and implement a Water Quality Monitoring Program (WQMP) to monitor the impacts of the project on surface and groundwater quality and resources and wetlands, during construction and operation. The WQMP was prepared in consultation with the EPA, DPI (Fishing and Aquaculture) and NOW, and was submitted to the Department of Planning and Infrastructure for approval on 11 February 2014. The plan was subsequently approved on 5 March 2014.

Figure 1-1 Location of Oxley Highway to Kempsey project



1.3 Purpose of this report

The WQMP developed in response to MCoA B17 outlines various pre-construction, construction and post-construction surface and groundwater quality monitoring and assessment requirements.

This report addresses the third and final year of operation for the period between **30 March 2020 and 29 March 2021** of surface and groundwater quality monitoring requirements outlined in Chapter 4 and Chapter 5 of the WQMP, which include, but are not limited to:

- Undertaking surface and groundwater quality sampling monthly and at other intervals throughout operation
- Collecting and analysing representative surface water samples for chemical, physical and nutrient properties during dry and wet-weather conditions
- Collecting and analysing representative groundwater samples for chemical, physical and nutrient properties, and major cations and anions at nominated intervals
- Comparing upstream and downstream surface water sampling results to evaluate and determine whether any changes and/or impacts on water quality might be attributable to construction or operation
- Evaluate trends in groundwater conditions through an analysis of measured results gathered during pre-construction and construction, and determine any changes and/or impacts that might be attributable to construction or operation
- Reviewing surface and ground water quality monitoring results to evaluate the potential for surface and groundwater interactions where a change in an established historical trend suggests an influence
- Providing results of sampling to relevant stakeholders including the DP&E, DPI (Fishing) and NOW (or their current equivalents)
- Accumulating further data to provide a basis for construction and post-construction monitoring result comparison.

2 Methodology

The approved method for surface and groundwater quality monitoring is outlined in detail in the WQMP. The following sections are a summary of key elements of that program.

2.1 Monitoring sites

The project traverses either through or near a number of water dependent ecosystems including major rivers, creeks, tributaries, coastal wetlands (formally SEPP 14 wetlands) and endangered ecological communities. Surface and groundwater quality monitoring sites were selected to ensure potential impacts on these systems from the project could be identified early and where necessary measures to remedy any impacts implemented.

2.1.1 Surface water monitoring sites

Table 2-1 lists the 27 surface water quality monitoring locations and the reason for site selection. Appendix A includes a series of maps that show the location of each monitoring site relative to the project alignment. The WQMP identified 30 locations for sampling of which SW4a, SW4b and SW5a are no longer subject to the program. These sites were removed from the regular sample regime as they rarely hold or carry water, generally only limited to the immediate effect of surface flows during a rain event. The remaining 27 site are considered sufficiently diverse in terms of location, condition, type and suitability for the protection of nearby sensitive water depended ecosystems / land uses.

Table 2-1 Surface water quality monitoring locations

Site no.	Chainage	Waterway name	Position relative to project	Reason for site selection
SW1a	2500	Unnamed tributary of Fernbank Creek	Upstream / West	Industrial land use upstream
SW1b	2600	Unnamed tributary of Fernbank Creek	Upstream / West	Industrial land use upstream
SW1c	2650	Unnamed tributary of Fernbank Creek	Downstream / East	Industrial land use upstream
SW2a	4620	Fernbank Creek	Downstream / East	EEC / ASS
SW2b	4800	Fernbank Creek	Upstream / West	EEC / ASS
SW3a	6040	Northern bank of Hastings River	Upstream / West	Major river with oyster leases downstream
SW3b	6080	Northern bank of Hastings River	Downstream / East	Major river with oyster leases downstream
SW5b	15820	Unnamed tributary of Wilson River	Downstream / West	EEC / ASS
SW6a	16460	South bank of Wilson River	Upstream / West	Major river / SEPP 14 / Floodplain / ASS

Site no.	Chainage	Waterway name	Position relative to project	Reason for site selection
SW6b	16600	South bank of Wilson River	Downstream / East	Major river / SEPP 14 / Floodplain / ASS
SW6c	16830	North bank of Wilson River	Upstream / West	Major river / SEPP 14 / Floodplain / ASS
SW6d	16840	North bank of Wilson River	Downstream / East	Major river / SEPP 14 / Floodplain / ASS
SW7a	19660	Cooperabung Creek	Upstream / West	EEC / Giant Barred Frog habitat
SW7b	19660	Cooperabung Creek	Downstream / East	EEC / Giant Barred Frog habitat
SW8a	23775	Barrys Creek	Upstream / West	EEC / Giant Barred Frog habitat
SW8b	24000	Barrys Creek	Downstream / East	EEC / Giant Barred Frog habitat
SW8c	25325	Barrys Creek	Downstream / East	EEC / Giant Barred Frog habitat
SW9a	28300	Smiths Creek	Downstream / East	EEC / Giant Barred Frog habitat
SW9b	28300	Smiths Creek	Upstream / West	EEC / Giant Barred Frog habitat
SW10a	30700	Pipers Creek	Downstream / East	EEC / Giant Barred Frog habitat
SW10b	30700	Pipers Creek	Upstream / West	EEC / Giant Barred Frog habitat
SW11a	34650	Unnamed drainage line	Downstream / East	Downhill of significant cut site / potential ASR
SW11b	34700	Unnamed drainage line	Upstream / West	Downhill of significant cut site / potential ASR
SW12a	36850	Maria River	Upstream / West	Major river / EEC / Giant Barred Frog habitat
SW12b	36850	Maria River	Downstream / East	Major river / EEC / Giant Barred Frog habitat
SW13a	37700	Stumpy Creek	Downstream / East	Major creek / EEC
SW13b	37750	Stumpy Creek	Upstream / West	Major creek / EEC

Surface water quality monitoring of a spring fed dam on private property (known as tipping dam) that had the potential to be affected during construction was also proposed in the WQMP. As noted in the pre-construction surface water quality monitoring report (June 2015) Roads and Maritime's construction partner for Stage 2 (K2K) and the property owner

reached an agreement to use the resource during construction. The dam was enlarged and water was used for construction purposes. The dam and surrounding land has since been restored in-line with the agreement established between the two parties.

2.1.2 Groundwater monitoring sites

Table 2-2 lists the 30 groundwater quality monitoring locations and the reason for site selection. Appendix A includes a series of maps that show the location of each monitoring site relative to the project alignment. A number of these monitoring sites were directly affected by construction (ie top of casing damaged by earthworks) during previous reporting periods. Further detail is provided in Section 3.7. Of the 13 damaged during previous reporting periods, 11 were reinstated in the lead up to monitoring in August 2016.

Table 2-2 Groundwater quality monitoring locations

Site no.	Chainage	Reason for site selection
GW01	3020	Category A Cut
GW02	5000	Floodplain / ASS / significant embankment
GW03	5500	Floodplain / ASS / significant embankment
GW04	6140	Floodplain / ASS / significant embankment
GW05	6350	Floodplain / ASS / significant embankment
GW06	7620	Category A Cut
GW07	8640	Category A Cut / significant earthworks for intersection / no existing groundwater information in this location
GW08	10360	Category A Cut / no existing groundwater information in this location
GW09	10440	Category A Cut
GW10	11460	Confirm Cut Category B / near EEC & GDE
GW11	13100	Floodplain / near existing groundwater users / near EEC & GDE
GW12	15830	Floodplain / ASS / near EEC & GDE
GW13	16400	Floodplain / ASS / near EEC & GDE / significant embankment
GW14	17080	SEPP 14 / floodplain / significant embankment / ASS / EEC / GDE
GW15	17920	Category A Cut / nearby existing groundwater users
GW16	18390	Category A Cut / near existing groundwater users / near ASS
GW17	20680	Category A Cut
GW18	21050	Category A Cut
GW19	22000	Confirm Cut Category B / near EEC
GW20	22620	Category A Cut
GW21	22620	Category A Cut (and will assist with modelling)
GW22	24800	Significant cut / acid sulfate rock expected in this location / capture impacts from the rest areas
GW23	24800	Significant cut / acid sulfate rock expected in this location / capture impacts from the rest areas
GW24	25900	Cluster of private bores to the east of the highway / next to a cut
GW25	33800	Category A Cut

Site no.	Chainage	Reason for site selection
GW26	34300	Category B Cut
GW27	35150	Category A Cut
GW28	35280	Category A Cut
GW29	35900	Category A Cut
GW30	37160	Category A Cut/ near existing groundwater user

2.2 Monitoring parameters

Surface water quality monitoring parameters have been selected with reference to:

- Roads and Maritime Guideline for Construction Water Quality Monitoring (RTA undated)
- The Australian guidelines for water quality monitoring and reporting (ANZECC Monitoring Guidelines) (ANZECC/ARMCANZ 2000b)
- The parameters included in earlier monitoring programs within the region (eg by the Port Macquarie Hastings Council and by the Kempsey Bypass Alliance).

For groundwater, the standard water quality parameters were selected from Appelo & Postma (1993), Driscoll (1989) and Sterrett (2007).

Table 2-3 lists the monitoring parameters that form the basis of the surface and groundwater water monitoring program and identifies whether measurement is taken in the field or by a NATA accredited laboratory off site.

Table 2-3 Water quality monitoring parameters

Parameter type	Surface (SW) or groundwater (GW)	Parameter	Unit of measurement	Analysis method
Chemical properties	SW and GW	pH	Scale 0 to 14	Field measurement
	SW	Dissolved oxygen (DO)	%	Field measurement
	SW and GW	Total petroleum hydrocarbons	ug/L	Field visual assessment / laboratory measurement
	SW and GW	Trace metals: Aluminum (Al) Arsenic (As) Cadmium (Cd) Chromium (Cr) Copper (Cu) Iron (Fe) Lead (Pb) Manganese (Mn) Mercury (Hg) Nickel (Ni) Silver (Ag) Zinc (Zn)	mg/L	Laboratory measurement

Physical properties	SW	Electrical conductivity (EC)	uS/cm	Field measurement
	GW	Electrical conductivity (EC)	uS/cm	Field measurement / laboratory analysis
	SW and GW	Temperature	^{0}C	Field measurement
	SW	Turbidity	NTU	Field measurement
	SW	Total suspended solids	mg/L	Laboratory measurement
Nutrients	SW and GW	Total nitrogen (TN)	mg/L	Laboratory measurement
	SW and GW	Total phosphorous (TP)	mg/L	Laboratory measurement
Nutrients	GW	Ammonia (NH_4) Phosphate (PO_4)	mg/L	Laboratory measurement
Major anions	GW	Bicarbonate (HCO-) Chloride (Cl-) Nitrate (NO3-) Sulfate ($SO4^{2-}$)	mg/L	Laboratory measurement
Major cations	GW	Calcium (Ca^{2+}) Magnesium (Mg^{2+}) Potassium (K+) Sodium (Na+)	mg/L	Laboratory measurement
Groundwater levels	GW	Groundwater levels	Metres below top of casing (mTOC)	Field measurement

2.3 Water quality analysis

2.3.1 Surface water

Section 2.2 noted that the analysis of water quality depending on the parameter subject to investigation is undertaken in one of two ways. Some physical and chemical properties due to their rapid degradation with time are analysed in the field. This analysis has been performed with the use of a Yeo-Kal Model 615 Water Quality Analyser on surface waters. The instrument is factory calibrated annually, with in-field calibration checked / undertaken at regular intervals, typically monthly and/or prior to each sampling event.

ALS NATA accredited Sydney laboratory operations undertake all off-site surface water quality analysis. Samples are collected on-site in ALS supplied sample bottles, refrigerated and transported to the ALS Warabrook depot for dispatch to Sydney. Chain of custody documentation is produced and updated during the collection, transport and analysis stages of the process.

2.3.2 Groundwater

Analysis of groundwater is undertaken both in the field and off-site by an accredited NATA laboratory as the parameter dictates (refer to Section 2.2). Automated data loggers (Hobo) are installed at 20 of the 25 accessible groundwater monitoring sites to recorded groundwater levels below ground at 60-minute intervals. Two barometric air pressure data

loggers have also been installed, enabling the correction of water levels across the monitoring site to local atmospheric conditions. In-field dip level monitoring is also undertaken on a two monthly basis.

In-field parameters are analysed using a DKK-TOA Model WQC-24 multi parameter water quality meter. The presence of hydrocarbons for both surface and groundwater are undertaken on a visual basis in the first instance. Where found to be present a sample is collected and sent for laboratory analysis.

ALS NATA accredited Sydney laboratory operations have performed off-site groundwater sample analysis during this reporting period. Chain of custody documentation is produced and updated during the collection, transport and analysis stages of the process.

2.4 Monitoring frequency and duration

2.4.1 Surface water

During operation surface water quality monitoring phase, sampling of all parameters except trace metals, are required for one dry event and as required one wet-weather event per month. Further monitoring of trace metals are required for one dry weather event and as required one wet weather event per quarter. A wet-weather event has been defined as 10 millimetres of rainfall within a 24-hour period. Sampling for a wet-weather event commences within 24 hours of the cessation of that event.

2.4.2 Groundwater

During operation groundwater quality monitoring phase, sampling of in-field parameters are required on a quarterly basis. Monitoring of anions, cations, ammonia and phosphate are to be monitored on an annual basis. All other laboratory analysed parameters shall be monitored on a quarterly basis for the first year of operation and then on a six monthly basis if no impact is detected. If an impact is detected (ie levels outside of trigger values that are inconsistent with historical trends), this monitoring would be reinstated to a quarterly basis.

2.5 Rainfall records

During this operational monitoring period rainfall records were obtained through three Bureau of Meteorology weather stations including:

- Kempsey Airport (Station number – 59007)
- Telegraph Point – Farrawells Road (Station number – 60031)
- Port Macquarie Airport (Station number – 60139).

Rainfall records for these stations are attached at Appendix B and include the period between April 2020 and March 2021.

Site based weather stations used during previous monitoring periods have been removed and were not available for this monitoring period.

3 Results

3.1 Prevailing climatic conditions

Rainfall during the reporting period 30 March 2020 to 29 March 2021 can be characterised as average or below average during the first two thirds of the period to well above average for December 2020 to March 2021 based rainfall records at the Port Macquarie Airport Bureau of Meteorology monitoring station. The broader region for the majority of the monitoring period was characterised by ongoing dry conditions. In contrast, the months of December 2020 through to March 2021 were well above historical averages. It is also noted that a significant wide spread flood event occurred between 18 and 24 March 2021. A summary of daily / monthly rainfall for the three Bureau of Meteorology weather stations within the Port Macquarie / Kempsey area referred to in Section 2.5 are provided at Appendix B.

3.2 Summary of activities

Work during the reporting period was limited and took place only in select locations with efforts focused on defect rectification or damaged infrastructure eg concrete pavement repairs, barrier and fencing repairs, and landscape maintenance eg weed spraying, mowing/slashing.

3.3 Limitations of surface water results

A number of factors have influenced either the continuity or completeness of water quality results obtained during the monitoring period and the extent in some circumstances to which they are suitable for upstream and downstream comparison. Relevant considerations include:

- Waterway conditions at times were such that where sampling was undertaken following wet weather events (ie an event greater than 10 millimetres in 24 hours), particularly where only a marginal event occurred, no visible response within some waterways was observed ie no subsequent flow and/or connection between upstream and downstream sampling locations.
- Some freshwater streams were observed to be isolated ponds at different times during sampling owing to the prevailing dry conditions during April 2020 to November 2020. Waterways affected included SW1, SW5, SW8, SW11 and SW12. On all occasions this was in response to naturally low flows and the prevailing dry conditions.
- Access to SW1b has not available due to a private property industrial development from 15 May 2017 onward.
- SW5b had insufficient water or was dry on five occasions.
- SW8a was dry on 16 occasions during the monitoring period. All sampling points were connected on six occasion only. On this basis, comparison between 80th and 20th percentiles at SW8a and downstream locations (ie SW8b, SW8c) do not adequately represent any potential impacts associated with the project.
- While construction on Stage 3 technically commenced during November 2014, samples collected up until January 2015 at SW5b have been used to supplement pre-construction data. Rainfall during the pre-construction period was sporadic and below average leading to a prolonged period where samples were unable to be collected for SW5b (ie water absent from sample location). As work with the ability to affected water quality at SW5b

were not in progress until late January 2015, data collected up until this time has been used for pre-construction / construction comparison purposes. Notwithstanding this, only eight samples analysed for metals were taken during the extended pre-construction period. Other parameters were measured on up to 18 occasions.

Notwithstanding, all monitoring events able to be completed during the period were at a frequency and for the requisite parameters in accordance with the approved WQMP.

3.4 Summary of surface water results

Table 3-1 to Table 3-54 represent an aggregate summary of water quality results by waterway for upstream and downstream sampling locations. In accordance with the WQMP, 80th and 20th percentile values for upstream sample locations from the previous 24 sampling rolling events form the trigger values for current monthly median downstream results. This approach seeks to accommodate long-term upstream catchment changes that may influence water quality without unduly attributing those changes to the project. Appendix C includes all monitoring results for this third operational period. Full laboratory reports for all sampling events are available on request.

Table 3-1 Operation surface water quality results by waterway

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020					May 2020					
				SW1a derived trigger values*			SW1b	SW1c	SW1a derived trigger values*			SW1b	SW1c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	3.2	20.4	14.0	DNS	19.1	3.2	20.4	14.0	DNS	16.0
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	782.8	1943.0	377.4	DNS	797.5	793.4	1943.0	377.4	DNS	1102.0
Dissolved oxygen (DO)	%	0-200	85-110	25.0	57.3	10.4	DNS	63.5	24.7	57.3	10.5	DNS	63.9
pH		0-14	6.5-8	0.5	6.7	6.0	DNS	6.2	0.4	6.6	6.0	DNS	6.7
Turbidity	NTU	0-600	6-50	238.3	172.8	22.5	DNS	119.6	238.0	172.8	23.8	DNS	15.0
Total suspended solids (TSS)	mg/L	5	-	58.5	37.4	7.2	DNS	41.0	58.8	32.2	7.2	DNS	7.5
Aluminium (Al)	mg/L	0.01	0.055”	0.15	0.17	0.02	DNS	DNS	0.15	0.17	0.02	DNS	0.01
Arsenic (As)	mg/L	0.001	0.024	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	DNS	0.0002	0.0001	0.0001	DNS	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Iron (Fe)	mg/L	0.05	ID	5.92	2.71	0.17	DNS	DNS	6.28	2.71	0.17	DNS	0.20
Lead (Pb)	mg/L	0.001	0.0034	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.272	0.592	0.088	DNS	DNS	0.284	0.570	0.088	DNS	0.199
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	DNS	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.002	0.001	DNS	DNS	0.002	0.002	0.001	DNS	0.001
Silver (Ag)	mg/L	0.001		0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.016	0.019	0.006	DNS	DNS	0.016	0.019	0.005	DNS	0.007
Total Nitrogen (TN)	mg/L	0.1	0.5	0.4	0.9	0.2	DNS	0.5	0.4	0.9	0.3	DNS	0.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.04	0.07	0.01	DNS	0.13	0.04	0.07	0.01	DNS	0.09

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (either not required by sampling program in accordance with WQMP or in the case of SW1b not accessible during the monitoring period).

Table 3-2 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	June 2020					July 2020					
				SW1a derived trigger values*			SW1b	SW1c	SW1a derived trigger values*			SW1b	SW1c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	3.2	20.4	13.7	DNS	14.7	3.3	20.4	13.5	DNS	12.7
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	800.7	1943.0	331.0	DNS	865.5	741.6	1757.4	331.0	DNS	1233.0
Dissolved oxygen (DO)	%	0-200	85-110	26.0	62.3	9.6	DNS	66.1	24.6	57.3	9.5	DNS	70.5
pH		0-14	6.5-8	0.5	6.7	6.0	DNS	6.8	0.5	6.7	6.0	DNS	7.0
Turbidity	NTU	0-600	6-50	237.8	172.8	21.6	DNS	29.5	239.2	143.9	17.1	DNS	14.6
Total suspended solids (TSS)	mg/L	5	-	59.3	29.8	6.0	DNS	9.5	57.6	19.8	6.0	DNS	6.5
Aluminium (Al)	mg/L	0.01	0.055”	0.15	0.17	0.02	DNS	DNS	0.15	0.17	0.02	DNS	DNS
Arsenic (As)	mg/L	0.001	0.024	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	DNS	0.0002	0.0001	0.0001	DNS	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Iron (Fe)	mg/L	0.05	ID	6.28	2.71	0.17	DNS	DNS	6.28	2.71	0.17	DNS	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.284	0.570	0.088	DNS	DNS	0.284	0.570	0.088	DNS	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	DNS	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.002	0.001	DNS	DNS	0.002	0.002	0.001	DNS	DNS
Silver (Ag)	mg/L	0.001		0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.016	0.019	0.005	DNS	DNS	0.016	0.019	0.005	DNS	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.4	0.9	0.3	DNS	0.5	0.3	0.9	0.3	DNS	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.05	0.01	DNS	0.04	0.03	0.04	0.01	DNS	0.04

* Trigger values derived from 24 sampling events up to and including the month indicated.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (either not required by sampling program in accordance with WQMP or in the case of SW1b not accessible during the monitoring period).

Table 3-3 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	August 2020					September 2020					
				SW1a derived trigger values*			SW1b	SW1c	SW1a derived trigger values*			SW1b	SW1c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	3.5	20.4	12.8	DNS	12.5	3.3	20.4	14.4	DNS	16.0
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	739.5	1757.4	331.0	DNS	1218.5	698.5	1332.6	268.0	DNS	733.5
Dissolved oxygen (DO)	%	0-200	85-110	24.4	51.5	9.5	DNS	82.3	25.2	56.0	9.3	DNS	54.2
pH		0-14	6.5-8	0.5	6.7	6.0	DNS	6.6	0.5	6.7	6.0	DNS	7.2
Turbidity	NTU	0-600	6-50	239.5	143.9	17.3	DNS	9.3	238.6	143.9	15.2	DNS	55.6
Total suspended solids (TSS)	mg/L	5	-	57.7	19.8	5.6	DNS	9.0	57.7	18.6	6.0	DNS	11.0
Aluminium (Al)	mg/L	0.01	0.055”	0.15	0.17	0.02	DNS	DNS	0.15	0.14	0.02	DNS	0.02
Arsenic (As)	mg/L	0.001	0.024	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	DNS	0.0002	0.0001	0.0001	DNS	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Iron (Fe)	mg/L	0.05	ID	6.28	2.71	0.17	DNS	DNS	6.85	3.91	0.17	DNS	0.16
Lead (Pb)	mg/L	0.001	0.0034	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.284	0.570	0.088	DNS	DNS	0.313	0.614	0.079	DNS	0.345
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	DNS	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.002	0.001	DNS	DNS	0.002	0.002	0.001	DNS	0.001
Silver (Ag)	mg/L	0.001		0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.016	0.019	0.005	DNS	DNS	0.017	0.019	0.005	DNS	0.008
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.9	0.3	DNS	0.1	0.3	0.9	0.3	DNS	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.04	0.01	DNS	0.04	0.03	0.04	0.01	DNS	0.07

* Trigger values derived from 24 sampling events up to and including the month indicated.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (either not required by sampling program in accordance with WQMP or in the case of SW1b not accessible during the monitoring period).

Table 3-4 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020					November 2020					
				SW1a derived trigger values*			SW1b	SW1c	SW1a derived trigger values*			SW1b	SW1c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	3.2	20.4	14.4	DNS	17.7	3.2	20.4	14.4	DNS	18.0
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	690.9	1332.6	268.0	DNS	1000.0	677.6	1149.8	268.0	DNS	997.0
Dissolved oxygen (DO)	%	0-200	85-110	21.9	43.9	8.7	DNS	47.0	22.3	43.9	8.5	DNS	45.6
pH		0-14	6.5-8	0.4	6.7	6.1	DNS	7.3	0.4	6.7	6.1	DNS	6.9
Turbidity	NTU	0-600	6-50	200.6	112.5	15.2	DNS	17.0	200.8	112.5	15.2	DNS	18.2
Total suspended solids (TSS)	mg/L	5	-	51.4	18.6	5.6	DNS	7.5	51.4	21.4	5.6	DNS	6.0
Aluminium (Al)	mg/L	0.01	0.055”	0.15	0.14	0.02	DNS	DNS	0.15	0.14	0.02	DNS	DNS
Arsenic (As)	mg/L	0.001	0.024	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	DNS	0.0002	0.0001	0.0001	DNS	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Iron (Fe)	mg/L	0.05	ID	6.85	3.91	0.17	DNS	DNS	6.85	3.91	0.17	DNS	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.313	0.614	0.079	DNS	DNS	0.313	0.614	0.079	DNS	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	DNS	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.002	0.001	DNS	DNS	0.002	0.002	0.001	DNS	DNS
Silver (Ag)	mg/L	0.001		0.002	0.001	0.001	DNS	DNS	0.002	0.001	0.001	DNS	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.017	0.019	0.005	DNS	DNS	0.017	0.019	0.005	DNS	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.9	0.3	DNS	0.4	0.3	0.9	0.3	DNS	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.03	0.01	DNS	0.05	0.03	0.03	0.01	DNS	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (either not required by sampling program in accordance with WQMP or in the case of SW1b not accessible during the monitoring period).

Table 3-5 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	December 2020					January 2021					
				SW1a derived trigger values*			SW1b	SW1c	SW1a derived trigger values*			SW1b	SW1c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	3.4	20.8	14.4	DNS	21.7	3.5	21.2	14.4	DNS	21.7
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	516.6	760.2	245.0	DNS	587.5	419.1	683.6	209.2	DNS	319.5
Dissolved oxygen (DO)	%	0-200	85-110	22.0	43.9	8.6	DNS	55.0	25.0	51.5	8.4	DNS	65.2
pH		0-14	6.5-8	0.4	6.8	6.2	DNS	6.9	0.4	6.8	6.2	DNS	6.9
Turbidity	NTU	0-600	6-50	164.3	71.3	15.2	DNS	22.6	163.0	62.1	14.4	DNS	41.9
Total suspended solids (TSS)	mg/L	5	-	51.7	19.0	5.0	DNS	5.5	49.9	15.8	5.0	DNS	4.5
Aluminium (Al)	mg/L	0.01	0.055”	0.17	0.21	0.02	DNS	0.12	0.17	0.21	0.02	DNS	DNS
Arsenic (As)	mg/L	0.001	0.024	0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	0.0001	0.0002	0.0001	0.0001	DNS	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Iron (Fe)	mg/L	0.05	ID	6.64	2.71	0.16	DNS	0.48	6.64	2.71	0.16	DNS	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.316	0.570	0.035	DNS	0.156	0.316	0.570	0.035	DNS	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0001	0.0000	0.0001	0.0001	DNS	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.002	0.001	DNS	0.001	0.002	0.002	0.001	DNS	DNS
Silver (Ag)	mg/L	0.001		0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.016	0.019	0.006	DNS	0.018	0.016	0.019	0.006	DNS	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.9	0.3	DNS	0.3	0.3	0.9	0.3	DNS	0.7
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.03	0.01	DNS	0.02	0.02	0.03	0.01	DNS	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (either not required by sampling program in accordance with WQMP or in the case of SW1b not accessible during the monitoring period).

Table 3-6 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	February 2021					March 2021					
				SW1a derived trigger values*			SW1b	SW1c	SW1a derived trigger values*			SW1b	SW1c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	3.5	21.3	14.4	DNS	23.0	3.5	21.1	14.4	DNS	21.7
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	241.1	637.8	245.0	DNS	994.5	245.6	637.8	206.4	DNS	707.0
Dissolved oxygen (DO)	%	0-200	85-110	24.6	43.9	7.1	DNS	56.8	24.6	43.9	7.8	DNS	56.9
pH		0-14	6.5-8	0.4	6.9	6.2	DNS	7.1	0.4	6.9	6.2	DNS	7.0
Turbidity	NTU	0-600	6-50	163.4	62.1	14.1	DNS	6.4	162.8	62.1	15.2	DNS	10.9
Total suspended solids (TSS)	mg/L	5	-	49.9	13.2	5.6	DNS	5.0	49.8	15.4	5.0	DNS	6.0
Aluminium (Al)	mg/L	0.01	0.055”	0.14	0.13	0.02	DNS	0.01	0.14	0.13	0.02	DNS	DNS
Arsenic (As)	mg/L	0.001	0.024	0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	0.0001	0.0002	0.0001	0.0001	DNS	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Iron (Fe)	mg/L	0.05	ID	6.79	2.71	0.16	DNS	0.25	6.79	2.71	0.16	DNS	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.356	0.697	0.058	DNS	0.208	0.356	0.697	0.058	DNS	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0001	0.0000	0.0001	0.0001	DNS	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.002	0.001	DNS	0.001	0.002	0.002	0.001	DNS	DNS
Silver (Ag)	mg/L	0.001		0.002	0.001	0.001	DNS	0.001	0.002	0.001	0.001	DNS	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.017	0.019	0.005	DNS	0.006	0.017	0.019	0.005	DNS	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.8	0.3	DNS	0.3	0.3	0.7	0.3	DNS	0.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.03	0.01	DNS	0.03	0.02	0.03	0.01	DNS	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (either not required by sampling program in accordance with WQMP or in the case of SW1b not accessible during the monitoring period).

Table 3-7 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW2b*			SW2a	SW2b*			SW2a	SW2b*			SW2a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	4.9	22.6	15.7	18.5	4.8	22.4	15.2	15.2	4.5	21.9	13.9	13.9
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	243.9	946.6	432.8	509.5	231.9	946.6	470.2	580.5	223.1	965.8	505.6	521.5
Dissolved oxygen (DO)	%	0-200	85-110	17.6	39.8	13.8	17.2	21.2	51.6	15.2	30.3	27.8	57.4	18.1	43.1
pH		0-14	6.5-8	0.6	7.0	6.4	5.9	0.6	6.9	6.4	6.3	0.6	6.9	6.4	5.7
Turbidity (NTU)	NTU	0-600	6-50	19.8	38.6	16.4	102.1	21.1	43.3	16.4	84.8	20.7	43.3	17.5	23.9
Total suspended solids (TSS)	mg/L	5	-	4.7	14.0	6.0	6.0	4.5	14.0	6.6	9.0	4.3	14.0	7.0	14.0
Aluminium (Al)	mg/L	0.01	0.055”	0.63	0.09	0.01	DNS	0.63	0.03	0.01	0.07	0.63	0.03	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.003	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.52	0.87	0.45	DNS	0.92	0.90	0.45	4.64	0.92	0.90	0.45	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.547	1.132	0.167	DNS	0.500	0.842	0.155	0.460	0.500	0.842	0.155	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.005	0.003	0.001	DNS	0.004	0.003	0.001	0.005	0.004	0.003	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.036	0.009	0.005	DNS	0.036	0.007	0.005	0.011	0.036	0.007	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.6	1.5	0.7	2.0	0.6	1.6	0.8	2.1	0.6	1.7	0.8	1.7
Total Phosphorous (TP)	mg/L	0.01	0.05	0.06	0.15	0.04	0.13	0.06	0.15	0.05	0.07	0.06	0.15	0.05	0.10

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-8 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW2b*			SW2a	SW2b*			SW2a	SW2b*			SW2a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	4.6	21.7	12.6	11.7	4.5	21.7	12.3	11.8	4.1	21.7	12.6	16.1
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	204.3	965.8	546.2	558.5	184.8	965.8	648.6	455.5	170.2	965.8	654.0	610.5
Dissolved oxygen (DO)	%	0-200	85-110	27.9	66.7	19.2	58.4	29.8	72.1	19.2	55.2	29.8	72.1	18.5	37.5
pH		0-14	6.5-8	0.7	6.9	6.4	5.6	0.9	6.9	6.1	4.7	1.1	6.9	4.7	4.8
Turbidity (NTU)	NTU	0-600	6-50	20.6	43.3	18.2	17.0	20.2	43.3	18.2	10.1	19.7	43.3	19.6	25.1
Total suspended solids (TSS)	mg/L	5	-	4.6	14.0	6.6	7.5	4.5	14.0	6.6	8.5	5.2	14.4	8.6	18.0
Aluminium (Al)	mg/L	0.01	0.055”	0.63	0.03	0.01	DNS	0.63	0.03	0.01	DNS	0.63	0.06	0.01	0.11
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.92	0.90	0.45	DNS	0.92	0.90	0.45	DNS	1.13	1.52	0.47	2.66
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.500	0.842	0.155	DNS	0.500	0.842	0.155	DNS	0.524	1.072	0.155	0.627
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.004	0.003	0.001	DNS	0.004	0.003	0.001	DNS	0.004	0.003	0.001	0.006
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.036	0.007	0.005	DNS	0.036	0.007	0.005	DNS	0.036	0.007	0.005	0.016
Total Nitrogen (TN)	mg/L	0.1	0.5	0.6	1.7	0.9	1.7	0.6	1.7	0.7	0.5	0.6	1.7	0.7	0.7
Total Phosphorous (TP)	mg/L	0.01	0.05	0.06	0.15	0.04	0.03	0.06	0.15	0.04	0.04	0.06	0.15	0.04	0.06

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Note -SW2a was dry for all monitoring events in January 2017.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-9 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW2b*			SW2a	SW2b*			SW2a	SW2b*			SW2a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.7	21.7	14.3	18.3	3.7	21.7	14.3	21.0	3.9	22.1	14.3	23.2
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	174.4	965.8	654.0	941.0	193.0	965.8	654.0	1131.0	257.4	993.8	648.6	850.0
Dissolved oxygen (DO)	%	0-200	85-110	31.4	72.1	14.6	8.3	30.8	72.1	16.7	36.5	30.7	73.4	18.5	71.7
pH		0-14	6.5-8	1.2	6.8	4.5	4.1	1.3	6.8	4.3	3.4	1.3	6.8	4.0	5.0
Turbidity (NTU)	NTU	0-600	6-50	26.4	51.4	19.6	65.9	29.0	56.5	19.6	67.0	29.8	56.5	18.5	10.2
Total suspended solids (TSS)	mg/L	5	-	8.6	16.2	9.0	24.5	8.9	18.4	9.0	25.0	9.2	18.4	7.6	6.0
Aluminium (Al)	mg/L	0.01	0.055”	0.63	0.06	0.01	DNS	0.63	0.06	0.01	DNS	2.14	0.10	0.01	4.60
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0002	0.0001	0.0001	0.0005
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.001	0.001	0.001	0.002
Iron (Fe)	mg/L	0.05	ID	1.13	1.52	0.47	DNS	1.13	1.52	0.47	DNS	1.23	2.03	0.50	2.21
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.524	1.072	0.155	DNS	0.524	1.072	0.155	DNS	0.912	1.072	0.155	2.485
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.004	0.003	0.001	DNS	0.004	0.003	0.001	DNS	0.022	0.005	0.001	0.058
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.036	0.007	0.005	DNS	0.036	0.007	0.005	DNS	0.095	0.012	0.005	0.257
Total Nitrogen (TN)	mg/L	0.1	0.5	0.7	1.8	0.8	2.1	0.7	1.8	0.8	2.8	1.0	2.0	0.8	2.9
Total Phosphorous (TP)	mg/L	0.01	0.05	0.06	0.15	0.04	0.05	0.06	0.14	0.04	0.08	0.06	0.13	0.04	0.08

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Note -SW2a was dry for all monitoring events in January 2017.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC).

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-10 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW2b*			SW2a	SW2b*			SW2a	SW2b*			SW2a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	4.1	22.1	14.3	22.7	4.1	22.3	14.3	21.9	4.0	21.8	14.3	21.4
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	274.6	993.8	530.2	344.5	288.6	958.4	474.6	353.5	303.9	958.4	454.8	333.5
Dissolved oxygen (DO)	%	0-200	85-110	29.8	73.4	21.0	27.5	29.1	73.4	22.4	40.3	29.3	72.1	21.0	21.7
pH		0-14	6.5-8	1.3	6.8	4.0	6.9	1.3	6.9	4.2	7.4	1.4	7.0	4.2	7.2
Turbidity (NTU)	NTU	0-600	6-50	32.0	65.4	19.6	49.5	36.7	100.2	19.6	64.3	36.7	100.2	19.6	52.1
Total suspended solids (TSS)	mg/L	5	-	9.5	22.0	8.2	18.0	9.9	25.4	8.2	12.5	10.2	26.0	8.2	20.0
Aluminium (Al)	mg/L	0.01	0.055”	2.14	0.10	0.01	DNS	2.14	0.10	0.01	0.04	2.14	0.10	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.001	0.001	0.001	DNS	0.002	0.001	0.001	0.001	0.002	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	1.23	2.03	0.50	DNS	1.31	2.59	0.57	2.42	1.31	2.59	0.57	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.912	1.072	0.155	DNS	0.904	1.072	0.167	0.197	0.904	1.072	0.167	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.022	0.005	0.001	DNS	0.022	0.005	0.001	0.001	0.022	0.005	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.095	0.012	0.005	DNS	0.095	0.012	0.005	0.007	0.095	0.012	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	1.0	2.0	0.8	1.6	1.0	2.4	0.8	1.4	1.1	2.2	0.7	1.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.08	0.15	0.04	0.19	0.09	0.17	0.04	0.11	0.09	0.16	0.04	0.12

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Note -SW2a was dry for all monitoring events in January 2017.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-11 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW3a*			SW3b	SW3a*			SW3b	SW3a*			SW3b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.2	23.4	17.1	21.4	3.2	23.1	17.0	18.0	3.3	23.1	16.4	16.6
Electrical conductivity (EC)	uS/cm	0-8000	-	2150.3	8000.0	8000.0	8000.0	2150.3	8000.0	8000.0	8000.0	2150.3	8000.0	8000.0	8000.0
Dissolved oxygen (DO)	%	0-200	80-110	5.5	93.3	83.2	85.3	5.2	93.4	83.3	89.7	4.9	93.4	84.9	91.3
pH		0-14	7.0-8.5	0.5	7.8	7.1	7.1	0.4	7.7	7.1	7.4	0.4	7.7	7.1	7.4
Turbidity (NTU)	NTU	0-600	0.5-10	12.4	9.8	2.8	14.3	12.4	9.2	2.8	5.2	12.3	9.2	2.8	7.3
Total suspended solids (TSS)	mg/L	5		13.2	14.0	5.0	9.5	13.2	14.4	5.0	6.5	15.7	14.4	5.0	5.0
Aluminium (Al)	mg/L	0.01	ID	0.04	0.10	0.08	DNS	0.04	0.10	0.08	0.07	0.04	0.10	0.08	DNS
Arsenic (As)	mg/L	0.001	ID	0.004	0.010	0.002	DNS	0.004	0.010	0.002	0.006	0.004	0.010	0.002	DNS
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0004	0.0010	0.0001	DNS	0.0004	0.0010	0.0001	0.0006	0.0004	0.0010	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.0274	0.004	0.010	0.002	DNS	0.004	0.010	0.002	0.006	0.004	0.010	0.002	DNS
Copper (Cu)	mg/L	0.001	0.0013	0.004	0.010	0.002	DNS	0.004	0.010	0.002	0.006	0.004	0.010	0.002	DNS
Iron (Fe)	mg/L	0.05	ID	0.04	0.10	0.10	DNS	0.04	0.10	0.10	0.19	0.04	0.10	0.10	DNS
Lead (Pb)	mg/L	0.001	0.0044	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.006	0.004	0.010	0.001	DNS
Manganese (Mn)	mg/L	0.001	ID	0.007	0.015	0.010	DNS	0.011	0.022	0.010	0.065	0.011	0.022	0.010	DNS
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.07	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.006	0.004	0.010	0.001	DNS
Silver (Ag)	mg/L	0.001	0.0014	0.004	0.010	0.003	DNS	0.004	0.010	0.003	0.006	0.004	0.010	0.003	DNS
Zinc (Zn)	mg/L	0.005	0.015	0.018	0.050	0.012	DNS	0.018	0.050	0.012	0.028	0.018	0.050	0.012	DNS
Total Nitrogen (TN)	mg/L	0.1	0.3	0.5	1.0	0.5	0.5	0.5	1.0	0.5	0.5	0.5	1.0	0.5	0.8
Total Phosphorous (TP)	mg/L	0.01	0.03	0.07	0.10	0.05	0.05	0.07	0.10	0.05	0.05	0.03	0.10	0.05	0.06

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-12 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW3a*			SW3b	SW3a*			SW3b	SW3a*			SW3b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.3	23.1	16.4	15.2	3.2	23.1	16.3	16.1	3.1	23.1	16.6	20.1
Electrical conductivity (EC)	uS/cm	0-8000	-	2150.3	8000.0	8000.0	8000.0	2150.3	8000.0	8000.0	8000.0	2150.3	8000.0	8000.0	8000.0
Dissolved oxygen (DO)	%	0-200	80-110	4.9	94.3	84.9	93.6	4.9	93.4	84.9	90.1	4.2	92.6	84.9	87.0
pH		0-14	7.0-8.5	0.4	7.7	7.1	7.8	0.5	7.7	7.0	7.4	0.4	7.6	7.0	7.6
Turbidity (NTU)	NTU	0-600	0.5-10	12.4	10.7	2.9	21.1	12.4	10.7	3.0	5.5	15.3	15.2	3.8	6.8
Total suspended solids (TSS)	mg/L	5		15.7	14.4	5.0	9.0	15.8	14.4	5.0	5.5	15.6	14.4	5.0	9.5
Aluminium (Al)	mg/L	0.01	ID	0.04	0.10	0.08	DNS	0.04	0.10	0.08	DNS	0.04	0.10	0.01	0.01
Arsenic (As)	mg/L	0.001	ID	0.004	0.010	0.002	DNS	0.004	0.010	0.002	DNS	0.004	0.010	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0004	0.0010	0.0001	DNS	0.0004	0.0010	0.0001	DNS	0.0004	0.0010	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.004	0.010	0.002	DNS	0.004	0.010	0.002	DNS	0.004	0.010	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.004	0.010	0.002	DNS	0.004	0.010	0.002	DNS	0.004	0.010	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.04	0.10	0.10	DNS	0.04	0.10	0.10	DNS	0.04	0.10	0.05	0.05
Lead (Pb)	mg/L	0.001	0.0044	0.004	0.010	0.001	DNS	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.011	0.022	0.010	DNS	0.011	0.022	0.010	DNS	0.014	0.031	0.010	0.050
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.004	0.010	0.001	DNS	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.001
Silver (Ag)	mg/L	0.001	0.0014	0.004	0.010	0.003	DNS	0.004	0.010	0.003	DNS	0.004	0.010	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.018	0.050	0.012	DNS	0.018	0.050	0.012	DNS	0.020	0.050	0.006	0.005
Total Nitrogen (TN)	mg/L	0.1	0.3	0.5	1.0	0.5	0.8	0.5	1.0	0.5	0.5	0.5	1.0	0.5	0.5
Total Phosphorous (TP)	mg/L	0.01	0.03	0.03	0.10	0.05	0.08	0.03	0.10	0.05	0.05	0.03	0.10	0.05	0.05

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-13 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW3a*			SW3b	SW3a*			SW3b	SW3a*			SW3b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.2	23.1	16.6	22.3	3.2	23.6	16.6	23.6	3.2	23.2	16.6	23.4
Electrical conductivity (EC)	uS/cm	0-8000	-	2150.3	8000.0	8000.0	8000.0	2150.3	8000.0	8000.0	8000.0	2488.8	8000.0	8000.0	4466.5
Dissolved oxygen (DO)	%	0-200	80-110	4.4	91.8	83.3	80.8	4.4	91.8	83.3	88.9	5.0	91.7	83.2	78.3
pH		0-14	7.0-8.5	0.4	7.6	7.0	8.1	0.4	7.5	7.0	7.6	0.4	7.5	7.0	7.4
Turbidity (NTU)	NTU	0-600	0.5-10	15.1	15.2	5.1	8.8	15.0	15.2	5.5	8.3	15.6	20.2	5.8	21.1
Total suspended solids (TSS)	mg/L	5		11.6	12.8	5.0	5.0	11.6	12.8	5.0	10.0	11.6	11.6	5.0	6.5
Aluminium (Al)	mg/L	0.01	ID	0.04	0.10	0.01	DNS	0.04	0.10	0.01	DNS	0.05	0.10	0.01	0.16
Arsenic (As)	mg/L	0.001	ID	0.004	0.010	0.001	DNS	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.006
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0004	0.0010	0.0001	DNS	0.0004	0.0010	0.0001	DNS	0.0004	0.0010	0.0001	0.0006
Chromium (Cr)	mg/L	0.001	0.0274	0.004	0.010	0.001	DNS	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.006
Copper (Cu)	mg/L	0.001	0.0013	0.004	0.010	0.001	DNS	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.006
Iron (Fe)	mg/L	0.05	ID	0.04	0.10	0.05	DNS	0.04	0.10	0.05	DNS	0.18	0.10	0.05	0.67
Lead (Pb)	mg/L	0.001	0.0044	0.004	0.010	0.001	DNS	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.006
Manganese (Mn)	mg/L	0.001	ID	0.014	0.031	0.010	DNS	0.014	0.031	0.010	DNS	0.019	0.033	0.010	0.054
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.004	0.010	0.001	DNS	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.006
Silver (Ag)	mg/L	0.001	0.0014	0.004	0.010	0.001	DNS	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.006
Zinc (Zn)	mg/L	0.005	0.015	0.020	0.050	0.006	DNS	0.020	0.050	0.006	DNS	0.021	0.050	0.006	0.029
Total Nitrogen (TN)	mg/L	0.1	0.3	0.5	1.0	0.5	0.8	0.5	1.0	0.5	0.5	0.5	1.0	0.5	1.4
Total Phosphorous (TP)	mg/L	0.01	0.03	0.03	0.10	0.05	0.08	0.03	0.10	0.05	0.05	0.03	0.10	0.05	0.11

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-14 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW3a*			SW3b	SW3a*			SW3b	SW3a*			SW3b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.1	23.0	16.6	23.5	3.2	23.4	16.6	25.2	3.2	23.4	16.6	25.2
Electrical conductivity (EC)	uS/cm	0-8000	-	2768.5	8000.0	6092.4	4257.0	2441.2	8000.0	8000.0	8000.0	2441.2	8000.0	8000.0	8000.0
Dissolved oxygen (DO)	%	0-200	80-110	5.1	91.7	83.2	84.3	5.3	91.7	82.7	80.8	5.3	91.7	82.7	80.8
pH		0-14	7.0-8.5	0.4	7.5	7.0	7.5	0.3	7.5	7.0	7.9	0.3	7.5	7.0	7.9
Turbidity (NTU)	NTU	0-600	0.5-10	20.8	20.2	6.0	45.3	18.6	15.7	6.0	14.6	18.6	15.7	6.0	14.6
Total suspended solids (TSS)	mg/L	5		11.3	11.6	5.0	20.5	10.8	10.0	5.0	8.5	10.8	10.0	5.0	8.5
Aluminium (Al)	mg/L	0.01	ID	0.05	0.10	0.01	DNS	0.05	0.10	0.01	0.01	0.05	0.10	0.01	0.01
Arsenic (As)	mg/L	0.001	ID	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.002	0.004	0.010	0.001	0.002
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0004	0.0010	0.0001	DNS	0.0004	0.0010	0.0001	0.0001	0.0004	0.0010	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.18	0.10	0.05	DNS	0.18	0.10	0.05	0.05	0.18	0.10	0.05	0.05
Lead (Pb)	mg/L	0.001	0.0044	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.019	0.033	0.010	DNS	0.022	0.040	0.010	0.054	0.022	0.040	0.010	0.054
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001
Silver (Ag)	mg/L	0.001	0.0014	0.004	0.010	0.001	DNS	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.021	0.050	0.006	DNS	0.022	0.050	0.005	0.006	0.022	0.050	0.005	0.006
Total Nitrogen (TN)	mg/L	0.1	0.3	0.6	1.0	0.5	0.7	0.4	1.0	0.5	0.5	0.4	1.0	0.5	0.5
Total Phosphorous (TP)	mg/L	0.01	0.03	0.03	0.10	0.05	0.08	0.03	0.10	0.05	0.05	0.03	0.10	0.05	0.05

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-15 Operation surface water quality results by waterway (cont.)

Parameter				Results									
	Unit	LOR / probe limit	ANZECC default trigger value	SW5b pre construction trigger values*			SW5b median values						
				Std dev	80th %	20th %	April 2020	May 2020	June 2020	July 2020	August 2020	September 2020	October 2020	November 2020
Temperature	^{0}C	-2-50	No data	5.4	27.3	19.3	20.0	16.1	14.3	12.1	13.4	17.1	DNS	DNS
Electrical conductivity (EC)	uS/cm	0-8000	No data	446	1042	490	640.5	714.5	573.5	757.0	642.0	634.0	DNS	DNS
Dissolved oxygen (DO)	%	0-200	No data	28	115	67	62.2	48.2	58.1	57.7	71.5	37.9	DNS	DNS
pH		0-14	No data	0.8	5.6	4.2	7.1	7.5	7.7	7.9	7.5	7.8	DNS	DNS
Turbidity (NTU)	NTU	0-600	No data	172	50	6	6.5	4.3	5.4	11.3	7.4	7.7	DNS	DNS
Total suspended solids	mg/L	5	-	290	188	5	5.0	6.0	5.0	5.0	17.0	6.5	DNS	DNS
Aluminium (Al)	mg/L	0.01	0.055”	1.13	1.97	0.42	DNS	0.01	DNS	DNS	DNS	0.01	DNS	DNS
Arsenic (As)	mg/L	0.001	0.024	0.003	0.004	0.001	DNS	0.001	DNS	DNS	DNS	0.001	DNS	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0004	0.0007	0.0001	DNS	0.0001	DNS	DNS	DNS	0.0001	DNS	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.001	0.001	0.001	DNS	0.002	DNS	DNS	DNS	0.001	DNS	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.004	0.002	DNS	0.001	DNS	DNS	DNS	0.001	DNS	DNS
Iron (Fe)	mg/L	0.05	ID	5.55	4.49	0.31	DNS	0.06	DNS	DNS	DNS	0.05	DNS	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.001	0.001	0.001	DNS	0.001	DNS	DNS	DNS	0.001	DNS	DNS
Manganese (Mn)	mg/L	0.001	1.9	1.097	3.086	1.652	DNS	0.120	DNS	DNS	DNS	0.264	DNS	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0001	0.0001	0.0001	DNS	0.0001	DNS	DNS	DNS	0.0001	DNS	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.008	0.015	0.005	DNS	0.002	DNS	DNS	DNS	0.002	DNS	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.001	DNS	DNS	DNS	0.001	DNS	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.126	0.269	0.043	DNS	0.006	DNS	DNS	DNS	0.005	DNS	DNS
Total Nitrogen (TN)	mg/L	0.1	No data	4.4	5.3	0.4	0.6	0.4	0.5	0.3	0.3	0.3	DNS	DNS
Total Phosphorous (TP)	mg/L	0.01	No data	0.59	0.16	0.02	0.03	0.07	0.03	0.01	0.01	0.02	DNS	DNS

* Trigger values are typically derived from 24 sampling events up to and including the month indicated. However, this is not the case for SW5b due to the general absence of water during the pre-construction monitoring period. The pre-construction period was extended to 20 January 2015 to facilitate the inclusion of additional pre-construction results. While work was in progress more broadly across the project, there was no work in the vicinity of the sampling point with the potential to influence results.

Note – Waterbody dry during February 2017.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (either not required by sampling program in accordance with WQMP, or insufficient water to obtain a sample).

Table 3-16 Operation surface water quality results by waterway (cont.)

Parameter				Results									
	Unit	LOR / probe limit	ANZECC default trigger value	SW5b pre construction trigger values*			SW5b median values						
				Std dev	80th %	20th %	December 2020	January 2021	February 2021	March 2021			
Temperature	^{0}C	-2-50	No data	5.4	27.3	19.3	23.4	23.7	DNS	21.5			
Electrical conductivity (EC)	uS/cm	0-8000	No data	446	1042	490	306.0	386.0	DNS	188.5			
Dissolved oxygen (DO)	%	0-200	No data	28	115	67	43.7	24.5	DNS	21.4			
pH		0-14	No data	0.8	5.6	4.2	7.3	7.4	DNS	7.3			
Turbidity (NTU)	NTU	0-600	No data	172	50	6	19.9	9.9	DNS	23.8			
Total suspended solids	mg/L	5	-	290	188	5	6.0	9.5	DNS	12.0			
Aluminium (Al)	mg/L	0.01	0.055”	1.13	1.97	0.42	0.16	DNS	DNS	DNS			
Arsenic (As)	mg/L	0.001	0.024	0.003	0.004	0.001	0.001	DNS	DNS	DNS			
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0004	0.0007	0.0001	0.0001	DNS	DNS	DNS			
Chromium (Cr)	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	DNS	DNS	DNS			
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.004	0.002	0.001	DNS	DNS	DNS			
Iron (Fe)	mg/L	0.05	ID	5.55	4.49	0.31	0.13	DNS	DNS	DNS			
Lead (Pb)	mg/L	0.001	0.0034	0.001	0.001	0.001	0.001	DNS	DNS	DNS			
Manganese (Mn)	mg/L	0.001	1.9	1.097	3.086	1.652	0.224	DNS	DNS	DNS			
Mercury (Hg)	mg/L	0.0001	0.0006	0.0001	0.0001	0.0001	0.0001	DNS	DNS	DNS			
Nickel (Ni)	mg/L	0.001	0.011	0.008	0.015	0.005	0.003	DNS	DNS	DNS			
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	DNS	DNS	DNS			
Zinc (Zn)	mg/L	0.005	0.008	0.126	0.269	0.043	0.023	DNS	DNS	DNS			
Total Nitrogen (TN)	mg/L	0.1	No data	4.4	5.3	0.4	0.8	1.1	DNS	0.5			
Total Phosphorous (TP)	mg/L	0.01	No data	0.59	0.16	0.02	0.04	0.09	DNS	0.05			

* Trigger values are typically derived from 24 sampling events up to and including the month indicated. However, this is not the case for SW5b due to the general absence of water during the pre-construction monitoring period. The pre-construction period was extended to 20 January 2015 to facilitate the inclusion of additional pre-construction results. While work was in progress more broadly across the project, there was no work in the vicinity of the sampling point with the potential to influence results.

Note – Waterbody dry during February 2017.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (either not required by sampling program in accordance with WQMP, or insufficient water to obtain a sample).

Table 3-17 Operation surface water quality results by waterway (cont)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW6a*			SW6b	SW6a*			SW6b	SW6a*			SW6b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.1	23.7	18.0	22.6	3.1	23.6	17.9	19.3	3.2	23.6	17.2	16.9
Electrical conductivity (EC)	uS/cm	0-8000	-	3205.3	8000.0	1143.6	1132.5	3321.6	8000.0	1143.6	4637.5	3304.3	8000.0	1143.6	6177.5
Dissolved oxygen (DO)	%	0-200	80-110	12.7	93.8	79.4	75.2	12.3	95.2	80.3	92.6	12.2	96.4	80.6	93.5
pH		0-14	7.0-8.5	0.4	7.6	6.9	6.5	0.4	7.5	6.8	6.9	0.4	7.5	6.8	6.9
Turbidity (NTU)	NTU	0-600	0.5-10	6.4	9.2	3.1	16.7	6.5	11.6	3.1	9.5	6.4	12.8	3.5	8.9
Total suspended solids (TSS)	mg/L	5		5.2	7.8	5.0	5.0	5.2	7.8	5.0	5.0	5.2	7.8	5.0	5.5
Aluminium (Al)	mg/L	0.01	ID	0.06	0.10	0.01	DNS	0.07	0.10	0.01	0.10	0.07	0.10	0.01	DNS
Arsenic (As)	mg/L	0.001	ID	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.002	0.003	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	0.0001	0.0003	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.0274	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0013	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.24	0.12	0.05	DNS	0.28	0.29	0.05	0.62	0.28	0.29	0.05	DNS
Lead (Pb)	mg/L	0.001	0.0044	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	ID	0.040	0.091	0.038	DNS	0.041	0.100	0.038	0.085	0.041	0.100	0.038	DNS
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.07	0.003	0.001	0.001	DNS	0.003	0.002	0.001	0.003	0.003	0.002	0.001	DNS
Silver (Ag)	mg/L	0.001	0.0014	0.003	0.002	0.001	DNS	0.003	0.002	0.001	0.001	0.003	0.002	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.015	0.016	0.029	0.005	DNS	0.017	0.029	0.005	0.005	0.017	0.029	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.3	0.3	1.0	0.5	0.7	0.3	1.0	0.5	0.5	0.3	1.0	0.5	0.5
Total Phosphorous (TP)	mg/L	0.01	0.03	0.11	0.09	0.03	0.02	0.11	0.09	0.02	0.02	0.03	0.07	0.02	0.05

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-18 Operation surface water quality results by waterway (cont)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW6a*			SW6b	SW6a*			SW6b	SW6a*			SW6b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.3	23.6	17.2	14.8	3.4	23.6	17.1	15.7	3.4	23.7	17.1	21.5
Electrical conductivity (EC)	uS/cm	0-8000	-	3275.5	8000.0	1143.6	4542.0	3223.0	8000.0	1143.6	3311.5	3105.3	8000.0	1143.6	5578.0
Dissolved oxygen (DO)	%	0-200	80-110	12.5	98.5	80.6	100.0	12.5	98.5	80.6	98.0	12.7	100.6	80.6	100.6
pH		0-14	7.0-8.5	0.4	7.5	6.8	7.0	0.5	7.5	6.7	6.5	0.5	7.5	6.7	7.2
Turbidity (NTU)	NTU	0-600	0.5-10	6.2	12.8	4.1	6.3	6.1	12.8	4.8	7.4	6.1	12.8	4.5	8.8
Total suspended solids (TSS)	mg/L	5		5.1	7.8	5.0	5.0	5.7	7.8	5.0	13.5	5.8	9.0	5.0	10.5
Aluminium (Al)	mg/L	0.01	ID	0.07	0.10	0.01	DNS	0.07	0.10	0.01	DNS	0.07	0.10	0.01	0.02
Arsenic (As)	mg/L	0.001	ID	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.28	0.29	0.05	DNS	0.28	0.29	0.05	DNS	0.28	0.29	0.05	0.07
Lead (Pb)	mg/L	0.001	0.0044	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.041	0.100	0.038	DNS	0.041	0.100	0.038	DNS	0.044	0.102	0.038	0.151
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.003	0.002	0.001	DNS	0.003	0.002	0.001	DNS	0.003	0.003	0.001	0.003
Silver (Ag)	mg/L	0.001	0.0014	0.003	0.002	0.001	DNS	0.003	0.002	0.001	DNS	0.003	0.002	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.017	0.029	0.005	DNS	0.017	0.029	0.005	DNS	0.017	0.029	0.005	0.008
Total Nitrogen (TN)	mg/L	0.1	0.3	0.3	1.0	0.5	0.5	0.3	1.0	0.5	0.3	0.3	0.9	0.4	0.2
Total Phosphorous (TP)	mg/L	0.01	0.03	0.03	0.07	0.02	0.03	0.03	0.07	0.01	0.01	0.03	0.06	0.01	0.04

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-19 Operation surface water quality results by waterway (cont)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW6a*			SW6b	SW6a*			SW6b	SW6a*			SW6b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.5	24.0	17.1	23.8	3.6	24.4	17.1	25.2	3.7	24.8	17.1	25.4
Electrical conductivity (EC)	uS/cm	0-8000	-	3105.3	8000.0	1143.6	8000.0	3105.3	8000.0	1143.6	8000.0	3156.9	8000.0	973.6	4179.5
Dissolved oxygen (DO)	%	0-200	80-110	12.7	100.6	80.6	89.1	12.9	103.3	80.6	98.6	10.3	100.6	80.6	79.7
pH		0-14	7.0-8.5	0.4	7.4	6.7	7.5	0.4	7.3	6.7	7.2	0.4	7.3	6.7	7.3
Turbidity (NTU)	NTU	0-600	0.5-10	6.0	12.8	4.8	6.5	5.8	12.8	5.2	10.1	6.6	14.3	5.2	13.1
Total suspended solids (TSS)	mg/L	5		5.0	7.8	5.0	5.0	5.0	8.4	5.0	5.0	3.5	8.4	5.0	5.5
Aluminium (Al)	mg/L	0.01	ID	0.07	0.10	0.01	DNS	0.07	0.10	0.01	DNS	0.08	0.12	0.01	0.18
Arsenic (As)	mg/L	0.001	ID	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.28	0.29	0.05	DNS	0.28	0.29	0.05	DNS	0.28	0.33	0.05	0.22
Lead (Pb)	mg/L	0.001	0.0044	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.044	0.102	0.038	DNS	0.044	0.102	0.038	DNS	0.045	0.105	0.038	0.091
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.003	0.003	0.001	DNS	0.003	0.003	0.001	DNS	0.003	0.003	0.001	0.002
Silver (Ag)	mg/L	0.001	0.0014	0.003	0.002	0.001	DNS	0.003	0.002	0.001	DNS	0.003	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.017	0.029	0.005	DNS	0.017	0.029	0.005	DNS	0.017	0.029	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.3	0.4	0.9	0.2	0.2	0.4	0.9	0.2	0.2	0.4	0.8	0.2	0.6
Total Phosphorous (TP)	mg/L	0.01	0.03	0.03	0.05	0.01	0.02	0.03	0.05	0.01	0.02	0.03	0.03	0.01	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-20 Operation surface water quality results by waterway (cont)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW6a*			SW6b	SW6a*			SW6b	SW6a*			SW6b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.7	24.8	17.1	25.0	4.0	25.0	17.1	26.4	4.0	25.0	17.1	23.0
Electrical conductivity (EC)	uS/cm	0-8000	-	3174.5	8000.0	354.6	245.0	3077.7	8000.0	528.2	959.5	3102.6	8000.0	354.6	224.0
Dissolved oxygen (DO)	%	0-200	80-110	9.8	100.6	83.2	87.3	10.2	100.6	80.7	74.0	10.2	100.6	82.1	77.1
pH		0-14	7.0-8.5	0.4	7.3	6.7	7.4	0.4	7.3	6.7	7.4	0.4	7.3	6.7	6.9
Turbidity (NTU)	NTU	0-600	0.5-10	24.2	17.3	5.7	57.0	24.0	16.3	6.1	16.3	24.0	16.6	6.1	21.0
Total suspended solids (TSS)	mg/L	5		9.8	9.4	5.0	26.5	9.8	9.4	5.0	10.0	9.8	10.0	5.0	7.5
Aluminium (Al)	mg/L	0.01	ID	0.08	0.12	0.01	DNS	0.08	0.12	0.01	0.08	0.08	0.12	0.01	DNS
Arsenic (As)	mg/L	0.001	ID	0.003	0.001	0.001	DNS	0.003	0.002	0.001	0.002	0.003	0.002	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	0.0001	0.0003	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.0274	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0013	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.28	0.33	0.05	DNS	0.40	0.47	0.05	1.28	0.40	0.47	0.05	DNS
Lead (Pb)	mg/L	0.001	0.0044	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	ID	0.045	0.105	0.038	DNS	0.045	0.105	0.040	0.053	0.045	0.105	0.040	DNS
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.07	0.003	0.003	0.001	DNS	0.003	0.003	0.001	0.001	0.003	0.003	0.001	DNS
Silver (Ag)	mg/L	0.001	0.0014	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.015	0.017	0.029	0.005	DNS	0.017	0.029	0.005	0.005	0.017	0.029	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.3	0.4	0.8	0.2	0.7	0.3	0.7	0.2	0.6	0.2	0.6	0.2	0.5
Total Phosphorous (TP)	mg/L	0.01	0.03	0.02	0.03	0.01	0.05	0.01	0.02	0.01	0.04	0.01	0.02	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-21 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW6c*			SW6d	SW6c*			SW6d	SW6c*			SW6d
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.3	24.1	17.6	22.1	3.3	24.1	17.6	18.8	3.5	24.1	16.6	16.4
Electrical conductivity (EC)	uS/cm	0-8000	-	3227.7	8000.0	1071.8	1063.5	3343.5	8000.0	1071.8	4597.5	3363.0	8000.0	1071.8	5462.0
Dissolved oxygen (DO)	%	0-200	80-110	13.5	99.2	83.4	75.5	13.3	101.0	83.4	95.0	13.1	101.0	83.5	94.5
pH		0-14	7.0-8.5	0.5	7.4	6.7	6.3	0.5	7.4	6.6	6.7	0.5	7.4	6.6	6.8
Turbidity (NTU)	NTU	0-600	0.5-10	6.2	9.7	3.5	19.4	6.2	10.9	3.5	8.7	6.3	12.7	3.7	9.2
Total suspended solids (TSS)	mg/L	5		8.0	8.0	5.0	6.5	8.0	8.0	5.0	5.0	8.0	6.8	5.0	5.0
Aluminium (Al)	mg/L	0.01	ID	0.06	0.10	0.01	DNS	0.06	0.10	0.01	0.09	0.06	0.10	0.01	DNS
Arsenic (As)	mg/L	0.001	ID	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	0.0001	0.0003	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.0274	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0013	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.21	0.12	0.05	DNS	0.26	0.27	0.05	0.53	0.26	0.27	0.05	DNS
Lead (Pb)	mg/L	0.001	0.0044	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	ID	0.039	0.091	0.034	DNS	0.039	0.083	0.034	0.074	0.039	0.083	0.034	DNS
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.07	0.003	0.001	0.001	DNS	0.003	0.002	0.001	0.001	0.003	0.002	0.001	DNS
Silver (Ag)	mg/L	0.001	0.0014	0.003	0.002	0.001	DNS	0.003	0.002	0.001	0.001	0.003	0.002	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.015	0.018	0.031	0.005	DNS	0.018	0.031	0.005	0.006	0.018	0.031	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.3	0.4	1.0	0.5	0.7	0.4	1.0	0.5	0.5	0.4	1.0	0.5	0.7
Total Phosphorous (TP)	mg/L	0.01	0.03	0.03	0.07	0.04	0.02	0.03	0.07	0.03	0.02	0.03	0.07	0.02	0.04

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-22 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW6c*			SW6d	SW6c*			SW6d	SW6c*			SW6d
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.6	24.1	16.6	14.3	3.6	24.1	16.6	15.5	3.6	24.1	16.6	20.9
Electrical conductivity (EC)	uS/cm	0-8000	-	3354.7	8000.0	1071.8	4120.0	3296.8	8000.0	1071.8	3222.0	3170.5	8000.0	1071.8	5453.5
Dissolved oxygen (DO)	%	0-200	80-110	13.2	102.4	83.5	100.4	13.1	102.4	83.5	96.0	12.8	101.5	83.5	95.3
pH		0-14	7.0-8.5	0.5	7.4	6.6	6.9	0.5	7.4	6.5	6.4	0.5	7.4	6.5	6.9
Turbidity (NTU)	NTU	0-600	0.5-10	6.1	12.7	3.8	7.0	6.0	12.7	4.3	6.2	6.1	12.7	4.3	5.4
Total suspended solids (TSS)	mg/L	5		8.0	6.8	5.0	5.5	8.3	8.0	5.0	12.5	8.3	9.6	5.0	9.0
Aluminium (Al)	mg/L	0.01	ID	0.06	0.10	0.01	DNS	0.06	0.10	0.01	DNS	0.06	0.10	0.01	0.01
Arsenic (As)	mg/L	0.001	ID	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.26	0.27	0.05	DNS	0.26	0.27	0.05	DNS	0.26	0.27	0.05	0.05
Lead (Pb)	mg/L	0.001	0.0044	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.039	0.083	0.034	DNS	0.039	0.083	0.034	DNS	0.044	0.098	0.034	0.151
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.003	0.002	0.001	DNS	0.003	0.002	0.001	DNS	0.003	0.003	0.001	0.004
Silver (Ag)	mg/L	0.001	0.0014	0.003	0.002	0.001	DNS	0.003	0.002	0.001	DNS	0.003	0.002	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.018	0.031	0.005	DNS	0.018	0.031	0.005	DNS	0.018	0.031	0.005	0.007
Total Nitrogen (TN)	mg/L	0.1	0.3	0.4	1.0	0.5	0.4	0.4	1.0	0.5	0.2	0.4	0.9	0.4	0.2
Total Phosphorous (TP)	mg/L	0.01	0.03	0.03	0.07	0.02	0.02	0.03	0.07	0.01	0.01	0.03	0.05	0.01	0.01

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-23 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW6c*			SW6d	SW6c*			SW6d	SW6c*			SW6d
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.6	24.3	16.6	23.7	3.8	24.5	16.6	25.5	3.8	24.7	16.6	25.0
Electrical conductivity (EC)	uS/cm	0-8000	-	3170.5	8000.0	1071.8	8000.0	3170.5	8000.0	1071.8	8000.0	3208.7	8000.0	876.2	4170.5
Dissolved oxygen (DO)	%	0-200	80-110	12.5	101.0	82.9	84.8	12.4	99.5	82.9	89.3	8.2	97.7	82.4	84.4
pH		0-14	7.0-8.5	0.5	7.2	6.5	7.2	0.5	7.1	6.5	6.9	0.4	7.1	6.5	7.2
Turbidity (NTU)	NTU	0-600	0.5-10	6.0	12.7	4.5	5.1	5.9	12.7	4.8	7.7	6.7	14.5	5.0	16.5
Total suspended solids (TSS)	mg/L	5		7.3	8.0	5.0	5.0	7.3	8.0	5.0	5.0	3.5	8.0	5.0	6.5
Aluminium (Al)	mg/L	0.01	ID	0.06	0.10	0.01	DNS	0.06	0.10	0.01	DNS	0.07	0.11	0.01	0.14
Arsenic (As)	mg/L	0.001	ID	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.26	0.27	0.05	DNS	0.26	0.27	0.05	DNS	0.25	0.27	0.05	0.16
Lead (Pb)	mg/L	0.001	0.0044	0.003	0.001	0.001	DNS	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.044	0.098	0.034	DNS	0.044	0.098	0.034	DNS	0.046	0.109	0.034	0.081
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.003	0.003	0.001	DNS	0.003	0.003	0.001	DNS	0.003	0.005	0.001	0.001
Silver (Ag)	mg/L	0.001	0.0014	0.003	0.002	0.001	DNS	0.003	0.002	0.001	DNS	0.003	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.018	0.031	0.005	DNS	0.018	0.031	0.005	DNS	0.018	0.031	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.3	0.4	0.9	0.3	0.2	0.4	0.9	0.3	0.5	0.4	0.9	0.2	0.6
Total Phosphorous (TP)	mg/L	0.01	0.03	0.03	0.05	0.01	0.03	0.03	0.05	0.01	0.02	0.03	0.05	0.01	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-24 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW6c*			SW6d	SW6c*			SW6d	SW6c*			SW6d
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.8	24.7	16.6	24.8	4.0	24.9	16.6	26.2	4.0	24.8	16.6	24.2
Electrical conductivity (EC)	uS/cm	0-8000	-	3199.7	8000.0	325.0	219.5	3105.9	8000.0	475.2	689.5	3102.1	8000.0	475.2	260.0
Dissolved oxygen (DO)	%	0-200	80-110	7.8	97.7	85.6	90.2	7.9	97.7	84.0	85.2	7.9	97.7	84.0	86.9
pH		0-14	7.0-8.5	0.4	7.1	6.5	7.3	0.3	7.1	6.5	7.3	0.3	7.0	6.5	7.0
Turbidity (NTU)	NTU	0-600	0.5-10	17.1	17.8	5.6	53.8	16.9	16.8	5.9	13.8	16.9	16.2	5.9	14.6
Total suspended solids (TSS)	mg/L	5		7.0	11.4	5.0	25.0	6.9	9.2	5.0	5.0	7.0	9.2	5.0	5.0
Aluminium (Al)	mg/L	0.01	ID	0.07	0.11	0.01	DNS	0.07	0.11	0.01	0.10	0.07	0.11	0.01	DNS
Arsenic (As)	mg/L	0.001	ID	0.003	0.001	0.001	DNS	0.003	0.002	0.001	0.002	0.003	0.002	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0003	0.0001	0.0001	DNS	0.0003	0.0001	0.0001	0.0001	0.0003	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.0274	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0013	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.25	0.27	0.05	DNS	0.31	0.38	0.05	0.89	0.31	0.38	0.05	DNS
Lead (Pb)	mg/L	0.001	0.0044	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	ID	0.046	0.109	0.034	DNS	0.046	0.109	0.028	0.028	0.046	0.109	0.028	DNS
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.07	0.003	0.005	0.001	DNS	0.003	0.005	0.001	0.001	0.003	0.005	0.001	DNS
Silver (Ag)	mg/L	0.001	0.0014	0.003	0.001	0.001	DNS	0.003	0.001	0.001	0.001	0.003	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.015	0.018	0.031	0.005	DNS	0.018	0.031	0.005	0.009	0.018	0.031	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.3	0.4	0.9	0.2	0.8	0.3	0.7	0.2	0.4	0.3	0.6	0.2	0.3
Total Phosphorous (TP)	mg/L	0.01	0.03	0.02	0.04	0.01	0.04	0.02	0.03	0.01	0.03	0.02	0.02	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated.

Note – Since April 2014 the upper limit of Electrical Conductivity (EC) is 8000 uS/cm due to in-field equipment range limitations.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-25 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW7a*			SW7b	SW7a*			SW7b	SW7a*			SW7b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	4.2	24.1	18.7	19.5	4.3	24.1	18.0	17.7	4.4	24.1	16.6	15.9
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	162.9	478.2	179.6	165.0	163.0	478.2	189.8	213.5	162.6	478.2	180.8	217.0
Dissolved oxygen (DO)	%	0-200	85-110	36.2	112.0	52.5	65.1	36.2	112.0	52.5	71.9	34.3	112.0	63.5	68.8
pH		0-14	6.5-8	0.6	7.3	6.3	6.1	0.6	7.3	6.3	6.2	0.6	7.3	6.3	6.7
Turbidity (NTU)	NTU	0-600	6-50	27.6	21.1	5.0	63.9	26.7	18.3	5.0	11.5	26.7	17.8	5.0	10.9
Total suspended solids (TSS)	mg/L	5	-	6.7	5.8	5.0	17.0	6.7	5.0	5.0	5.0	6.7	5.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.08	0.09	0.01	DNS	0.08	0.09	0.01	0.02	0.08	0.09	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.004	0.001	0.001	DNS	0.004	0.001	0.001	0.001	0.004	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.44	1.06	0.18	DNS	0.44	1.03	0.18	0.47	0.44	1.03	0.18	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.160	0.378	0.051	DNS	0.158	0.378	0.051	0.243	0.158	0.378	0.051	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.002	0.000	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.006	0.010	0.005	DNS	0.006	0.010	0.005	0.005	0.006	0.010	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.4	1.0	0.2	0.8	0.4	0.8	0.2	0.1	0.5	1.1	0.2	0.8
Total Phosphorous (TP)	mg/L	0.01	0.05	0.05	0.03	0.01	0.05	0.05	0.03	0.01	0.01	0.05	0.02	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-26 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW7a*			SW7b	SW7a*			SW7b	SW7a*			SW7b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	4.7	23.3	16.0	14.1	4.5	21.9	14.7	13.3	3.1	20.8	14.7	17.1
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	164.4	478.2	180.8	219.5	166.7	478.2	180.8	214.5	157.5	456.0	180.8	241.0
Dissolved oxygen (DO)	%	0-200	85-110	30.2	112.0	69.9	71.5	29.1	112.0	71.5	79.8	27.4	107.0	68.5	70.5
pH		0-14	6.5-8	0.6	7.3	6.3	6.7	0.6	7.2	6.3	6.5	0.5	7.1	6.3	6.9
Turbidity (NTU)	NTU	0-600	6-50	26.6	15.2	5.0	12.5	26.5	17.1	5.2	14.2	26.4	17.8	5.2	19.3
Total suspended solids (TSS)	mg/L	5	-	6.7	5.0	5.0	5.0	6.6	5.0	5.0	5.0	6.6	5.0	5.0	6.5
Aluminium (Al)	mg/L	0.01	0.055”	0.08	0.09	0.01	DNS	0.08	0.09	0.01	DNS	0.08	0.06	0.01	0.05
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.004	0.001	0.001	DNS	0.004	0.001	0.001	DNS	0.004	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.44	1.03	0.18	DNS	0.44	1.03	0.18	DNS	0.43	1.03	0.18	0.60
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.158	0.378	0.051	DNS	0.158	0.378	0.051	DNS	0.156	0.378	0.051	0.213
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.006	0.010	0.005	DNS	0.006	0.010	0.005	DNS	0.006	0.010	0.005	0.008
Total Nitrogen (TN)	mg/L	0.1	0.5	0.5	1.1	0.1	0.1	0.5	1.1	0.1	0.1	0.4	0.8	0.1	0.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.05	0.02	0.01	0.01	0.05	0.02	0.01	0.04	0.02	0.02	0.01	0.01

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-27 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW7a*			SW7b	SW7a*			SW7b	SW7a*			SW7b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	0C	-2-50	NA	2.6	19.7	14.7	18.0	2.8	19.9	14.7	19.7	2.8	20.8	16.0	21.3
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	153.4	377.8	177.2	240.5	150.3	337.8	180.8	281.0	137.9	242.4	168.8	230.0
Dissolved oxygen (DO)	%	0-200	85-110	31.2	97.8	67.4	42.3	31.5	94.7	63.5	37.2	30.8	87.4	51.5	63.9
pH		0-14	6.5-8	0.5	6.9	6.3	7.0	0.5	6.9	6.3	6.5	0.5	6.8	6.3	7.1
Turbidity (NTU)	NTU	0-600	6-50	26.5	17.9	6.2	12.5	26.0	18.3	6.5	20.7	22.9	20.0	7.3	31.0
Total suspended solids (TSS)	mg/L	5	-	6.7	5.6	5.0	5.0	6.6	6.0	5.0	7.0	4.6	6.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.08	0.06	0.01	DNS	0.08	0.06	0.01	DNS	0.08	0.10	0.01	0.22
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.004	0.001	0.001	DNS	0.004	0.001	0.001	DNS	0.004	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.43	1.03	0.18	DNS	0.43	1.03	0.18	DNS	0.43	0.87	0.18	0.39
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.156	0.378	0.051	DNS	0.156	0.378	0.051	DNS	0.159	0.378	0.047	0.102
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.006	0.010	0.005	DNS	0.006	0.010	0.005	DNS	0.006	0.010	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.4	0.8	0.1	0.2	0.4	0.8	0.1	0.1	0.4	0.6	0.1	0.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.01

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-28 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW7a*			SW7b	SW7a*			SW7b	SW7a*			SW7b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	2.9	21.9	16.5	21.9	3.1	22.1	16.5	23.2	3.0	22.0	16.5	21.2
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	74.3	231.4	160.4	140.5	40.2	225.6	160.4	195.0	42.9	225.6	151.6	128.5
Dissolved oxygen (DO)	%	0-200	85-110	29.5	86.8	51.5	76.9	21.1	83.9	38.4	39.4	20.8	86.5	40.8	81.0
pH		0-14	6.5-8	0.5	7.0	6.3	7.2	0.4	6.9	6.3	6.9	0.4	6.9	6.3	6.9
Turbidity (NTU)	NTU	0-600	6-50	22.9	23.2	8.7	30.0	22.5	24.5	11.6	15.6	22.4	29.4	13.4	36.4
Total suspended solids (TSS)	mg/L	5	-	4.6	6.0	5.0	5.5	4.6	6.0	5.0	5.5	4.6	6.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.08	0.10	0.01	DNS	0.08	0.09	0.01	0.03	0.08	0.09	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.004	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.43	0.87	0.18	DNS	0.40	0.77	0.18	1.05	0.40	0.77	0.18	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.159	0.378	0.047	DNS	0.153	0.309	0.047	0.265	0.153	0.309	0.047	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.006	0.010	0.005	DNS	0.006	0.008	0.005	0.012	0.006	0.008	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.4	0.6	0.1	0.4	0.3	0.5	0.1	0.3	0.3	0.4	0.1	0.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.02	0.01	0.02	0.01	0.02	0.01	0.03	0.02	0.02	0.01	0.04

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-29 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020					May 2020					
				SW8a derived trigger values*			SW8b	SW8c	SW8a derived trigger values*			SW8b	SW8c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	2.9	21.2	15.9	20.8	19.3	2.9	21.2	15.9	18.9	17.8
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	75.6	278.8	128.4	200.0	218.0	75.6	278.8	128.4	224.0	244.0
Dissolved oxygen (DO)	%	0-200	85-110	29.5	91.5	29.7	32.3	28.2	29.5	91.5	29.7	50.3	33.4
pH		0-14	6.5-8	0.3	6.7	6.1	5.8	6.2	0.3	6.7	6.1	6.0	6.5
Turbidity	NTU	0-600	6-50	12.0	29.9	8.0	9.0	10.3	12.0	29.9	8.0	6.9	6.6
Total suspended solids (TSS)	mg/L	5	-	0.6	5.0	5.0	5.0	5.0	0.6	5.0	5.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.42	0.71	0.08	DNS	DNS	0.42	0.71	0.08	0.04	0.02
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.15	0.31	0.05	DNS	DNS	0.15	0.31	0.05	0.46	0.10
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.016	0.015	0.004	DNS	DNS	0.016	0.015	0.004	0.123	0.034
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.012	0.005	DNS	DNS	0.004	0.012	0.005	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.4	0.1	0.2	0.2	0.2	0.4	0.1	0.1	0.1
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01

* Trigger values derived from 24 sampling events up to and including the month indicated. Due to the general absence of water at SW8a during many sampling events, trigger values are derived from up to 24 sampling events, where possible, up to and including the most recent sampling event where a sample could be obtained from SW8a.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-30 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	June 2020					July 2020					
				SW8a derived trigger values			SW8b	SW8c	SW8a derived trigger values			SW8b	SW8c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	2.8	21.1	15.9	16.6	16.4	2.8	21.1	15.9	15.8	14.1
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	71.7	273.0	128.4	263.5	247.5	71.7	273.0	128.4	230.0	255.0
Dissolved oxygen (DO)	%	0-200	85-110	28.7	91.5	32.0	54.3	32.2	28.7	91.5	32.0	54.7	41.8
pH		0-14	6.5-8	0.3	6.7	6.1	6.3	6.6	0.3	6.7	6.1	6.6	6.8
Turbidity	NTU	0-600	6-50	12.2	29.9	7.6	6.7	5.4	12.2	29.9	7.6	4.5	5.7
Total suspended solids (TSS)	mg/L	5	-	0.6	5.0	5.0	5.0	5.0	0.6	5.0	5.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.42	0.71	0.08	DNS	DNS	0.42	0.71	0.08	DNS	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	DNS	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Iron (Fe)	mg/L	0.05	ID	0.15	0.31	0.05	DNS	DNS	0.15	0.31	0.05	DNS	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.016	0.015	0.004	DNS	DNS	0.016	0.015	0.004	DNS	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	DNS	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.012	0.005	DNS	DNS	0.004	0.012	0.005	#NUM!	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.4	0.1	0.6	0.3	0.3	0.4	0.1	0.1	0.1
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated. Due to the general absence of water at SW8a during many sampling events, trigger values are derived from up to 24 sampling events, where possible, up to and including the most recent sampling event where a sample could be obtained from SW8a.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-31 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	August 2020					September 2020					
				SW8a derived trigger values			SW8b	SW8c	SW8a derived trigger values			SW8b	SW8c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	2.8	21.1	15.9	16.6	13.9	2.8	21.1	15.9	17.7	16.3
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	71.7	273.0	128.4	241.0	243.0	71.7	273.0	128.4	255.5	239.5
Dissolved oxygen (DO)	%	0-200	85-110	28.7	91.5	32.0	61.5	50.8	28.7	91.5	32.0	52.8	45.2
pH		0-14	6.5-8	0.3	6.7	6.1	6.1	6.5	0.3	6.7	6.1	6.4	6.9
Turbidity	NTU	0-600	6-50	12.2	29.9	7.6	3.9	7.2	12.2	29.9	7.6	11.8	13.2
Total suspended solids (TSS)	mg/L	5	-	0.6	5.0	5.0	5.0	5.0	0.6	5.0	5.0	5.0	6.5
Aluminium (Al)	mg/L	0.01	0.055”	0.42	0.71	0.08	DNS	DNS	0.42	0.71	0.08	0.08	0.07
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.15	0.31	0.05	DNS	DNS	0.15	0.31	0.05	0.16	0.08
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.016	0.015	0.004	DNS	DNS	0.016	0.015	0.004	0.040	0.014
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.012	0.005	DNS	DNS	0.004	0.012	0.005	0.006	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.4	0.1	0.1	0.1	0.3	0.4	0.1	0.2	0.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.01	0.01	0.05	0.05	0.01	0.01	0.01	0.01	0.01

* Trigger values derived from 24 sampling events up to and including the month indicated. Due to the general absence of water at SW8a during many sampling events, trigger values are derived from up to 24 sampling events, where possible, up to and including the most recent sampling event where a sample could be obtained from SW8a.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-32 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020					November 2020					
				SW8a derived trigger values			SW8b	SW8c	SW8a derived trigger values			SW8b	SW8c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	2.8	21.1	15.9	18.1	18.1	2.8	21.1	15.9	19.3	19.8
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	71.7	273.0	128.4	255.0	274.0	71.7	273.0	128.4	263.0	260.0
Dissolved oxygen (DO)	%	0-200	85-110	28.7	91.5	32.0	15.6	30.6	28.7	91.5	32.0	61.3	36.1
pH		0-14	6.5-8	0.3	6.7	6.1	6.7	7.1	0.3	6.7	6.1	6.0	6.2
Turbidity	NTU	0-600	6-50	12.2	29.9	7.6	12.0	9.0	12.2	29.9	7.6	14.6	14.0
Total suspended solids (TSS)	mg/L	5	-	0.6	5.0	5.0	5.0	5.0	0.6	5.0	5.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.42	0.71	0.08	DNS	DNS	0.42	0.71	0.08	DNS	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	DNS	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Iron (Fe)	mg/L	0.05	ID	0.15	0.31	0.05	DNS	DNS	0.15	0.31	0.05	DNS	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.016	0.015	0.004	DNS	DNS	0.016	0.015	0.004	DNS	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	DNS	0.0000	0.0001	0.0001	DNS	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	DNS	0.000	0.001	0.001	DNS	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.012	0.005	DNS	DNS	0.004	0.012	0.005	DNS	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.4	0.1	0.2	0.1	0.3	0.4	0.1	0.2	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01

* Trigger values derived from 24 sampling events up to and including the month indicated. Due to the general absence of water at SW8a during many sampling events, trigger values are derived from up to 24 sampling events, where possible, up to and including the most recent sampling event where a sample could be obtained from SW8a.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-33 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	December 2020					January 2021					
				SW8a derived trigger values			SW8b	SW8c	SW8a derived trigger values			SW8b	SW8c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	2.8	21.2	15.9	20.8	21.0	2.9	21.3	15.9	21.6	21.9
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	69.5	273.0	134.2	166.5	158.5	71.3	273.0	132.6	146.5	150.5
Dissolved oxygen (DO)	%	0-200	85-110	27.8	89.4	32.0	84.7	81.4	29.1	91.8	29.7	71.8	54.0
pH		0-14	6.5-8	0.4	6.8	6.2	7.0	7.1	0.4	6.9	6.2	7.0	7.0
Turbidity	NTU	0-600	6-50	10.0	25.6	7.6	23.1	27.7	9.7	25.6	7.6	23.5	24.4
Total suspended solids (TSS)	mg/L	5	-	0.6	5.0	5.0	5.0	5.0	0.7	5.0	5.0	5.0	6.0
Aluminium (Al)	mg/L	0.01	0.055”	0.32	0.43	0.08	0.23	0.30	0.32	0.43	0.08	DNS	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.002	0.000	0.001	0.001	DNS	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Iron (Fe)	mg/L	0.05	ID	0.12	0.18	0.05	0.11	0.16	0.12	0.18	0.05	DNS	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.016	0.015	0.003	0.004	0.006	0.016	0.015	0.003	DNS	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.007	0.013	0.005	0.006	0.005	0.007	0.013	0.005	DNS	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.4	0.1	0.6	0.4	0.3	0.4	0.1	0.3	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01

* Trigger values derived from 24 sampling events up to and including the month indicated. Due to the general absence of water at SW8a during many sampling events, trigger values are derived from up to 24 sampling events, where possible, up to and including the most recent sampling event where a sample could be obtained from SW8a.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-34 Operation surface water quality results by waterway (cont.)

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	February 2021					March 2021					
				SW8a derived trigger values			SW8b	SW8c	SW8a derived trigger values			SW8b	SW8c
				Std dev	80th %	20th %	Median	Median	Std dev	80th %	20th %	Median	Median
Temperature	^{0}C	-2-50	NA	2.9	21.3	15.9	21.5	22.7	2.6	21.4	17.2	21.9	21.1
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	71.3	273.0	132.6	190.5	220.5	71.8	273.0	132.6	140.5	136.0
Dissolved oxygen (DO)	%	0-200	85-110	29.1	91.8	29.7	31.0	17.2	27.2	89.4	32.0	39.4	67.5
pH		0-14	6.5-8	0.4	6.9	6.2	6.6	6.9	0.4	6.9	6.2	6.5	7.0
Turbidity	NTU	0-600	6-50	9.7	25.6	7.6	17.8	12.3	9.9	25.6	8.2	28.1	30.6
Total suspended solids (TSS)	mg/L	5	-	0.7	5.0	5.0	5.0	5.0	0.7	5.0	5.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.32	0.43	0.08	0.10	0.04	0.32	0.43	0.08	DNS	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Iron (Fe)	mg/L	0.05	ID	0.12	0.18	0.05	0.34	0.62	0.12	0.18	0.05	DNS	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.016	0.015	0.003	0.150	0.243	0.016	0.015	0.003	DNS	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	DNS	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.007	0.013	0.005	0.005	0.008	0.007	0.013	0.005	DNS	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.4	0.1	0.2	0.2	0.3	0.4	0.1	0.3	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated. Due to the general absence of water at SW8a during many sampling events, trigger values are derived from up to 24 sampling events, where possible, up to and including the most recent sampling event where a sample could be obtained from SW8a.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-35 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW9b*			SW9a	SW9b*			SW9a	SW9b*			SW9a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.2	21.4	14.5	18.0	3.3	21.4	14.5	15.9	3.3	21.4	14.4	14.0
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	3114.3	8000.0	185.4	185.0	3168.9	8000.0	185.4	211.0	3219.7	8000.0	181.2	212.5
Dissolved oxygen (DO)	%	0-200	85-110	17.9	79.0	52.1	72.5	16.9	79.0	53.4	67.3	14.8	79.0	54.6	63.1
pH		0-14	6.5-8	0.5	7.6	6.7	6.7	0.5	7.5	6.7	7.0	0.4	7.4	6.7	7.1
Turbidity (NTU)	NTU	0-600	6-50	10.0	17.4	6.3	13.7	9.5	16.8	6.3	14.4	9.4	18.7	6.9	16.2
Total suspended solids (TSS)	mg/L	5	-	3.1	8.4	5.0	5.0	3.1	7.4	5.0	5.0	2.9	5.8	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.07	0.07	0.01	DNS	0.07	0.08	0.01	0.06	0.07	0.08	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.51	1.12	0.17	DNS	0.50	1.10	0.17	0.83	0.50	1.10	0.17	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.247	0.578	0.057	DNS	0.214	0.440	0.051	0.070	0.214	0.440	0.051	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.007	0.009	0.005	DNS	0.007	0.009	0.005	0.005	0.007	0.009	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.6	0.3	0.2	0.2	0.5	0.3	0.3	0.2	0.5	0.3	0.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.03	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.03	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-36 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW9b*			SW9a	SW9b*			SW9a	SW9b*			SW9a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.5	21.4	14.4	14.0	3.7	21.4	13.4	11.6	3.7	21.4	14.1	15.5
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	3058.3	5441.8	181.2	212.5	2872.7	4913.0	181.2	224.0	2380.7	4670.2	181.2	242.0
Dissolved oxygen (DO)	%	0-200	85-110	14.5	79.0	56.9	63.1	11.8	79.0	56.9	76.2	12.7	77.6	54.1	45.1
pH		0-14	6.5-8	0.4	7.5	6.8	7.1	0.4	7.5	6.8	6.9	0.4	7.5	6.8	7.3
Turbidity (NTU)	NTU	0-600	6-50	9.3	18.1	6.9	16.2	9.1	16.3	6.9	12.7	9.3	18.0	6.9	20.2
Total suspended solids (TSS)	mg/L	5	-	2.9	5.8	5.0	5.0	2.3	5.0	5.0	5.0	2.4	5.0	5.0	7.0
Aluminium (Al)	mg/L	0.01	0.055”	0.07	0.08	0.01	DNS	0.07	0.08	0.01	DNS	0.07	0.08	0.01	0.04
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.50	1.10	0.17	DNS	0.50	1.10	0.17	DNS	0.48	0.99	0.17	0.91
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.214	0.440	0.051	DNS	0.214	0.440	0.051	DNS	0.210	0.414	0.051	0.261
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.007	0.009	0.005	DNS	0.007	0.009	0.005	DNS	0.007	0.007	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.1	0.5	0.2	0.4	0.1	0.4	0.2	0.2	0.1	0.4	0.2	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.03	0.01	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-37 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW9b*			SW9a	SW9b*			SW9a	SW9b*			SW9a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.7	21.4	14.1	17.6	3.7	21.4	14.1	19.1	3.6	21.3	14.1	20.4
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	1987.8	4555.0	181.2	272.0	1886.4	2026.6	181.2	269.0	1553.5	267.0	163.6	163.0
Dissolved oxygen (DO)	%	0-200	85-110	16.0	77.6	51.0	26.1	17.6	77.6	46.8	18.4	18.8	79.6	46.8	73.4
pH		0-14	6.5-8	0.4	7.5	6.8	7.6	0.4	7.5	6.8	6.9	0.4	7.5	6.8	7.1
Turbidity (NTU)	NTU	0-600	6-50	5.9	18.5	6.9	19.9	6.0	19.0	6.9	24.1	8.1	21.1	8.4	32.2
Total suspended solids (TSS)	mg/L	5	-	2.1	5.4	5.0	12.0	2.1	6.8	5.0	16.0	2.0	5.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.07	0.08	0.01	DNS	0.07	0.08	0.01	DNS	0.09	0.13	0.01	0.21
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.48	0.99	0.17	DNS	0.48	0.99	0.17	DNS	0.48	0.97	0.17	0.62
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.210	0.414	0.051	DNS	0.210	0.414	0.051	DNS	0.202	0.351	0.043	0.025
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.007	0.007	0.005	DNS	0.007	0.007	0.005	DNS	0.006	0.007	0.005	0.007
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.4	0.2	0.8	0.2	0.4	0.2	0.6	0.6	0.5	0.2	1.8
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.03	0.01	0.07	0.02	0.03	0.01	0.06	0.04	0.03	0.01	0.01

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-38 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW9b*			SW9a	SW9b*			SW9a	SW9b*			SW9a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.5	21.1	14.1	21.2	3.5	21.1	14.1	22.0	3.5	21.0	14.1	20.7
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	966.0	244.0	138.2	140.5	51.3	241.6	163.6	223.5	47.3	241.6	179.2	152.0
Dissolved oxygen (DO)	%	0-200	85-110	19.9	81.8	46.8	79.3	21.4	79.6	35.0	32.0	21.6	79.6	35.0	75.1
pH		0-14	6.5-8	0.4	7.4	6.8	7.2	0.4	7.5	6.9	7.4	0.4	7.5	6.9	6.9
Turbidity (NTU)	NTU	0-600	6-50	8.7	21.9	12.8	26.9	7.8	21.9	14.6	15.7	7.8	22.8	14.9	28.4
Total suspended solids (TSS)	mg/L	5	-	2.0	6.0	5.0	6.5	2.0	6.0	5.0	5.0	2.0	6.0	5.0	6.0
Aluminium (Al)	mg/L	0.01	0.055”	0.09	0.13	0.01	DNS	0.09	0.13	0.01	0.09	0.09	0.13	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.48	0.97	0.17	DNS	0.39	0.93	0.17	1.01	0.39	0.93	0.17	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.202	0.351	0.043	DNS	0.197	0.279	0.043	0.112	0.197	0.279	0.043	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.006	0.007	0.005	DNS	0.005	0.005	0.005	0.005	0.005	0.005	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.6	0.5	0.2	0.4	0.6	0.5	0.2	0.3	0.6	0.5	0.2	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.04	0.03	0.01	0.01	0.04	0.04	0.01	0.03	0.04	0.04	0.01	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-39 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW10b*			SW10a	SW10b*			SW10a	SW10b*			SW10a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.5	21.6	13.9	18.0	3.4	21.6	14.0	16.0	3.6	21.6	13.5	14.2
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	197.2	592.4	212.8	207.5	234.9	596.0	236.0	248.0	248.1	602.8	198.4	269.5
Dissolved oxygen (DO)	%	0-200	85-110	13.7	70.8	43.1	55.1	13.4	70.8	45.3	50.7	14.6	70.9	52.7	49.7
pH		0-14	6.5-8	0.6	7.8	6.9	6.6	0.6	7.8	6.9	6.9	0.6	7.8	6.8	7.3
Turbidity (NTU)	NTU	0-600	6-50	18.3	17.5	5.3	52.0	19.0	17.7	5.4	35.3	22.2	22.3	5.3	44.7
Total suspended solids (TSS)	mg/L	5	-	2.9	6.4	5.0	12.5	2.8	6.0	5.0	5.0	2.9	6.4	5.0	6.0
Aluminium (Al)	mg/L	0.01	0.055”	0.11	0.14	0.01	DNS	0.11	0.14	0.01	0.06	0.11	0.14	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.51	0.71	0.21	DNS	0.58	0.81	0.21	1.39	0.58	0.81	0.21	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.209	0.263	0.051	DNS	0.200	0.227	0.051	0.192	0.200	0.227	0.051	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.002	0.000	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.005	0.009	0.005	DNS	0.005	0.009	0.005	0.005	0.005	0.009	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.4	0.2	0.5	0.2	0.4	0.2	0.4	0.2	0.5	0.2	0.5
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.02	0.01	0.03	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-40 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW10b*			SW10a	SW10b*			SW10a	SW10b*			SW10a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.8	21.6	13.5	11.7	3.9	21.6	13.0	11.6	3.7	21.6	14.0	16.1
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	247.1	572.6	198.4	287.0	251.3	572.6	198.4	255.5	251.6	572.6	198.4	295.5
Dissolved oxygen (DO)	%	0-200	85-110	15.0	70.9	51.7	46.5	14.5	70.9	53.8	59.5	14.1	69.2	53.8	55.3
pH		0-14	6.5-8	0.6	7.8	6.8	7.6	0.6	7.8	6.7	6.9	0.6	7.7	6.7	7.3
Turbidity (NTU)	NTU	0-600	6-50	22.2	30.5	5.3	31.5	22.2	30.5	5.3	21.8	22.5	35.5	5.3	31.2
Total suspended solids (TSS)	mg/L	5	-	2.9	6.4	5.0	5.0	2.8	5.4	5.0	5.0	3.1	7.0	5.0	9.0
Aluminium (Al)	mg/L	0.01	0.055”	0.11	0.14	0.01	DNS	0.11	0.14	0.01	DNS	0.09	0.10	0.01	0.06
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.58	0.81	0.21	DNS	0.58	0.81	0.21	DNS	0.58	0.81	0.21	0.70
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.200	0.227	0.051	DNS	0.200	0.227	0.051	DNS	0.205	0.263	0.051	0.418
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.005	0.009	0.005	DNS	0.005	0.009	0.005	DNS	0.004	0.006	0.005	0.008
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.5	0.2	0.4	0.2	0.4	0.2	0.3	0.2	0.5	0.3	0.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.03	0.01	0.02	0.01	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-41 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW10b*			SW10a	SW10b*			SW10a	SW10b*			SW10a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.7	21.6	14.0	17.7	3.8	21.6	14.0	19.5	3.7	21.6	14.0	20.5
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	249.7	572.6	198.4	379.5	250.1	572.6	198.4	236.0	247.2	349.8	176.8	168.5
Dissolved oxygen (DO)	%	0-200	85-110	13.4	65.0	47.6	32.1	13.5	64.4	43.9	44.1	14.9	65.5	41.5	64.5
pH		0-14	6.5-8	0.6	7.7	6.7	7.7	0.6	7.7	6.7	7.1	0.6	7.6	6.6	6.9
Turbidity (NTU)	NTU	0-600	6-50	22.2	35.5	6.3	23.8	21.8	35.5	7.1	19.5	31.8	42.6	10.3	83.1
Total suspended solids (TSS)	mg/L	5	-	3.1	7.0	5.0	5.5	5.0	7.4	5.0	5.0	5.3	9.2	5.0	11.5
Aluminium (Al)	mg/L	0.01	0.055”	0.09	0.10	0.01	DNS	0.09	0.10	0.01	DNS	0.11	0.21	0.01	0.34
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.58	0.81	0.21	DNS	0.58	0.81	0.21	DNS	0.60	0.99	0.21	0.95
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.205	0.263	0.051	DNS	0.205	0.263	0.051	DNS	0.207	0.227	0.040	0.062
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.006	0.005	DNS	0.004	0.006	0.005	DNS	0.004	0.006	0.005	0.009
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.5	0.3	0.4	0.2	0.5	0.3	0.5	0.2	0.5	0.3	0.7
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.02	0.01	0.03	0.01	0.02	0.01	0.04	0.07	0.04	0.01	0.24

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-42 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW10b*			SW10a	SW10b*			SW10a	SW10b*			SW10a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.6	21.4	14.0	21.3	3.6	21.6	14.0	21.9	3.5	21.2	14.0	20.5
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	223.3	298.2	160.6	159.5	195.3	290.4	176.8	277.5	193.8	290.4	182.8	185.0
Dissolved oxygen (DO)	%	0-200	85-110	16.5	69.2	41.5	67.4	18.1	65.3	37.1	20.3	18.4	69.2	40.3	64.9
pH		0-14	6.5-8	0.5	7.5	6.6	7.1	0.5	7.5	6.7	7.4	0.5	7.5	6.6	6.8
Turbidity (NTU)	NTU	0-600	6-50	31.3	49.1	12.2	32.1	30.4	49.1	15.6	25.2	29.3	49.1	20.3	27.3
Total suspended solids (TSS)	mg/L	5	-	5.5	11.0	5.0	11.0	5.5	11.0	5.0	7.5	5.4	11.0	5.0	5.5
Aluminium (Al)	mg/L	0.01	0.055”	0.11	0.21	0.01	DNS	0.11	0.10	0.01	0.03	0.11	0.10	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.60	0.99	0.21	DNS	0.60	1.07	0.21	1.04	0.60	1.07	0.21	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.207	0.227	0.040	DNS	0.232	0.350	0.040	0.555	0.232	0.350	0.040	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.006	0.005	DNS	0.004	0.006	0.005	0.005	0.004	0.006	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.6	0.3	0.4	0.2	0.6	0.3	0.5	0.2	0.6	0.3	0.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.07	0.04	0.01	0.02	0.07	0.04	0.01	0.04	0.07	0.04	0.01	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-43 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW11b*			SW11a	SW11b*			SW11a	SW11b*			SW11a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	4.8	22.6	14.3	18.5	4.3	21.7	14.3	15.8	3.8	21.1	13.7	14.5
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	758.4	750.4	136.2	547.0	711.4	454.8	136.2	780.5	538.0	297.0	136.2	881.0
Dissolved oxygen (DO)	%	0-200	85-110	34.7	97.2	25.5	75.7	36.3	97.2	23.1	47.5	36.6	97.2	23.1	73.8
pH		0-14	6.5-8	0.7	7.6	6.3	6.3	0.7	7.6	6.2	6.5	0.7	7.5	6.2	7.0
Turbidity (NTU)	NTU	0-600	6-50	18.2	42.1	5.7	13.2	16.0	31.5	6.5	26.6	14.3	25.4	6.5	33.5
Total suspended solids (TSS)	mg/L	5	-	8.0	9.0	5.0	5.0	8.0	9.0	5.0	5.0	7.9	8.4	5.0	5.5
Aluminium (Al)	mg/L	0.01	0.055”	0.17	0.35	0.01	DNS	0.17	0.35	0.01	0.01	0.17	0.35	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.022	0.002	0.001	DNS	0.022	0.002	0.001	0.001	0.022	0.002	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.19	0.47	0.07	DNS	0.46	0.49	0.08	0.34	0.46	0.49	0.08	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.407	0.374	0.039	DNS	0.403	0.374	0.039	0.443	0.403	0.374	0.039	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.002	0.000	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.010	0.010	0.005	DNS	0.010	0.009	0.005	0.006	0.010	0.009	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.6	0.3	0.4	0.2	0.6	0.3	0.2	0.2	0.6	0.3	0.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.03	0.01	0.01	0.02	0.03	0.01	0.01	0.02	0.04	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-44 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW11b*			SW11a	SW11b*			SW11a	SW11b*			SW11a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.3	19.3	12.7	12.3	3.2	17.7	12.4	12.1	3.0	17.7	12.5	16.2
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	526.6	333.2	159.0	1713.0	522.1	381.2	159.0	583.5	101.4	333.2	159.0	611.0
Dissolved oxygen (DO)	%	0-200	85-110	34.7	93.5	23.1	70.1	33.2	74.7	21.8	86.5	28.3	42.4	20.6	80.1
pH		0-14	6.5-8	0.8	7.4	5.9	7.0	0.8	7.3	5.8	6.5	0.8	7.2	5.8	7.1
Turbidity (NTU)	NTU	0-600	6-50	13.5	25.4	7.3	20.0	20.6	26.8	7.3	30.6	21.1	35.9	7.9	39.4
Total suspended solids (TSS)	mg/L	5	-	5.8	7.4	5.0	5.0	4.4	8.0	5.0	10.0	3.4	8.0	5.0	8.0
Aluminium (Al)	mg/L	0.01	0.055”	0.17	0.35	0.01	DNS	0.17	0.35	0.01	DNS	0.17	0.35	0.01	0.15
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.022	0.002	0.001	DNS	0.022	0.002	0.001	DNS	0.022	0.002	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.46	0.49	0.08	DNS	0.46	0.49	0.08	DNS	0.61	0.49	0.08	0.19
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.403	0.374	0.039	DNS	0.403	0.374	0.039	DNS	0.405	0.436	0.044	0.163
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.010	0.009	0.005	DNS	0.010	0.009	0.005	DNS	0.010	0.011	0.005	0.007
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.6	0.3	0.3	0.3	0.6	0.3	0.2	0.3	0.6	0.3	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.03	0.01	0.01	0.02	0.03	0.01	0.01	0.02	0.03	0.01	0.01

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-45 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW11b*			SW11a	SW11b*			SW11a	SW11b*			SW11a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.0	17.7	12.5	16.8	3.0	17.9	13.0	18.7	3.3	19.3	14.4	21.8
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	113.2	395.2	181.8	2174.5	113.6	395.2	181.8	704.0	120.2	395.2	135.6	122.5
Dissolved oxygen (DO)	%	0-200	85-110	25.1	36.6	20.6	66.5	25.3	36.6	19.2	83.6	29.6	66.7	21.0	93.4
pH		0-14	6.5-8	0.8	7.2	5.8	7.7	0.8	7.2	5.8	6.8	0.7	6.9	5.8	6.5
Turbidity (NTU)	NTU	0-600	6-50	21.2	42.0	7.9	9.0	21.3	47.5	9.2	35.5	22.2	49.7	12.3	55.1
Total suspended solids (TSS)	mg/L	5	-	3.7	8.4	5.0	5.5	4.0	9.8	5.0	8.0	4.0	9.8	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.17	0.35	0.01	DNS	0.17	0.35	0.01	DNS	0.23	0.41	0.01	0.78
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.022	0.002	0.001	DNS	0.022	0.002	0.001	DNS	0.022	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.61	0.49	0.08	DNS	0.61	0.49	0.08	DNS	0.60	0.49	0.08	0.44
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.405	0.436	0.044	DNS	0.405	0.436	0.044	DNS	0.409	0.374	0.036	0.020
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.010	0.011	0.005	DNS	0.010	0.011	0.005	DNS	0.010	0.010	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.6	0.3	0.3	0.3	0.6	0.3	0.4	0.3	0.7	0.3	0.7
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.03	0.01	0.01	0.02	0.04	0.01	0.01	0.02	0.04	0.01	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-46 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW11b*			SW11a	SW11b*			SW11a	SW11b*			SW11a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.6	21.1	14.4	21.6	3.6	21.1	14.4	21.3	3.5	20.5	14.4	21.0
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	143.4	403.2	117.2	148.0	137.4	403.2	135.6	1158.5	133.8	403.2	171.4	226.5
Dissolved oxygen (DO)	%	0-200	85-110	31.8	91.9	21.0	58.3	30.5	67.9	20.4	57.2	29.4	63.7	21.6	72.0
pH		0-14	6.5-8	0.7	6.8	5.8	6.5	0.6	6.9	5.9	7.2	0.6	6.9	5.9	6.6
Turbidity (NTU)	NTU	0-600	6-50	21.4	49.7	13.3	30.3	20.2	49.7	15.4	19.3	19.0	49.7	21.3	42.1
Total suspended solids (TSS)	mg/L	5	-	4.3	11.8	5.0	7.5	4.3	11.8	5.0	7.0	4.3	11.8	5.0	7.5
Aluminium (Al)	mg/L	0.01	0.055”	0.23	0.41	0.01	DNS	0.23	0.41	0.01	0.05	0.23	0.41	0.01	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.022	0.001	0.001	DNS	0.022	0.001	0.001	0.001	0.022	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.60	0.49	0.08	DNS	0.77	1.05	0.08	0.43	0.77	1.05	0.08	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.409	0.374	0.036	DNS	0.409	0.374	0.036	0.453	0.409	0.374	0.036	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.010	0.010	0.005	DNS	0.010	0.010	0.005	0.005	0.010	0.010	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.6	0.3	0.5	0.3	0.6	0.3	0.3	0.3	0.6	0.3	0.5
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.04	0.01	0.01	0.02	0.03	0.01	0.01	0.02	0.03	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-47 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW12a*			SW12b	SW12a*			SW12b	SW12a*			SW12b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	4.2	21.7	13.7	18.2	3.5	21.7	15.4	15.6	3.2	21.7	15.4	14.3
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	85.7	285.2	147.0	172.5	85.4	285.2	147.0	224.5	86.1	293.6	147.0	201.5
Dissolved oxygen (DO)	%	0-200	85-110	18.4	64.3	25.7	25.1	19.1	64.3	23.5	28.9	20.6	64.3	20.5	35.6
pH		0-14	6.5-8	0.6	7.4	6.4	6.1	0.6	7.4	6.4	6.5	0.6	7.4	6.4	6.8
Turbidity (NTU)	NTU	0-600	6-50	17.7	31.0	11.2	12.2	17.8	31.0	10.7	26.2	21.3	32.6	11.0	16.2
Total suspended solids (TSS)	mg/L	5	-	4.2	9.2	5.0	8.5	5.8	10.2	5.0	6.5	6.8	17.2	5.0	5.5
Aluminium (Al)	mg/L	0.01	0.055”	0.11	0.18	0.04	DNS	0.11	0.21	0.05	0.14	0.11	0.21	0.05	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.002	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.002	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.001	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.53	1.19	0.20	DNS	1.38	1.33	0.23	1.63	1.38	1.33	0.23	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.096	0.183	0.025	DNS	0.097	0.204	0.025	0.200	0.097	0.204	0.025	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.000	0.002	0.001	0.003	0.000	0.002	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.017	0.016	0.005	DNS	0.017	0.016	0.005	0.006	0.017	0.016	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.6	1.0	0.5	0.6	0.6	1.2	0.5	0.8	0.6	1.3	0.6	0.6
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.05	0.02	0.02	0.03	0.05	0.02	0.02	0.03	0.06	0.02	0.04

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-48 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW12a*			SW12b	SW12a*			SW12b	SW12a*			SW12b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.6	21.7	15.2	11.8	4.1	21.7	13.5	12.4	4.0	21.7	13.5	17.6
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	85.7	293.6	147.0	258.0	84.3	293.6	151.8	237.5	80.3	277.2	151.8	197.0
Dissolved oxygen (DO)	%	0-200	85-110	21.2	60.7	14.7	21.2	21.1	60.7	14.7	21.7	21.3	62.1	14.7	44.6
pH		0-14	6.5-8	0.6	7.4	6.4	6.8	0.6	7.4	6.4	6.5	0.6	7.5	6.4	7.3
Turbidity (NTU)	NTU	0-600	6-50	21.7	35.4	11.0	22.7	22.5	41.8	11.7	27.2	22.9	50.4	11.7	17.0
Total suspended solids (TSS)	mg/L	5	-	6.7	17.2	5.0	5.0	6.7	17.2	5.0	7.5	6.8	17.2	5.0	9.5
Aluminium (Al)	mg/L	0.01	0.055”	0.11	0.21	0.05	DNS	0.11	0.21	0.05	DNS	0.11	0.21	0.06	0.10
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	1.38	1.33	0.23	DNS	1.38	1.33	0.23	DNS	1.37	1.66	0.25	1.07
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.097	0.204	0.025	DNS	0.097	0.204	0.025	DNS	0.096	0.204	0.025	0.193
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.002	0.001	DNS	0.000	0.002	0.001	DNS	0.000	0.002	0.001	0.002
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.017	0.016	0.005	DNS	0.017	0.016	0.005	DNS	0.017	0.016	0.005	0.009
Total Nitrogen (TN)	mg/L	0.1	0.5	0.6	1.3	0.6	0.7	0.6	1.3	0.6	0.4	0.6	1.3	0.7	0.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.06	0.02	0.02	0.03	0.06	0.02	0.02	0.03	0.06	0.02	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-49 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW12a*			SW12b	SW12a*			SW12b	SW12a*			SW12b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.7	19.9	13.5	18.0	3.5	18.8	13.5	19.4	3.4	18.9	13.5	20.6
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	63.2	271.0	151.8	243.5	59.7	271.0	173.8	212.0	61.2	260.0	143.0	120.0
Dissolved oxygen (DO)	%	0-200	85-110	21.9	59.4	12.6	13.5	21.8	59.4	12.6	23.4	21.0	57.2	12.6	58.2
pH		0-14	6.5-8	0.6	7.6	6.4	7.5	0.6	7.5	6.4	6.5	0.6	7.3	6.4	6.4
Turbidity (NTU)	NTU	0-600	6-50	19.7	41.8	12.0	15.1	19.1	35.0	12.0	12.0	19.0	36.9	12.5	33.8
Total suspended solids (TSS)	mg/L	5	-	6.7	17.2	5.0	7.5	6.7	17.2	5.0	5.0	6.6	17.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.11	0.21	0.06	DNS	0.11	0.21	0.06	DNS	0.19	0.22	0.06	0.66
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	1.37	1.66	0.25	DNS	1.37	1.66	0.25	DNS	1.38	1.66	0.25	0.70
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.096	0.204	0.025	DNS	0.096	0.204	0.025	DNS	0.099	0.204	0.025	0.030
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.002	0.001	DNS	0.000	0.002	0.001	DNS	0.000	0.002	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.017	0.016	0.005	DNS	0.017	0.016	0.005	DNS	0.017	0.016	0.005	0.007
Total Nitrogen (TN)	mg/L	0.1	0.5	0.5	1.3	0.7	0.7	0.5	1.2	0.7	0.6	0.5	1.2	0.7	0.7
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.06	0.03	0.04	0.03	0.06	0.03	0.02	0.03	0.06	0.02	0.02

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-50 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW12a*			SW12b	SW12a*			SW12b	SW12a*			SW12b
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.7	21.6	13.5	21.9	3.8	21.7	14.1	22.5	3.7	21.2	14.1	20.6
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	61.4	245.8	120.8	153.0	57.1	245.8	143.0	214.5	55.7	245.8	159.8	161.5
Dissolved oxygen (DO)	%	0-200	85-110	21.6	57.2	12.6	50.1	20.1	51.9	12.6	21.3	20.0	51.9	12.9	38.5
pH		0-14	6.5-8	0.6	7.2	6.3	6.6	0.5	7.3	6.4	7.1	0.5	7.3	6.4	6.5
Turbidity (NTU)	NTU	0-600	6-50	19.1	36.9	11.1	15.9	19.1	36.9	11.1	20.2	17.9	36.9	14.2	26.0
Total suspended solids (TSS)	mg/L	5	-	6.5	17.0	5.0	5.5	6.5	17.0	5.0	8.5	6.4	17.0	5.6	9.5
Aluminium (Al)	mg/L	0.01	0.055”	0.19	0.22	0.06	DNS	0.19	0.22	0.06	0.12	0.19	0.22	0.06	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.002	0.000	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	1.38	1.66	0.25	DNS	1.38	1.66	0.25	1.55	1.38	1.66	0.25	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.099	0.204	0.025	DNS	0.099	0.205	0.025	0.202	0.099	0.205	0.025	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.002	0.001	DNS	0.000	0.002	0.001	0.002	0.000	0.002	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.017	0.016	0.005	DNS	0.017	0.016	0.005	0.007	0.017	0.016	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.5	1.1	0.7	0.7	0.3	1.0	0.7	0.7	0.3	1.0	0.7	0.6
Total Phosphorous (TP)	mg/L	0.01	0.05	0.04	0.06	0.02	0.02	0.04	0.06	0.02	0.04	0.04	0.06	0.02	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-51 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	April 2020				May 2020				June 2020			
				SW13b*			SW13a	SW13b*			SW13a	SW13b*			SW13a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.3	20.6	13.8	18.0	3.3	20.6	13.8	15.5	3.4	20.6	13.8	14.3
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	138.2	382.4	175.0	183.0	139.9	374.0	175.0	262.0	142.6	374.0	169.0	353.0
Dissolved oxygen (DO)	%	0-200	85-110	27.7	75.1	24.4	63.4	28.5	75.1	21.6	47.5	27.6	75.1	24.4	77.4
pH		0-14	6.5-8	0.7	7.9	6.9	6.7	0.7	7.9	6.9	7.0	0.7	7.9	6.9	7.2
Turbidity (NTU)	NTU	0-600	6-50	7.4	21.9	9.0	22.5	10.3	24.3	9.0	17.2	11.0	27.6	9.0	14.9
Total suspended solids (TSS)	mg/L	5	-	4.4	12.0	5.0	6.0	3.4	12.0	5.0	5.0	3.3	12.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.22	0.30	0.03	DNS	0.22	0.30	0.03	0.09	0.22	0.30	0.03	DNS
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.002	0.001	0.001	0.002	0.002	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.002	0.001	0.001	0.001	0.002	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.002	0.001	0.001	0.001	0.002	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.54	1.02	0.28	DNS	0.58	1.12	0.23	1.53	0.58	1.12	0.23	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.002	0.001	0.001	0.001	0.002	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.098	0.141	0.049	DNS	0.104	0.160	0.045	0.066	0.104	0.160	0.045	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.001	0.001	0.001	DNS	0.002	0.001	0.001	0.001	0.002	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.023	0.015	0.005	DNS	0.024	0.018	0.005	0.006	0.024	0.018	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.4	0.9	0.2	0.6	0.4	0.9	0.2	0.5	0.4	0.9	0.3	0.7
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.03	0.01	0.03	0.02	0.04	0.01	0.01	0.02	0.04	0.01	0.04

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-52 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	July 2020				August 2020				September 2020			
				SW13b*			SW13a	SW13b*			SW13a	SW13b*			SW13a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.6	20.6	13.2	11.6	3.7	20.6	12.2	12.0	3.5	20.6	13.8	16.0
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	143.7	374.0	169.0	434.5	142.1	374.0	169.0	346.5	136.5	336.0	169.0	327.0
Dissolved oxygen (DO)	%	0-200	85-110	25.5	69.6	26.0	83.1	26.0	75.1	27.9	93.7	22.5	67.4	27.9	67.9
pH		0-14	6.5-8	0.6	7.8	6.9	7.6	0.6	7.8	6.9	7.2	0.6	7.8	6.9	7.6
Turbidity (NTU)	NTU	0-600	6-50	11.0	28.5	9.0	21.5	11.9	30.6	9.0	25.0	15.4	32.6	10.6	24.5
Total suspended solids (TSS)	mg/L	5	-	3.2	10.8	5.0	5.0	3.1	10.8	5.0	6.5	3.3	12.0	5.0	8.5
Aluminium (Al)	mg/L	0.01	0.055”	0.22	0.30	0.03	DNS	0.22	0.30	0.03	DNS	0.19	0.28	0.03	0.13
Arsenic (As)	mg/L	0.001	0.024	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	0.0002	0.0001	0.0001	DNS	0.0002	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.002
Iron (Fe)	mg/L	0.05	ID	0.58	1.12	0.23	DNS	0.58	1.12	0.23	DNS	0.58	1.12	0.23	1.03
Lead (Pb)	mg/L	0.001	0.0034	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.104	0.160	0.045	DNS	0.104	0.160	0.045	DNS	0.108	0.160	0.045	0.197
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.024	0.018	0.005	DNS	0.024	0.018	0.005	DNS	0.023	0.015	0.005	0.019
Total Nitrogen (TN)	mg/L	0.1	0.5	0.4	0.9	0.3	4.9	0.4	0.9	0.2	3.5	0.3	0.9	0.4	1.9
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.04	0.01	0.03	0.02	0.04	0.01	0.06	0.02	0.04	0.01	0.05

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-53 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	October 2020				November 2020				December 2020			
				SW13b*			SW13a	SW13b*			SW13a	SW13b*			SW13a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.5	20.6	13.8	16.7	3.5	20.6	13.8	18.3	3.5	20.6	13.8	20.5
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	136.6	336.0	169.0	243.0	137.9	327.6	154.0	166.0	138.1	264.8	107.6	103.0
Dissolved oxygen (DO)	%	0-200	85-110	22.2	67.4	28.5	34.0	22.6	67.4	26.0	42.1	22.5	67.4	27.7	67.8
pH		0-14	6.5-8	0.6	7.8	6.9	8.0	0.6	7.7	6.9	6.9	0.6	7.7	6.7	6.6
Turbidity (NTU)	NTU	0-600	6-50	15.3	32.6	10.6	12.6	14.8	34.6	12.2	28.2	15.0	40.9	15.4	45.0
Total suspended solids (TSS)	mg/L	5	-	3.2	12.0	5.0	5.5	3.9	12.0	5.0	16.0	3.8	12.0	5.0	5.0
Aluminium (Al)	mg/L	0.01	0.055”	0.19	0.28	0.03	DNS	0.19	0.28	0.03	DNS	0.32	0.32	0.03	1.14
Arsenic (As)	mg/L	0.001	0.024	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	0.0002	0.0001	0.0001	DNS	0.0002	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.58	1.12	0.23	DNS	0.58	1.12	0.23	DNS	0.56	0.98	0.23	0.75
Lead (Pb)	mg/L	0.001	0.0034	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.108	0.160	0.045	DNS	0.108	0.160	0.045	DNS	0.110	0.160	0.039	0.034
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.001	0.001	DNS	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.023	0.015	0.005	DNS	0.023	0.015	0.005	DNS	0.023	0.015	0.005	0.008
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.9	0.5	0.9	0.3	0.9	0.5	1.0	0.4	0.9	0.6	1.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.04	0.01	0.07	0.02	0.04	0.01	0.04	0.02	0.04	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)\

DNS – Did not sample (not required by sampling program in accordance with WQMP).

Table 3-54 Operation surface water quality results by waterway (cont.)

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	January 2021				February 2021				March 2021			
				SW13b*			SW13a	SW13b*			SW13a	SW13b*			SW13a
				Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median	Std dev	80th %	20th %	Median
Temperature	^{0}C	-2-50	NA	3.7	21.3	13.8	21.3	3.7	21.1	13.8	21.4	3.6	20.8	13.8	20.5
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	105.7	247.0	102.8	121.0	64.5	247.0	107.6	253.0	65.8	247.0	113.0	117.0
Dissolved oxygen (DO)	%	0-200	85-110	24.3	69.5	23.1	58.4	23.2	67.4	20.5	46.4	23.4	69.2	20.5	63.4
pH		0-14	6.5-8	0.6	7.6	6.6	6.8	0.5	7.7	6.7	7.7	0.5	7.7	6.8	6.8
Turbidity (NTU)	NTU	0-600	6-50	14.7	42.3	18.7	26.6	14.0	42.3	21.3	13.1	12.3	44.4	24.4	32.4
Total suspended solids (TSS)	mg/L	5	-	3.9	12.0	5.0	7.0	3.9	12.0	5.0	5.0	3.9	12.0	5.0	8.0
Aluminium (Al)	mg/L	0.01	0.055”	0.32	0.32	0.03	DNS	0.32	0.30	0.03	0.09	0.32	0.30	0.03	DNS
Arsenic (As)	mg/L	0.001	0.024	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.002	0.002	0.001	0.001	DNS
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0002	0.0001	0.0001	DNS	0.0002	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	DNS
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001	0.002	0.001	0.001	DNS
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001	0.002	0.001	0.001	DNS
Iron (Fe)	mg/L	0.05	ID	0.56	0.98	0.23	DNS	0.55	1.02	0.23	1.06	0.55	1.02	0.23	DNS
Lead (Pb)	mg/L	0.001	0.0034	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001	0.002	0.001	0.001	DNS
Manganese (Mn)	mg/L	0.001	1.9	0.110	0.160	0.039	DNS	0.112	0.173	0.039	0.091	0.112	0.173	0.039	DNS
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	DNS
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.001	0.001	DNS	0.002	0.001	0.001	0.001	0.002	0.001	0.001	DNS
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.000	0.001	0.001	0.001	0.000	0.001	0.001	DNS
Zinc (Zn)	mg/L	0.005	0.008	0.023	0.015	0.005	DNS	0.023	0.015	0.005	0.008	0.023	0.015	0.005	DNS
Total Nitrogen (TN)	mg/L	0.1	0.5	0.4	1.0	0.6	1.0	0.3	1.0	0.6	0.5	0.3	0.9	0.6	0.7
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.04	0.01	0.02	0.02	0.04	0.02	0.02	0.01	0.04	0.01	0.03

* Trigger values derived from 24 sampling events up to and including the month indicated. Where individual sampling events had prevailing dry conditions, the 24 sampling events were comprised from the earlier period to ensure 24 sampling events were always used when deriving trigger values.

Colour red - Represents the calculated median result being either above the 80th percentile or below the 20th percentile at the downstream sampling location.

“ for pH >6.5. Insufficient data for pH <6.5.

ID – Insufficient representative data (ANZECC)

DNS – Did not sample (not required by sampling program in accordance with WQMP).

3.5 Discussion of surface water results

Nearly all waterways had at least one parameter for one or more monthly results that fell either above or below calculated upstream 80th and 20th percentile values. Where a connection between upstream and downstream monitoring locations was present, the level of variability was typical of results experienced during pre-construction monitoring. Overwhelmingly, the variability was due to the prolonged dry conditions across the region where waterways were often still without flow or shallow isolated ponds. This occurred in affected waterways generally from April 2020 to November 2020.

The period between December 2020 and March 2021 was characterised by wet weather events with precipitation well above historical averages. Exceedances during this period (eg turbidity, TSS) were generally attributable to the high waterway flows and were experienced at up and downstream sampling points during individual sampling events.

Observations during sampling events suggest that landscaping along the project and particularly around waterways has established well and provides a high level of stability to areas disturbed by construction. Therefore, the following general and specific observations can be made:

- About 65 per cent of the monitoring period can be characterised by rainfall values at or below average across the entire project and broader region. April 2020 through until early November 2020 saw rainfall figures for four of these months at least half the monthly average and in one case substantially lower than the historical average (ie November 2020 was 10 times below the historical average). During this period a number of waterways exhibited conditions including a connection but not flow, a series of isolated ponds, or in the case of SW5b too shallow to sample. Exceptions were the Hastings River and Wilson River which are both subject to tidal flow. December 2020 through to March 2021 saw a considerable change to climatic conditions with significant rainfall events and monthly totals resulting in connections and flow in nearly all waterways. The March 2021 period was characterised by a wide spread flood event affecting much of the region. Wide spread damage to property was noted. However, with the exception of substantial flood debris deposits, landscaping across the project generally remained intact.
- Temperature – Calculated median values were below or above the calculated upstream 80th and 20th percentile trigger value on one or more occasions for all waterways during the monitoring period. Variability was consistent across the project for all waterways and coincided with the winter and summer months with waterway temperatures below the 20th percentile trigger value during winter and above the 80th percentile in summer. In nearly all instances the values were consistent at both upstream and downstream sampling points. In the instances where minor variability was recorded, this was generally the result of low or no flow conditions, shallow water depth and exposure to sunlight. It is considered that temperature variability during the monitoring period within all waterways was unrelated to the project.
- Electrical conductivity – Calculated median values were below or above the calculated upstream 80th and 20th percentile trigger value on one or more occasions for all waterways during the monitoring period with the exception of SW8b. On review of individual sampling events where calculated monthly medians fall outside of 80th or 20th percentile trigger values, the individual results are typically consistent between upstream and downstream samples. Exceptions to this include individual results at SW1, SW2, SW5b, SW11 and SW13. At all sampling locations (with the exception of SW5 which is measured against historical records dating to pre-construction) the greater differences coincide with no visible flow or sample points persisting as isolated ponds at the time of sampling. Under these circumstances, the natural characteristics of individual waterways

(eg shallow pools with small water volume or large pools with substantial water volume) can influence the speed at which chemical and physical changes within the waterway can occur and directly influence sampling results. For all freshwater waterways with the exception of SW11, SW12 and SW13, the calculated median values were within the default trigger values for low land rivers presented in the ANZECC guidelines. At SW11, SW12 and SW13, EC levels marginally below the ANZECC guideline trigger values coincided with or followed substantial rain events in December 2020. At SW5b, recorded levels between December 2020 and March 2021 coincide with high to extreme wet weather and flooding and are only marginally lower than the 20th percentile trigger values.

It is considered that the project's contribution to EC variability during the monitoring period was negligible owing to the generally stable and well vegetated road corridor that was previously subject to construction disturbance. Improvements in elevated extremes (levels above ANZECC upper limit default trigger value) of EC in some waterways compared to previous monitoring periods suggest a combination of weather conditions and waterway resilience has improved.

- Dissolved oxygen – Calculated median values were below or above the calculated upstream 80th and 20th percentile trigger value on one or more occasions for all waterways during the monitoring period. SW2a, SW3b, SW5b, SW6b, SW6d, SW7b, SW8b, SW8c, SW9a, SW10a and SW12b were below the 20th percentile trigger values for between one and eight months during the monitoring period. On nearly all occasions, levels were also below the lower limit default trigger value for low land and rivers present in the ANZECC guidelines. While 80th percentile trigger values were exceeded on a number of occasions (on between one and ten occasions), particularly at SW1c. In all instance levels were below the upper limit default trigger value for low land rivers presented in the ANZECC guidelines.

  On review of individual sampling events where calculated monthly medians fall outside of 80th or 20th percentile trigger values, the individual results for SW3, SW6 (b and d), SW7, SW8 (b and c), SW9 and SW10 were consistent between upstream and downstream samples. For SW2, the waterway routinely persists as standing water where water level, rather than flow, is very dependent on rainfall. This waterway, while connected throughout the monitoring period, was observed to have no flow on all occasions.

  At the remaining waterways (SW1, SW11, SW12 and SW13), it was noted that these waterways persisted with little to no flow, or were present as isolated ponds, during periods when upstream and downstream variability was recorded. It is also noted that in some waterways the variability also coincides with localised algae outbreaks.

  While impacts generally attributable to the project are considered negligible, it has been previously noted that the removal of waterway vegetation (within and on adjacent banks) during construction may have locally reduce the waterways resilience to elevated sediment and nutrient loads (eg ability of vegetation to consume additional nutrients and additional sunlight exposure) from the broader catchment land use practices. This being more evident in waterways without the flushing effects of tidal changes experienced at SW3 and SW6. Vegetation density has continued to develop throughout the three years since the project opened to traffic. It is expected that further growth and the re-establishment of waterway bank and canopy vegetation would further improve waterway condition.

- pH – Calculated median values were generally within, or close to, the calculated upstream 80th and 20th percentile trigger values for all waterways throughout the 12-month monitoring period. Exceptions in nearly all instances were minor, with differences ranging between pH 0.1 and 0.9. In all but 14 instances, pH levels were within the default trigger value for low land rivers presented in the ANZECC guidelines. Where outside the

range, these were typically marginal and all slightly below the default trigger value for low land rivers presented in the ANZECC guidelines.

SW5b was the only waterway that recorded pH levels above the 80th percentile for each event a sample was collected. Levels above the 80th percentile ranged between pH 1.5 and 2.4, and were within the default trigger value for low land rivers presented in the ANZECC guidelines. It is noted that pre-construction monitoring data used to establish 80th and 20th percentiles were particularly acidic with levels between pH 4.2 and 5.6. This period was characterised by generally drier conditions and agricultural activity eg cattle grazing within area subject to sampling. Results collected during this year 3 operational period remain consistent with levels obtained during the previous year 1 and year 2 operational monitoring periods.

It is considered that pH variability during the monitoring period within all waterways was unrelated to the project. Above average rainfall between December 2020 and March 2021, or the predominantly drier conditions preceding this, are considered to the predominant factors affecting pH.

- Turbidity and TSS – Calculated median values for SW2a, SW3b, SW6b, SW6d, SW7b, SW8b, SW8c, SW9a, SW10a, SW11a and SW13a exceeded calculated 80th percentile values for turbidity on one or more occasions during the monitoring period. A number of these exceedances at SW2a, SW3b, SW6b, SW6d, SW7b, SW10b and SW11b were also above the ANZECC upper limit default trigger value for the respective waterway type.

  For all instances at SW3b, SW6b, SW6d, SW7b, SW8b, SW8c, SW9a, levels were similar both upstream and downstream for the individual sampling events. Where elevated levels were experienced in waterways with tidal influences (ie SW3 and SW6), particularly where there was no corresponding substantial rain event, these were considered attributable to long-shore water movement, wind and wave action, and in some instances water craft traversing the area creating waves. Impacts attributable to the project are considered negligible.

  At SW2, the elevated turbidity during April, May, October and November 2020 coincided with visible evidence of livestock activity (ie cattle traversing waterway and/or feeding on aquatic vegetation) generally downstream of the upstream sampling location. Primary production activity is considered to be the main factor contributing to upstream and downstream differences, and the generally elevated turbidity levels in this waterway.

  In waterways such as SW10 and SW11 where there was a greater variability between upstream and downstream turbidity levels, corresponding TSS levels were either consistent between upstream and downstream, or at low levels eg <15 mg/l.

  Observations made during the year three sampling events and the subsequent monitoring results suggest the project is having a negligible impact on turbidity levels in waterways across the project. The results reinforce that maturation of landscaping, including increased groundcover and canopy cover densities, has and will further improve water quality across the project.

- Nitrogen and phosphorus – Calculated median values were generally below the calculated upstream 80th percentile trigger values for the majority of waterways throughout the 12-month monitoring period. Exceptions in all waterways, other than some in SW2 and SW13, were of a minor nature with levels generally consistent between upstream and downstream for individual sampling events. Where variability was observed between upstream and downstream, it generally coincided with conditions where there was no visible flow.

Higher levels and increased variability was recorded at SW2 and SW13. Generally, broader land use practices eg commercial and agriculture, are considered likely to be the major influences on nitrogen and phosphorus in these and other waterways experiencing elevated levels.

SW2 lies within an active grazing farmland and is proximate to a rock-lined causeway trafficked by farming equipment and livestock (ie cattle). Observations during routine monitoring also note cattle frequenting the area for foraging and grazing purposes which directly impacts water quality monitoring results. Material imported for the project, other than permanent road structure (ie bridge piers and scour protection), was removed from the area prior to opening to traffic and stabilised with grasses (where access for livestock is available) or native shrubs and grasses in the adjacent road corridor where livestock are excluded by project boundary fencing. The ongoing trend of elevated nitrogen and phosphorus levels within this waterway are considered unlikely to be the result of construction or operation of the project.

At SW13a, results for nitrogen and phosphorous show an initial extreme elevated trend commencing in July 2017. This trend continued on and off into 2019 and again through the current monitoring period including July through to December 2020, but primarily for nitrogen rather than phosphorus. As the project site has remained unchanged in this area for a considerable period of time (ie landscape vegetation maturing), it is considered unlikely to be a result of construction or operation of the project. However, changes to land use activities that may contribute to an increased nitrogen and phosphorous load in the waterway including a large land subdivision and the development and operation commercial facilities have been observed within the SW13a catchment during previous monitoring periods.

Impacts attributable to construction or operation of the project are considered negligible.

- Total petroleum hydrocarbons (TPH) – Sampling for TPH following the observed presence of oil and grease was not undertaken at any waterways during the reporting period.
- Metals – Analysis of metals showed limited variation in levels for nearly all sampling locations and analytes. Exceptions included aluminium, iron, magnesium, nickel and zinc at some waterways, which showed substantial variability. Comparatively low or elevated levels were generally experienced concurrently both upstream and downstream for individual monitoring events. Where clear differences between upstream and downstream locations were recorded, this typically coincided with monitoring locations persisting as isolated ponds or standing water with limited to no flow. Under these circumstances, the natural characteristics of individual waterways (eg shallow pools with small water volume or large pools with substantial water volume) can influence the speed at which chemical and physical changes within the waterway can occur (eg through temperature fluctuations and/or evaporation) and directly influence sampling results. The results were not inconsistent with the variability and levels experienced during the pre-construction monitoring period. None of the elevated or low metal parameters are considered likely to be attributable to the project.

3.6 Overview of surface water quality results and project response

Site observations and detailed assessment of the water monitoring data shows that impacts on water quality that could be attributed to the project are generally considered negligible.

Landscape vegetation continues to mature and surface coverage is generally good along the length of the project. Natural stagnation of smaller waterways during low flow and prolonged dry conditions, and the increased exposure to light, may contribute to localised algal growth when combined with elevated nutrient levels derived from broader catchment land uses from time to time. Under these conditions extreme fluctuations in physical parameters such a dissolved oxygen can prevail. However, it would be expected that as landscape vegetation increases in height, particularly around waterways, this light penetration would reduce and the resilience of waterways within the boundary of the project would further improve.

As noted in section 3.5, water quality monitoring continues to show variability for a number of parameters. However, this variability is generally both consistent for upstream and downstream sampling points where there is a connection and flow. At other times, the differences generally occur when waterways are disconnected and present as isolated ponds, or are connected without flow.

Broader land use practices continue to evolve along the length of the project. Areas to the south and north have been subject to extensive land clearing, and commercial and industrial development. Water quality results for these waterway reflect the ongoing and developing adjacent land use practices. Elsewhere, prevailing land use continues to be agricultural eg stock grazing, and physical, chemical and nutrient results reflect this.

The approved Water Quality Monitoring Program had the primary objective to observe and assess the impact of the project on water quality in relevant waterways throughout construction and up to three year of operation. Monitoring performed for the project has achieved the objectives of the program, has been completed for a period of three years of operation, and demonstrated through observations and results that the project poses negligible ongoing risks or impacts. On this basis, further water quality monitoring is not proposed or considered warranted.

As with all major road projects, Transport's asset and maintenance group have incorporated the project and related infrastructure into its management system and conduct routine inspections and maintenance, as required. This ongoing surveillance serves to identify issues as they arise eg scouring in a waterway, and perform maintenance for both asset and environmental protection.

3.7 Limitations of groundwater results

A number of factors have influenced the continuity and completeness of groundwater quality results obtained during this and previous monitoring periods and the extent to which they can be analysed for trends. Relevant considerations include:

- There is insufficient historical (pre-construction) data to allow for the development of 80th and 20th percentile trigger values in accordance with ANZECC guidelines. The minimum number of samples to develop site-specific trigger values is 24 (eg generally a period of two years). With the exception of groundwater level and temperature, most analytes were sampled on three or less occasions.
- In-field parameters, other than water level, were not recorded during the June 2020 sampling event due to an equipment malfunction. This was rectified for subsequent monitoring events.
- Manually recorded electrical conductivity levels during August and September 2016 are considered unreliable due to an error with the monitoring equipment and the recorded units of measurement. This issue was rectified for October 2016 and subsequent sampling events.

- GW02, GW03, GW12, GW21 and GW22 are no longer accessible due to restricted access attributable to permanent boundary fencing.
- GW05 was not accessible of two out of five sampling events.
- GW06 was dry when monitored in December 2014 and believed destroyed prior to the subsequent sampling event in February 2015. The borehole was re-established prior to June 2016 and monitoring recommenced.
- GW07, GW08, GW09, GW10, GW16, GW19, GW20 and GW25 were dry or had insufficient water and were unable to be sampled for between one and four occasions during the reporting period.
- GW08 has no pre-construction water quality data to facilitate the development of trends between pre, during and post construction. GW08 also had insufficient water for a sample on two out of four occasions during the reporting period.
- GW13 and GW14 were destroyed by construction prior to April 2015 and reinstated for monitoring prior to June 2016 monitoring event. Since June 2017, SW13 was understood to be permanently inaccessible due to permanent project boundary fencing. However, became accessible again in November 2018.
- GW16, GW17 and GW20 were not sampled during the pre-construction period and, with the exception of GW17, had insufficient water to sample during this and previous monitoring periods. GW20 was sampled on one occasion in April 2015 for laboratory parameters only due to the limited depth of water. GW16 was destroyed by construction prior to August 2015 monitoring event and restored prior to December 2016 sampling event. However, since then has had insufficient water to collect a sample.
- GW01, GW02, GW04, GW06, GW09, GW10, GW11, GW13, GW14, GW16 and GW19 were destroyed by construction during previous construction monitoring periods. All, but GW02 and GW16, were reinstated prior to July 2016 sampling event. GW02 and GW16 were reinstated prior to the September and December 2016 sampling events, respectively. GW02 and GW13 were then destroyed by construction in November and July 2017, respectively. SW13 was reinstated prior to the November 2018 monitoring event.
- Laboratory analysis was conducted for various parameters on up to four occasions for GW01, GW04 to GW11, GW13 to GW15, GW17, GW18, and GW23 to GW30 only. As indicated previously, all other boreholes were dry, destroyed, or not accessible due to permanent fencing.

3.8 Summary of groundwater results

Table 3-55 to Table 3-73 present data collected manually during the third year of operation between 30 March 2020 and 17 May 2021 with reference to the pre-construction data reported in the Oxley Highway to Kempsey Groundwater Pre-construction Report, April 2014 (note, the previous report contained monitoring data up until and including January 2020). Groundwater levels captured automatically (as noted in section 2.3) have been graphed with corresponding rainfall data from the Bureau of Meteorology and presented in Appendix D.

Appendix E presents cumulative construction groundwater quality monitoring results since December 2014. These tables capture all monitoring data throughout construction and all years of operation and allow for the identification of any long-term trends.

Table 3-55 Operation groundwater monitoring results by borehole

Parameter	Unit	LOR	GW01		Results					GW02		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	4.24	4.6	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01*	<0.01*					
Dissolved Arsenic	mg/L	0.001	0.007	0.008	<0.001	<0.001	<0.001	<0.001	0.001	0.0034	0.0046					
Dissolved Cadmium	mg/L	0.0001	0.001	0.001	0.0031	0.0022	0.0027	0.0024	0.0038	<0.01*	<0.01*					
Dissolved Chromium	mg/L	0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01*	<0.01*					
Dissolved Copper	mg/L	0.001	0.043	0.063	0.016	0.011	0.023	0.040	0.003	<0.01*	<0.01*					
Total Iron	mg/L	0.05	7.01	10.84	4.46	0.80	3.44	4.00	29.7	42.54	59.28					
Dissolved Lead	mg/L	0.001	0.021	0.03	<0.001	<0.001	<0.001	<0.001	<0.001	<0.01*	<0.01*					
Total Manganese	mg/L	0.001	0.472	0.487	0.982	1.16	0.636	0.853	1.60	0.458	0.482					
Mercury	mg/L	0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001							
Dissolved Nickel	mg/L	0.001	0.033	0.035	0.012	0.006	0.015	0.010	0.008	0.0032	0.0038					
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001*	<0.001*					
Dissolved Zinc	mg/L	0.005	0.522	0.553	0.235	0.142	0.151	0.144	0.089	0.0074	0.0086					
EC laboratory	uS/cm		5166	5982	7730	7640	7520	7750	7640	384	469					
Total Nitrogen	mg/L		0.35	1.00	1.4	0.7	0.9	1.1	2.2	1.08	2.04					
Total Phosphorus	mg/L		0.04	0.12	0.07	0.07	0.03	0.10	0.44	0.196	0.424					
Ammonia	mg/L		0.03	0.03	0.84	0.32	0.18	0.22	0.46	0.272	0.506					
Phosphate	mg/L															
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$								123							
Chloride	mg/L		1427	1919	2400				2490	27	37.2					
Nitrate	mg/L				0.10	0.06	0.10	0.60	0.06							
Sulphate	mg/L		105	258	96				91	14.4	29.4					
Calcium	mg/L		7.86	10.23	9				6	14.28	18.66					
Magnesium	mg/L		109.3	136.2	250				239	12.18	16.92					
Potassium	mg/L		6.17	7.23	12				13	4.85	6.044					
Sodium	mg/L		741	874	1200				1200	38.48	54.38					

* No variation established between sampling events.

DNS – Did Not Sample

Table 3-56 Operation groundwater monitoring results by borehole

Parameter	Unit	LOR	GW03		Results					GW04		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	0.03	0.03						<0.01*	<0.01*	<0.01	0.02	<0.01	<0.01	<0.01
Dissolved Arsenic	mg/L	0.001	0.003	0.003						0.0034	0.0046	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001*	<0.001*						<0.001*	<0.001*	<0.0001	0.0001	<0.0001	<0.0001	0.0001
Dissolved Chromium	mg/L	0.001	0.012	0.012						0.002	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.007	0.007						<0.001*	<0.001*	0.001	0.003	0.003	0.013	0.003
Total Iron	mg/L	0.05	53.7	149.8						66.3	93.3	33.8	24.0	79.8	19.4	15.9
Dissolved Lead	mg/L	0.001	<0.001*	<0.001*						<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.252	0.483						0.410	0.540	0.560	0.113	0.227	0.388	0.367
Mercury	mg/L	0.0001										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.0048	0.0132						0.0018	0.0042	0.010	0.005	0.005	0.008	0.006
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*						<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.013	0.013						0.010	0.014	0.086	0.076	0.124	0.333	0.222
EC laboratory	uS/cm		967	1292						3212	4922	1270	562	840	914	635
Total Nitrogen	mg/L		1.2	1.9						1.4	2.7	1.9	2.5	2.8	1.5	3.3
Total Phosphorus	mg/L		0.30	0.62						0.38	1.40	0.66	0.82	1.47	0.38	0.56
Ammonia	mg/L		0.07	0.17						0.18	0.98	0.31	0.07	0.79	0.15	0.10
Phosphate	mg/L															
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$															101
Chloride	mg/L		194	325						1089	1309	246				60
Nitrate	mg/L											0.11	0.11	0.03	0.40	0.02
Sulphate	mg/L		99	149						40	65	111				129
Calcium	mg/L		33.1	58.0						34.7	54.9	46				37
Magnesium	mg/L		37	76						68	107	30				17
Potassium	mg/L		6.17	13.84						14.2	24.7	4				2
Sodium	mg/L		97	337						511	701	158				76

* No variation established between sampling events.

DNS – Did Not Sample

Table 3-57 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW05		Results					GW07^		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	<0.01*	<0.01*			<0.01		0.01						0.02	0.02
Dissolved Arsenic	mg/L	0.001	0.006	0.010			<0.001		<0.001						<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001*	<0.001*			<0.0001		<0.0001						<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001*	<0.001*			<0.001		<0.001						<0.001	<0.001
Dissolved Copper	mg/L	0.001	<0.001*	<0.001*			<0.001		<0.001						0.042	0.045
Total Iron	mg/L	0.05	158	510			97.4		270	38.3	38.3				0.86	1.94
Dissolved Lead	mg/L	0.001	<0.001*	<0.001*			<0.001		<0.001						<0.001	<0.001
Total Manganese	mg/L	0.001	0.799	0.980			2.18		2.38						0.019	0.020
Mercury	mg/L	0.0001					<0.0001		<0.0001						<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.004	0.01			0.009		0.024						0.001	0.002
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*			<0.001		<0.001						<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.019	0.019			0.005		0.404						0.032	0.095
EC laboratory	uS/cm		6598	7294			17900		15000	168	168				188	150
Total Nitrogen	mg/L		2.6	5.5			18.0		4.3	1.4	1.4				0.5	0.9
Total Phosphorus	mg/L		1.60	3.18			3.08		0.81	0.2	0.2				0.02	0.06
Ammonia	mg/L		0.80	0.89			1.73		2.08	0.07	0.07				0.03	0.02
Phosphate	mg/L															
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$								89							12
Chloride	mg/L		1468	1564					4540	38	38					39
Nitrate							0.02		<0.50						0.11	0.09
Sulphate	mg/L		1055	1171					1050	4.7	4.7					5
Calcium	mg/L		170	232					233	37.6	37.6					1
Magnesium	mg/L		273	367					461	16.9	16.9					2
Potassium	mg/L		35.4	56.34					54	5.25	5.25					<1
Sodium	mg/L		973	1045					2380	26.2	26.2					28

* No variation established between sampling events.

^ Based on one record only.

DNS – Did Not Sample

Table 3-58 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW08		Results					GW09		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01			1.00			0.57		0.23^	0.23^				0.07	0.14
Dissolved Arsenic	mg/L	0.001			0.002			0.001		<0.001^	<0.001^				0.001	<0.001
Dissolved Cadmium	mg/L	0.0001			<0.0001			0.0001		0.002^	0.002^				<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001			0.003			0.002		0.001^	0.001^				<0.001	<0.001
Dissolved Copper	mg/L	0.001			0.007			0.025		0.218^	0.218^				0.008	0.006
Total Iron	mg/L	0.05			9.02			6.77		8.47	9.49				9.06	28.6
Dissolved Lead	mg/L	0.001			0.001			<0.001		<0.001^	<0.001^				<0.001	<0.001
Total Manganese	mg/L	0.001			0.085			0.078		0.85^	0.85^				0.245	0.084
Mercury	mg/L	0.0001			<0.0001			<0.0001							<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001			0.006			0.005		0.061^	0.061^				0.002	0.002
Dissolved Silver	mg/L	0.001			<0.001			<0.001		<0.001^	<0.001^				<0.001	<0.001
Dissolved Zinc	mg/L	0.005			0.065			0.093		0.063^	0.063^				0.307	0.407
EC laboratory	uS/cm				920			878							521	390
Total Nitrogen	mg/L				5.1			8.4							2.7	4.0
Total Phosphorus	mg/L				0.54			0.98							0.25	0.83
Ammonia	mg/L				0.69			6.97							0.09	0.04
Phosphate	mg/L															
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$															61
Chloride	mg/L				251											72
Nitrate					0.02			0.30							0.10	0.04
Sulphate	mg/L				16											31
Calcium	mg/L				4					20.45	59.86					11
Magnesium	mg/L				5					54.8	108.9					3
Potassium	mg/L				1					5.57	11.59					<1
Sodium	mg/L				166					478	698					74

* No variation established between sampling events.

^ Based on one record only.

DNS – Did Not Sample

Table 3-59 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW010		Results					GW11		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	1^	1^	0.15	0.26		0.48	0.47	0.26	0.56	0.16	<0.01	<0.01	0.14	0.12
Dissolved Arsenic	mg/L	0.001	0.001^	0.001^	0.001	<0.001		<0.001	<0.001	<0.001*	<0.001*	0.002	0.002	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001^	<0.001^	<0.0001	<0.0001		<0.0001	<0.0001	0.0022	0.0028	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	0.003^	0.003^	0.003	0.001		0.001	0.003	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.02^	0.02^	0.002	0.008		0.010	0.014	0.1818	0.2292	<0.001	0.005	0.026	0.018	0.015
Total Iron	mg/L	0.05	115.1	194.5	29.1	0.72		4.67	6.74	46.8	219.3	18.7	11.1	12.4	16.8	19.8
Dissolved Lead	mg/L	0.001	0.001^	0.001^	<0.001	<0.001		<0.001	0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.013^	0.013^	0.396	0.036		0.053	0.048	0.791	1.623	0.225	0.130	0.063	0.122	0.068
Mercury	mg/L	0.0001			<0.0001	<0.0001		<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.002^	0.002^	0.003	<0.001		0.003	0.002	0.0626	0.0884	0.003	0.002	0.002	0.004	0.002
Dissolved Silver	mg/L	0.001	<0.001^	<0.001^	<0.001	<0.001		<0.001	<0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.007^	0.007^	0.230	0.030		0.049	0.079	0.0788	0.0992	0.013	0.294	0.378	1.11	0.523
EC laboratory	uS/cm		270^	270^	914	331		410	314	2904	7650	528	628	628	313	227
Total Nitrogen	mg/L		1.1^	1.1^	9.4	0.6		0.9	1.4	0.56	1	7.8	2.4	1.5	9.7	2.6
Total Phosphorus	mg/L		0.11^	0.11^	1.17	0.07		0.04	0.16	0.08	0.70	0.69	0.37	0.17	0.49	0.25
Ammonia	mg/L		<0.02^	<0.02^	1.32	0.04		0.07	0.02	0.03	0.13	2.83	0.32	0.16	0.08	0.06
Phosphate	mg/L															
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$								6							25
Chloride	mg/L		52^	52^	263				91	581	1422	68				37
Nitrate					0.01	0.03		0.11	<0.01			0.05	0.09	0.01	0.04	0.01
Sulphate	mg/L		9.4^	9.4^	2				4	448	1263	1				29
Calcium	mg/L		46.1	127.0	13				2	30.8	120.4	3				1
Magnesium	mg/L		22.1	48.6	11				4	58.1	189.4	4				1
Potassium	mg/L		9.42	16.01	1				<1	14.4	20.8	2				<1
Sodium	mg/L		69.0	120.8	137				56	427	1013	93				46

* No variation established between sampling events.

^ Based on one record only.

DNS – Did Not Sample

Table 3-60 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW12		Results					GW013		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	0.02	0.02						0.02	0.03	0.02	0.01	<0.01	0.05	0.02
Dissolved Arsenic	mg/L	0.001	0.029	0.030						0.002	0.004	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001*	<0.001*						<0.001*	<0.001*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001*	<0.001*						0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	<0.001*	<0.001*						<0.001*	<0.001*	<0.001	0.002	0.005	0.004	<0.001
Total Iron	mg/L	0.05	185	283						41.5	60.4	8.98	6.25	6.71	10.6	12.0
Dissolved Lead	mg/L	0.001	<0.001*	<0.001*						<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	5.07	7.14						0.217	0.249	0.124	0.107	0.088	0.125	0.155
Mercury	mg/L	0.0001										<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.003	0.003						0.003	0.003	0.002	0.001	<0.001	0.003	0.001
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*						<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.028	0.034						0.014	0.023	0.006	0.080	0.199	0.068	0.011
EC laboratory	uS/cm		3314	6962						207	305	269	216	189	231	274
Total Nitrogen	mg/L		1.3	1.7						1.6	1.7	15.1	9.1	4.1	2.0	12.5
Total Phosphorus	mg/L		0.08	0.19						0.41	0.59	2.11	1.01	0.56	0.50	1.88
Ammonia	mg/L		0.82	0.93						0.32	0.50	5.46	3.67	0.13	0.83	7.07
Phosphate	mg/L															
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$															79
Chloride	mg/L		394	781						25	36	34				37
Nitrate												0.40	0.18	1.12	0.15	0.44
Sulphate	mg/L		1284	3267						14	26	1				2
Calcium	mg/L		85.9	148.8						3.70	4.36	3				5
Magnesium	mg/L		137	233						8.23	9.23	4				5
Potassium	mg/L		14.2	21.0						6.19	8.58	6				9
Sodium	mg/L		313	481						28.8	41.2	28				28

* No variation established between sampling events.

DNS – Did Not Sample

Table 3-61 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW14		Results					GW15		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	4.07	4.29	0.17	0.14	0.79	2.73	0.07	0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Arsenic	mg/L	0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.020	0.021	0.002	0.002	<0.001	0.001	0.003
Dissolved Cadmium	mg/L	0.0001	<0.001*	<0.001*	0.0002	0.0003	0.0003	0.0006	<0.0001	<0.001*	<0.001*	<0.0001	<0.0001	0.0001	0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.114	0.200	0.018	0.124	0.852	0.351	0.098	<0.001*	<0.001*	<0.001	0.004	0.009	0.006	<0.001
Total Iron	mg/L	0.05	2.05	3.40	1.59	0.47	14.2	10.0	4.24	8.13	10.30	3.48	1.29	1.41	1.80	2.55
Dissolved Lead	mg/L	0.001	0.001	0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.757	0.759	0.195	0.230	0.412	0.966	0.113	2.85	2.99	1.95	1.60	1.64	1.60	2.48
Mercury	mg/L	0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.028	0.029	0.012	0.013	0.021	0.052	0.005	0.003	0.003	0.004	0.002	0.006	0.006	0.007
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.130	0.146	18.2	18.8	21.2	34.5	36.3	0.007	0.007	0.031	0.044	0.080	0.076	0.060
EC laboratory	uS/cm		7480	8074	1550	1600	2880	5770	915	3768	3798	3860	3760	3720	3710	3640
Total Nitrogen	mg/L		0.7	0.9	0.7	0.8	0.7	1.2	0.9	0.43	0.96	0.5	0.4	0.6	0.6	1.2
Total Phosphorus	mg/L		0.02	0.03	<0.01	0.02	0.03	0.03	0.05	0.07	0.09	<0.01	0.07	0.02	0.05	0.09
Ammonia	mg/L		0.08	0.10	0.09	0.03	0.05	0.29	0.03	0.07	0.10	0.23	0.15	0.08	0.07	0.21
Phosphate	mg/L															
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$								<1							251
Chloride	mg/L		2386	3480	412				266	990	1559	949				946
Nitrate					0.39	0.44	0.06	0.21	0.28			0.10	0.04	0.14	0.10	0.04
Sulphate	mg/L		166	215	105				39	136	206	159				149
Calcium	mg/L		106	127	16				11	62.3	71.5	50				49
Magnesium	mg/L		165	195	29				15	115	123	116				116
Potassium	mg/L		2.67	3.12	4				7	8.80	9.14	9				10
Sodium	mg/L		1048	1216	217				117	532	557	561				556

* No variation established between sampling events.

DNS – Did Not Sample

Table 3-62 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW017		Results					GW018		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	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
Dissolved Arsenic	mg/L	0.001			<0.001	0.001	0.002	<0.001	<0.001	0.007	0.008	0.003	0.003	0.002	0.004	0.001
Dissolved Cadmium	mg/L	0.0001			<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.001*	<0.001*	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001			<0.001	<0.001	0.572	<0.001	<0.001	<0.001*	<0.001*	<0.001	<0.001	0.004	<0.001	<0.001
Total Iron	mg/L	0.05			5.18	3.42	4.15	2.51	6.10	5.76	9.92	2.67	1.89	2.16	4.28	5.19
Dissolved Lead	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001			0.232	0.206	0.193	0.154	0.194	1.64	1.83	1.31	1.25	0.978	1.58	1.57
Mercury	mg/L	0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001			0.002	<0.001	0.003	0.002	<0.001	0.003	0.005	0.002	0.002	0.002	0.002	0.006
Dissolved Silver	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005			0.021	0.019	0.060	0.007	0.010	0.011	0.015	0.025	0.011	0.033	<0.005	0.023
EC laboratory	uS/cm				3040	2910	2840	2780	2610	1652	1658	1840	1810	1790	1840	1280
Total Nitrogen	mg/L				0.2	0.2	0.2	0.4	0.6	0.6	0.7	0.2	0.4	0.2	0.6	0.8
Total Phosphorus	mg/L				0.03	0.04	0.02	0.11	0.13	0.15	0.15	0.02	0.03	0.01	0.04	0.05
Ammonia	mg/L				0.05	0.06	0.03	0.04	0.03	0.20	0.22	0.08	0.10	0.07	0.27	0.09
Phosphate	mg/L															
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$								538							452
Chloride	mg/L				513				441	101	109	81				30
Nitrate					0.01	0.04	0.01	0.07	<0.01			0.11	0.05	0.02	0.05	0.01
Sulphate	mg/L				364				337	150	154	250				276
Calcium	mg/L				114				96	166	185	237				154
Magnesium	mg/L				144				118	61.9	62.1	58				40
Potassium	mg/L				7				7	7.65	8.02	5				5
Sodium	mg/L				353				312	100.0	108.3	112				81

* No variation established between sampling events.

DNS – Did Not Sample

Table 3-63 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW19		Results					GW20		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	<0.01^	<0.01^												
Dissolved Arsenic	mg/L	0.001	0.001^	0.001^												
Dissolved Cadmium	mg/L	0.0001	<0.001^	<0.001^												
Dissolved Chromium	mg/L	0.001	<0.001^	<0.001^												
Dissolved Copper	mg/L	0.001	0.013^	0.013^												
Total Iron	mg/L	0.05	18.1	48.4												
Dissolved Lead	mg/L	0.001	<0.001^	<0.001^												
Total Manganese	mg/L	0.001	0.636^	0.636^												
Mercury	mg/L	0.0001														
Dissolved Nickel	mg/L	0.001	0.015^	0.015^												
Dissolved Silver	mg/L	0.001	<0.001^	<0.001^												
Dissolved Zinc	mg/L	0.005	0.057^	0.057^												
EC laboratory	uS/cm		746	1371												
Total Nitrogen	mg/L		1.6	1.7												
Total Phosphorus	mg/L		0.24	0.38												
Ammonia	mg/L		0.1	0.28												
Phosphate	mg/L															
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$															
Chloride	mg/L		90	98												
Nitrate																
Sulphate	mg/L		46	143												
Calcium	mg/L		34.8	124.9												
Magnesium	mg/L		22.7	55.8												
Potassium	mg/L		7.74	8.23												
Sodium	mg/L		91.1	100.8												

* No variation established between sampling events.

^ Based on one record only.

DNS – Did Not Sample

Table 3-64 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW21^		Results					GW022		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	0.05	0.05						0.05^	0.05^					
Dissolved Arsenic	mg/L	0.001	0.002	0.002						<0.01^	<0.01^					
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001						<0.001^	<0.001^					
Dissolved Chromium	mg/L	0.001	<0.001	<0.001						<0.001^	<0.001^					
Dissolved Copper	mg/L	0.001	0.048	0.048						0.01^	0.01^					
Total Iron	mg/L	0.05	43.2	43.2						199	217					
Dissolved Lead	mg/L	0.001	<0.001	<0.001						<0.001^	<0.001^					
Total Manganese	mg/L	0.001	0.358	0.358						0.011^	0.011^					
Dissolved Mercury	mg/L	0.0001														
Dissolved Nickel	mg/L	0.001	0.144	0.144						<0.001^	<0.001^					
Dissolved Silver	mg/L	0.001	<0.001	<0.001						<0.001^	<0.001^					
Dissolved Zinc	mg/L	0.005	0.122	0.122						0.084^	0.084^					
EC laboratory	uS/cm		1750	1750						872	2056					
Total Nitrogen	mg/L		2.6	2.6						2.4	2.6					
Total Phosphorus	mg/L		0.39	0.39						0.56	0.89					
Ammonia	mg/L									0.08	0.08					
Phosphate	mg/L															
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$															
Chloride	mg/L		178	178						201	475					
Nitrate	mg/L															
Sulphate	mg/L		326	326						52	154					
Calcium	mg/L		29.3	29.3						22.5	27.5					
Magnesium	mg/L		28.2	28.2						42.3	56.5					
Potassium	mg/L		10.3	10.3						17.5	18.3					
Sodium	mg/L		310	310						154.8	331.9					

* No variation established between sampling events.

^ Based on one record only.

DNS – Did Not Sample

Table 3-65 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW23		Results					GW24		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	0.05	0.19	0.20		0.12	0.12	0.18	0.19^	0.19	0.38	0.20		0.07	0.08
Dissolved Arsenic	mg/L	0.001	0.001	0.001	<0.001		0.001	<0.001	<0.001	0.002^	0.002	<0.001	<0.001		<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001*	<0.001*	<0.0001		0.0001	<0.0001	<0.0001	<0.001^	<0.001	<0.0001	0.0001		<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001*	<0.001*	<0.001		0.001	<0.001	<0.001	<0.001^	<0.001	0.002	0.001		<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.009	0.009	0.016		0.065	0.068	0.128	0.428^	0.428	0.178	1.00		0.296	1.46
Total Iron	mg/L	0.05	21.9	35.8	4.39		7.05	2.88	3.15	34.2	98.5	3.11	6.12		13.7	10.6
Dissolved Lead	mg/L	0.001	<0.001*	<0.001*	<0.001		<0.001	<0.001	<0.001	<0.001^	<0.001	<0.001	<0.001		<0.001	<0.001
Total Manganese	mg/L	0.001	0.458	0.642	0.159		0.277	0.137	0.195	0.172^	0.172	0.047	0.156		0.113	0.094
Dissolved Mercury	mg/L	0.0001			<0.0001		<0.0001	<0.0001	<0.0001			<0.0001	<0.0001		<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.003	0.006	0.002		0.004	0.003	0.002	0.028^	0.028	0.004	0.006		0.005	0.003
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*	<0.001		<0.001	<0.001	<0.001	<0.001^	<0.001	<0.001	<0.001		<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.069	0.239	0.057		0.078	0.063	0.063	0.13^	0.13	0.014	0.051		0.036	0.069
EC laboratory	uS/cm		417	624	345		490	372	343	5530^	5530^	641	583		427	556
Total Nitrogen	mg/L		0.5	0.8	1.9		1.0	1.0	0.5	1.2^	1.2^	1.4	1.6		1.3	1.0
Total Phosphorus	mg/L		0.43	1.096	0.24		0.08	0.09	0.06	4.6^	4.6^	0.18	0.18		0.13	0.10
Ammonia	mg/L		0.03	0.04	0.03		0.02	0.02	0.02	0.04^	0.04^	0.15	0.16		0.32	0.21
Phosphate	mg/L															
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$								21							36
Chloride	mg/L		55.4	86	66				81	1686^	1686^	115				150
Nitrate	mg/L				0.02		0.02	0.22	<0.01			0.02	0.05		0.04	<0.01
Sulphate	mg/L		51	87	14				24	151^	151^	31				17
Calcium	mg/L		28.8	45.6	4				6	42.5	160.6	16				12
Magnesium	mg/L		17	23	4				6	29.35	96.59	5				4
Potassium	mg/L		5.56	5.93	1				1	7.2	12.5	1				1
Sodium	mg/L		54.0	87.6	52				54	206.7	593.9	108				87

* No variation established between sampling events.

^ Based on one record only.

DNS – Did Not Sample

Table 3-66 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW025		Results					GW26		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	0.05^	0.05^				0.14	0.13			0.04	0.01	<0.01	0.01	0.02
Dissolved Arsenic	mg/L	0.001	0.001^	0.001^				0.001	0.001			<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	0.001^	0.001^				0.0004	0.0003			0.0005	0.0008	0.0011	0.0002	0.0003
Dissolved Chromium	mg/L	0.001	<0.001^	<0.001^				<0.001	<0.001			<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.066^	0.066^				0.115	0.101			1.54	9.87	14.9	0.018	0.551
Total Iron	mg/L	0.05	89.0	103.3				6.56	12.2	41.3	41.3	2.46	0.84	10.0	1.36	5.77
Dissolved Lead	mg/L	0.001	0.001^	0.001^				<0.001	<0.001			<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.902^	0.902^				0.158	0.160			0.243	0.275	0.251	0.482	0.325
Mercury	mg/L	0.0001						<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.016^	0.016^				0.005	0.004			0.008	0.012	0.014	0.006	0.011
Dissolved Silver	mg/L	0.001	<0.001^	<0.001^				<0.001	<0.001			<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.15^	0.15^				0.182	0.116			0.124	0.197	0.289	0.084	0.145
EC laboratory	uS/cm		805^	805^				321	254	494	494	630	766	771	626	664
Total Nitrogen	mg/L		0.9^	0.9^				2.8	2.1	1.4	1.4	0.6	1.3	2.6	0.9	1.0
Total Phosphorus	mg/L		0.12^	0.12^				0.22	0.21	0.18	0.18	0.09	0.25	0.35	0.06	0.11
Ammonia	mg/L		0.14^	0.14^				0.05	0.09	0.1	0.1	0.03	0.02	0.04	0.05	0.07
Phosphate	mg/L															
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$								12							14
Chloride	mg/L		235^	235^					65	136	136	179				205
Nitrate								0.26	0.04			<0.01	<0.01	<0.01	0.17	0.05
Sulphate	mg/L		18^	18^					9	18	18	7				4
Calcium	mg/L		2.55^	2.55^					<1	2.09	2.09	6				8
Magnesium	mg/L		14.8^	14.8^					2	7.07	7.07	5				7
Potassium	mg/L		17^	17^					2	12.8	12.8	2				3
Sodium	mg/L		130^	130^					49	78.9	78.9	98				109

* No variation established between sampling events.

^ Based on one record only.

DNS – Did Not Sample

Table 3-67 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW27		Results					GW028		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	<0.01^	<0.01^	0.04		<0.01	0.03	0.01			0.73		<0.01	0.08	0.02
Dissolved Arsenic	mg/L	0.001	0.001^	0.001^	<0.001		<0.001	<0.001	<0.001			0.001		<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001^	<0.001^	0.0001		0.0002	<0.0001	<0.0001			0.0004		0.0006	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001^	<0.001^	<0.001		<0.001	<0.001	<0.001			0.002		<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.002^	0.002^	0.151		0.784	0.450	1.07			6.78		10.3	0.929	0.025
Total Iron	mg/L	0.05	6.61	10.20	6.20		16.7	2.31	4.30	65.3	65.3	5.22		3.67	6.11	3.55
Dissolved Lead	mg/L	0.001	<0.001^	<0.001^	<0.001		<0.001	<0.001	<0.001			<0.001		<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.492^	0.492^	0.500		0.776	0.133	0.279			0.085		0.063	0.055	0.032
Mercury	mg/L	0.0001			<0.0001		<0.0001	<0.0001	<0.0001			<0.0001		<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.006^	0.006^	0.007		0.012	0.005	0.003			0.012		0.006	0.003	<0.001
Dissolved Silver	mg/L	0.001	<0.001^	<0.001^	<0.001		<0.001	<0.001	<0.001			<0.001		<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.026^	0.026^	0.057		0.071	0.031	0.048			0.170		0.144	0.030	0.038
EC laboratory	uS/cm		567	746	340		477	304	355	2140	2140	291		328	209	166
Total Nitrogen	mg/L		0.3	0.7	1.5		3.1	0.9	1.7	2.6	2.6	2.8		1.6	1.6	0.6
Total Phosphorus	mg/L		0.14	0.22	0.41		0.48	0.11	0.19	0.92	0.92	0.31		0.08	0.22	0.07
Ammonia	mg/L		0.04	0.06	0.23		0.39	0.06	0.21	0.06	0.06	0.13		0.02	0.03	0.02
Phosphate	mg/L															
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$								48							9
Chloride	mg/L		80	81	54				71	34	34	53				43
Nitrate					0.11		0.01	0.12	0.98			<0.01		<0.01	<0.01	0.01
Sulphate	mg/L		41	64	25				20	5.9	5.9	11				4
Calcium	mg/L		18.3	25.6	12				17	5.75	5.75	3				<1
Magnesium	mg/L		8.3	9.6	5				7	6.83	6.83	3				2
Potassium	mg/L		4.34	6.24	3				3	10.5	10.5	2				1
Sodium	mg/L		60.2	60.3	41				45	33.1	33.1	48				30

* No variation established between sampling events.

^ Based on one record only.

DNS – Did Not Sample

Table 3-68 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW29		Results					GW30		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21	20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01	3.21^	3.21^	0.13		0.16	0.11	0.11	2.34	2.60	1.01	0.96	0.09	0.73	0.20
Dissolved Arsenic	mg/L	0.001	0.014^	0.014^	<0.001		0.001	0.001	0.001	0.002	0.003	<0.001	0.002	0.001	<0.001	0.006
Dissolved Cadmium	mg/L	0.0001	0.001^	0.001^	<0.0001		<0.0001	<0.0001	<0.0001	0.001	0.001	0.0012	0.0005	0.0015	0.0008	0.0002
Dissolved Chromium	mg/L	0.001	0.006^	0.006^	<0.001		<0.001	<0.001	<0.001	<0.001*	<0.001*	0.003	0.008	<0.001	0.006	0.001
Dissolved Copper	mg/L	0.001	0.017^	0.017^	0.038		0.143	0.030	0.025	2.09	2.23	7.76	0.212	0.578	0.662	0.116
Total Iron	mg/L	0.05	109	110	9.92		6.74	5.43	5.87	36.9	115.6	52.3	5.52	17.7	4.23	12.7
Dissolved Lead	mg/L	0.001	0.009^	0.009^	<0.001		<0.001	<0.001	<0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.571^	0.571^	0.260		0.157	0.123	0.095	3.21	3.58	4.49	3.87	4.48	2.50	0.472
Mercury	mg/L	0.0001			<0.0001		<0.0001	<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.031^	0.031^	0.026		0.018	0.009	0.009	0.161	0.172	0.289	0.154	0.152	0.169	0.021
Dissolved Silver	mg/L	0.001	<0.001^	<0.001^	<0.001		<0.001	<0.001	<0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	5.25^	5.25^	0.184		0.118	0.071	0.104	0.813	0.859	1.02	0.362	0.626	0.594	0.110
EC laboratory	uS/cm		291	539	344		402	227	218	4436	4934	3890	3930	4160	3720	2390
Total Nitrogen	mg/L		2.6	4.8	0.4		1.4	1.1	1.1	1.8	2.0	7.0	1.1	1.6	1.2	1.2
Total Phosphorus	mg/L		0.63	1.07	0.12		0.06	0.09	0.16	0.52	0.55	1.39	0.16	0.19	0.09	0.18
Ammonia	mg/L		0.05	0.06	0.03		<0.01	0.06	0.03	0.04	0.05	0.34	0.22	0.04	0.10	0.04
Phosphate	mg/L															
Bicaronate / Alkalinity	mg CaCO3/L-1								38							69
Chloride	mg/L		45	63	51				39	1219	1390	1050				605
Nitrate					0.10		<0.01	0.04	0.01			<0.01	0.01	<0.01	0.34	0.02
Sulphate	mg/L		35.9	123.7	15				14	158	167	125				200
Calcium	mg/L		7.2	13.9	5				4	11.5	12.3	11				14
Magnesium	mg/L		23.1	34.0	6				3	79.9	90.3	66				22
Potassium	mg/L		13.9	20.3	2				1	13.2	14.2	4				3
Sodium	mg/L		133	231	51				39	687	760	659				452

* No variation established between sampling events.

^ Based on one record only.

DNS – Did Not Sample

Table 3-69 Operation groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW06		Results				
			20th per#	80th per#	Apr 20	Jun 20	Sept 20	Jan 21	May 21
Dissolved Aluminium	mg/L	0.01			<0.01	<0.01	0.01	<0.01	0.02
Dissolved Arsenic	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001			<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Dissolved Chromium	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001			<0.001	0.004	0.006	0.002	<0.001
Total Iron	mg/L	0.05			14.6	0.61	13.7	25.4	34.9
Dissolved Lead	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001			0.268	0.129	0.013	0.164	0.274
Mercury	mg/L	0.0001			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001			0.002	0.002	0.002	0.001	0.001
Dissolved Silver	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005			0.244	0.133	0.045	0.208	0.011
EC laboratory	uS/cm				1540	1510	798	314	323
Total Nitrogen	mg/L				3.5	1.4	1.9	2.1	3.9
Total Phosphorus	mg/L				0.72	0.40	0.10	0.27	0.81
Ammonia	mg/L				0.03	0.02	0.06	0.04	0.04
Phosphate	mg/L								
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$								156
Chloride	mg/L				423				21
Nitrate					0.08	0.53	0.10	0.06	0.02
Sulphate	mg/L				33				7
Calcium	mg/L				14				13
Magnesium	mg/L				10				4
Potassium	mg/L				2				2
Sodium	mg/L				265				75

* No variation established between sampling events.

Note: There have been no pre-construction or construction results for GW06 prior to August 2016.

Table 3-70 Operation groundwater level – manual record

Borehole reference	Top of casting RL (mAHD)	Depth of water level						
		Pre-construction		Operation				
		20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW01 (mTOC)	20.11	4.41	4.93	6.44	6.55	6.32	6.12	5.76
GW01 (mAHD)		15.18	15.70					
GW02 (mTOC)	3.57	1.95	2.96	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access
GW02 (mAHD)		0.61	1.62					
GW03 (mTOC)	2.64	0.81	2.08	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access
GW03 (mAHD)		0.58	1.81					
GW04 (mTOC)	1.69	1.11	2.21	1.24	1.04	1.15	1.06	1.02
GW04 (mAHD)		-0.52	0.58					
GW05 (mTOC)	1.24	0.81	1.55	Bull in paddock	Unreadable - no access	0.44	Unreadable - no access	1.45
GW05 (mAHD)		-0.31	0.43					
GW06 (mTOC)	20.1	5.36	5.85	2.36	2.2	2.20	1.83	1.55
GW06 (mAHD)		14.25	14.74					
GW07 (mTOC)	15.98	2.86	5.19	Dry	Dry	Dry	3.03	4.75
GW07 (mAHD)		10.79	13.12					
GW08 (mTOC)	19.09	6.94	6.94	8.28	Dry	Dry	8.28	8.29
GW08 (mAHD)		12.15	12.15					
GW09 (mTOC)	17.57	8.05	8.66	7.16	Dry	Dry	5.04	5.36
GW09 (mAHD)		8.91	9.52					

Borehole reference	Top of casting RL (mAHD)	Depth of water level						
		Pre-construction		Operation				
		20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW10 (mTOC)	15.38	3.34	7.27	6.99	2.46	Dry	1.07	4.38
GW10 (mAHD)		8.11	12.04					
GW11 (mTOC)	1.591	1.49	2.45	2.55	3.23	2.85	1.32	1.7
GW11 (mAHD)		-0.86	0.10					
GW12 (mTOC)	1.573	0.74	1.68	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence
GW12 (mAHD)		-0.20	0.83					
GW13 (mTOC)	2.04	1.44	2.05	3.40	3.55	3.53	3.29	3.28
GW13 (mAHD)		-0.01	0.60					
GW14 (mTOC)	5.656	2.60	3.43	1.76	2.04	1.75	1.55	1.51
GW14 (mAHD)		2.23	3.06					
GW15 (mTOC)	13.79	10.01	10.32	10.32	10.42	10.27	10.04	9.74
GW15 (mAHD)		3.47	3.78					
GW16 (mTOC)	14.14	8.13	8.13	Dry	Dry	Dry	Dry	Dry
GW16 (mAHD)		6.01	6.01					
GW17 (mTOC)	59.47	Dry	Dry	11.21	11.48	11.57	11.05	10.84
GW17 (mAHD)		Dry	Dry					
GW18 (mTOC)	96.71	33.98	34.04	33.40	33.39	33.35	33.28	33.08
GW18 (mAHD)		62.67	62.73					
GW19 (mTOC)	51.81	7.53	9.46	Dry	Dry	Dry	Dry	Dry

Borehole reference	Top of casting RL (mAHD)	Depth of water level						
		Pre-construction		Operation				
		20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW19 (mAHD)		42.35	44.28					
GW20 (mTOC)	87.18	Dry	Dry	Dry	Dry	Dry	Dry	Dry
GW20 (mAHD)		Dry	Dry					
GW21 (mTOC)	51.29	4.65	5.79	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence
GW21 (mAHD)		45.50	46.64					
GW22 (mTOC)	17.27	4.64	5.28	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence
GW22 (mAHD)		11.99	12.63					
GW23 (mTOC)	39.22	15.93	15.99	16.40	Dry	16.40	16.26	16.13
GW23 (mAHD)		23.23	23.29					
GW24 (mTOC)	26.09	6.25	7.78	7.00	7.37	7.00	6.62	6.8
GW24 (mAHD)		18.31	19.84					
GW25 (mTOC)	61.72	11.53	12.35	Dry	12.76	Dry	12.61	12.73
GW25 (mAHD)		49.37	50.19					
GW26 (mTOC)	54.56	14.17	14.98	13.44	14.36	14.74	12.32	13.56
GW26 (mAHD)		39.58	40.39					
GW27 (mTOC)	74.33	27.45	27.66	27.52	Unreadable - no access	28.70	27.28	27.63
GW27 (mAHD)		46.67	46.88					
GW28 (mTOC)	54.65	8.45	9.40	9.06	909	9.08	8.77	7.09

Borehole reference	Top of casting RL (mAHD)	Depth of water level						
		Pre-construction		Operation				
		20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW28 (mAHD)		45.25	46.20					
GW29 (mTOC)	45.11	2.97	8.82	6.43	Unreadable - no access	7.00	6.0	6.42
GW29 (mAHD)		36.29	42.14					
GW30 (mTOC)	41.49	3.16	4.59	6.80	6.5	6.42	5.76	4.28
GW30 (mAHD)		36.90	38.33					

Table 3-71 Operation groundwater monitoring (EC) – manual record

Borehole reference	Electrical conductivity (uS/cm)						
	Pre-construction		Operation				
	20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW01	5062	5502	43.7		3655	6854	7102
GW02	293	656	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access
GW03	1009	1283	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access
GW04	3027	5520	1230		902	863	661
GW05	5970	6728	Bull in paddock		16000	Unreadable - no access	133.4
GW06	1359	8204	1356		750	326	330.9
GW07	172	230	Insufficient sample for field testing		Insufficient sample for field testing	174.8	144.5
GW08	No record	No record	860		Insufficient sample for field testing	817	Insufficient sample for field testing
GW09	1981	2536	Insufficient sample for field testing		Insufficient sample for field testing	491.5	355.9
GW10	443	780	33		Insufficient sample for field testing	407	150.1
GW11	1296	5880	239		630	243.3	227

Borehole reference	Electrical conductivity (uS/cm)						
	Pre-construction		Operation				
	20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW12	2467	4460	Permanently unreadable – not accessible due to boundary fence e	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence
GW13	186	295	254		190	245	144.1
GW14	6312	7068	651.0		2750	5416	816
GW15	3600	3740	1675		3607	3417	107.4
GW16	No record	No record	Insufficient sample for field testing		Dry	Insufficient sample for field testing	Insufficient sample for field testing
GW17	No record	No record	2805		2752	2757	2383
GW18	1588	1648	856		1700	1721	1126
GW19	554	602	Insufficient sample for field testing		Insufficient sample for field testing	Insufficient sample for field testing	Insufficient sample for field testing
GW20	No record	No record	Insufficient sample for field testing		Insufficient sample for field testing	Insufficient sample for field testing	Insufficient sample for field testing
GW21	1861	2426	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence
GW22	842	5484	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence	Permanently unreadable – not accessible due to boundary fence
GW23	415	726	186		4995	337.2	313.8
GW24	509	974	398.0		398	419.1	314
GW25	476	965	Insufficient sample for field testing		Insufficient sample for field testing	303.4	245.3
GW26	1083	1337	573		750	591	613
GW27	535	737	1.3		432	288.9	335.2
GW28	181	225	265		307	203.8	119.4
GW29	222	299	371		400	203.7	201.7
GW30	1750	3800	3521		3750	3363	2211

Table 3-72 Operation groundwater monitoring (pH) – manual record

Borehole reference	pH						
	Pre-construction		Operation				
	20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW01	4.1	4.5	5.85		6.32	6	6.27
GW02	6.2	6.5	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access
GW03	6.0	6.5	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access
GW04	6.0	6.3	6.10		6.41	6.23	6.5
GW05	6.2	6.6	Bull in paddock		5.88	Unreadable - no access	5.3
GW06	3.6	5.0	5.77		6.77	6.85	6.88
GW07	5.6	5.9	Insufficient sample for field testing		Insufficient sample for field testing	5.75	5.38
GW08	No record	No record	5.67		Insufficient sample for field testing	5.86	Insufficient sample for field testing
GW09	4.1	5.6	Insufficient sample for field testing		Insufficient sample for field testing	6.19	5.71
GW10	5.7	6.3	5.69		Insufficient sample for field testing	4.61	5.41
GW11	4.9	5.2	5.92		5.56	5.85	5.65
GW12	5.8	6.0	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence
GW13	5.3	5.8	5.76		5.92	5.5	6.02
GW14	4.4	6.1	4.67		3.59	3.42	4.36
GW15	6.2	6.4	6.26		6.08	6.28	6.4
GW16	No record	No record	Insufficient sample for field testing		Insufficient sample for field testing	Insufficient sample for field testing	Insufficient sample for field testing
GW17	No record	No record	6.54		6.48	6.57	6.79
GW18	6.5	6.7	6.81		6.94	6.8	7.21
GW19	6.1	6.4	Insufficient sample for field testing		Insufficient sample for field testing	Insufficient sample for field testing	Insufficient sample for field testing
GW20	No record	No record	Insufficient sample for field testing		Insufficient sample for field testing	Insufficient sample for field testing	Insufficient sample for field testing
GW21	6.2	6.3	Not accessible due to boundary fence		Not accessible due to boundary fence	Not accessible due to boundary fence	Not accessible due to boundary fence
GW22	6.0	6.3	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence

Borehole reference	pH						
	Pre-construction		Operation				
	20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW23	5.8	6.2	6.14		6.33	5.67	7.44
GW24	4.5	5.3	6.0		6.0	6.0	5.6
GW25	4.7	5.0	Insufficient sample for field testing		Insufficient sample for field testing	5.14	5.56
GW26	5.5	5.9	5.4		5.59	5.68	5.59
GW27	6.0	6.2	6.65		6.61	6.58	6.14
GW28	5.3	5.7	5.68		5.73	5.51	5.08
GW29	5.4	5.9	6.00		6.26	6.12	6.74
GW30	4.3	5.0	4.68		4.5	4.82	6.12

Table 3-73 Operation groundwater monitoring (temperature) – manual record

Borehole reference	Temperature						
	Pre-construction		Operation				
	20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW01	20.1	20.9	21.5		22.7	25.8	24
GW02	19.0	21.2	Permanently unreadable - no access		Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access
GW03	18.5	21.3	Permanently unreadable - no access		Permanently unreadable - no access	Permanently unreadable - no access	Permanently unreadable - no access
GW04	18.6	20.3	21.2		19.6	21.9	18.9
GW05	17.4	18.9	Bull in paddock		19.1	Unreadable - no access	17.6
GW06	18.5	19.8	21.7		19.0	21.7	19.3
GW07	18.5	19.5	Insufficient sample for field testing		Insufficient sample for field testing	21.3	18.7
GW08	No record	No record	19.9		Insufficient sample for field testing	21.1	Insufficient sample for field testing
GW09	18.3	18.5	Insufficient sample for field testing		Insufficient sample for field testing	21.3	19.0
GW10	18.2	19.5	21.2		Insufficient sample for field testing	22.8	21.0
GW11	18.2	19.6	22.2		20.3	22.7	19.5

Borehole reference	Temperature						
	Pre-construction		Operation				
	20th per	80th per	Apr 20	Jun 20	Sept 20	Jan 21	May 21
GW12	18.0	20.5	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence
GW13	19.1	20.0	22.3		20.6	22.5	21.3
GW14	19.2	20.0	21.5		19.7	22.3	18.3
GW15	19.4	20.2	21.2		21.7	21.3	20.7
GW16	No record	No record	Insufficient sample for field testing		Dry	Insufficient sample for field testing	Insufficient sample for field testing
GW17	No record	No record	19.8		20.5	21.2	19.2
GW18	19.9	20.5	19.7		20.4	20.7	18.1
GW19	19.5	20.2	Insufficient sample for field testing		Insufficient sample for field testing	Insufficient sample for field testing	Insufficient sample for field testing
GW20	No record	No record	Insufficient sample for field testing		Insufficient sample for field testing	Insufficient sample for field testing	Insufficient sample for field testing
GW21	18.8	20.3	Not accessible due to boundary fence		Not accessible due to boundary fence	Not accessible due to boundary fence	Not accessible due to boundary fence
GW22	17.6	20.2	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence	Permanently unreadable - fenced off by boundary fence
GW23	19.0	19.6	19.7		20.6	21.7	18.3
GW24	18.3	19.0	19.8		19.8	20.5	18.8
GW25	19.9	20.5	Insufficient sample for field testing			21.2	19.7
GW26	19.1	20.6	20.4		20.7	21.1	19.5
GW27	19.3	20.5	21.5		20.6	22	19.2
GW28	19.5	22.6	21.0		21.3	20.7	19.7
GW29	18.4	19.9	20.3		20.8	20.7	19.3
GW30	19.4	20.0	20.5		20.8	21.2	19.6

3.9 Discussion of groundwater results

Construction activity at the time of the first construction monitoring event in April 2015 was limited. Activity across the majority of the project at that time was largely limited to vegetation clearing, topsoil removal and minor earthworks (eg water quality basins), and is considered unlikely to have directly or indirectly affected groundwater resources.

Construction activity at the time of the second monitoring event (ie to July 2015) had continued with a number of large cut and fill operations progressing. During the August 2015 to January 2016 monitoring period the majority of major earthworks (ie deep cuts and high fill embankments) across the project had been completed.

During the period between January 2016 to July 2016 construction efforts focused in many areas on achieving final design levels both in fills and cuts, bridge structures and some paving operations. The Cooperabung Range, in the vicinity of GW18, remained the one cut on the project where a substantial amount of earthwork was required to achieve the final design levels.

During the monitoring period between July 2016 to January 2017 construction efforts focused on paving operations with a number of traffic switches occurring on both Stage 2 and Stage 3 of the project. In many areas all earthworks were completed, structures finished and final landscaping in a maintenance phase. Earthworks to accommodate the southbound carriageway through the Cooperabung Range remained outstanding.

During the January 2017 to July 2017 monitoring period construction efforts have been focused on paving operations and finishing work (eg installation of crash barriers, line marking, signage) with a number of traffic switches occurring on both Stage 2 and Stage 3 of the project. In many areas all earthworks have been completed, structures finished and final landscaping in a maintenance phase. Earthworks to accommodate the southbound carriageway through the Cooperabung Range progressed.

During the 22 July 2017 to 29 March 2018 monitoring period construction efforts were largely been confined to minor earthworks to achieve final levels and completing paving in the lead up to project opening. The large cut through the Cooperabung Range was completed in the second half of 2017. In addition to paving operations, the other primary focus was on final landscape treatments and site restoration.

During the 30 March 2018 to 29 March 2019 monitoring period the project was open to traffic in its entirety. Some restoration work to demobilise main site compounds, ancillary facilities and stockpile areas was undertaken. The activities generally included removing surplus or redundant material, buildings and hardstands, replacing topsoil and undertaking final landscaping activities. With the exception of the Kundabung main site compound, restoration activities were completed in all other locations. Ongoing work priorities during this first operational monitoring period included repair of pavement defects (eg joint repairs) and maintenance of final landscape treatments.

During the second year monitoring period (ie 30 March 2019 to 29 March 2020) the project continued to operate in full with some localised lane closures in place during pavement and barrier repairs, and landscape maintenance activities.

During the third and final year monitoring period (ie 30 March 2020 to 29 March 2021) the project remained under full operational conditions. No outstanding work remains and the road is subject to routine landscape and pavement inspections and maintenance along with the broader road network.

Considering these factors, the following observations can be made:

- Logged data shows that groundwater level has a variable response to recent rainfall across the monitoring sites. Of eighteen accessible data loggers which provided recent

data, fourteen were responsive to rainfall, three had variable response to rainfall events, while one of the loggers was unresponsive. Other smaller scale fluctuations in groundwater levels are present in most boreholes, which likely reflect variability in the groundwater table from less significant events. It is noted that the depth to groundwater may also fluctuate with changes to drainage and/or other site specific activities (see Appendix D).

- No major changes to groundwater levels were observed during the reporting period. While some boreholes at times were dry, the low or dry conditions in these boreholes coincided with prevailing and prolonged dry atmospheric conditions rather than as a direct result of the project. This is consistent with results experienced throughout construction and during previous operational periods.
- Laboratory analysed parameters continue to show variability for a number of analytes between sampling events eg Aluminium, Iron, Manganese and Zinc. However, this is generally consistent with pre-construction and/or during construction results.

  Other laboratory analysed parameters continue to show similar levels across all pre-construction, construction operational monitoring periods.
- Manually recorded pH records show some variability across most sampling locations. pH appears to vary within a range of up to 1.5 pH and more often is slightly acidic rather than alkaline. Lower pH levels continue to be experienced around the flood plains of the Hastings River and Wilson River, and areas proximate to Maria River. The variability is consistent with levels experienced during pre-construction, construction and operational monitoring periods.
- Manually recorded temperature records are generally consistent with levels recorded during the pre-construction, construction and previous operational reporting periods. Subtle temperature movements either up or down tend to reflect seasonal changes rather than potential impacts from the project.
- Manually recorded electrical conductivity show a general level of alignment between pre-construction, construction and levels recorded at nearly all sites during the operational reporting periods. Some variability is evident for individual sampling events likely in response prevailing and prolonged dry conditions. An example of this is at GW05 where EC is 16,000 μS/cm in September 2020 and 133 μS/cm in May 2021. The corresponding levels reflect both dry and wet conditions respectively, and egress of brackish water from the Hastings River during dry periods.

3.10 Overview of groundwater quality results and project response

The detailed assessment of groundwater monitoring data shows that impacts attributable to the project are generally considered negligible. As noted in section 3.9, groundwater levels continue to show a variable response to rainfall. While some boreholes were either dry or experiencing low levels at times, this tended to coincide with prevailing dry conditions at the time of sampling. Physical in-field and laboratory analysed parameters also show variability for certain parameters, while other remained consistent throughout. Generally, these monitoring data observations have been consistent prior to construction, throughout construction and through the three years of operation.

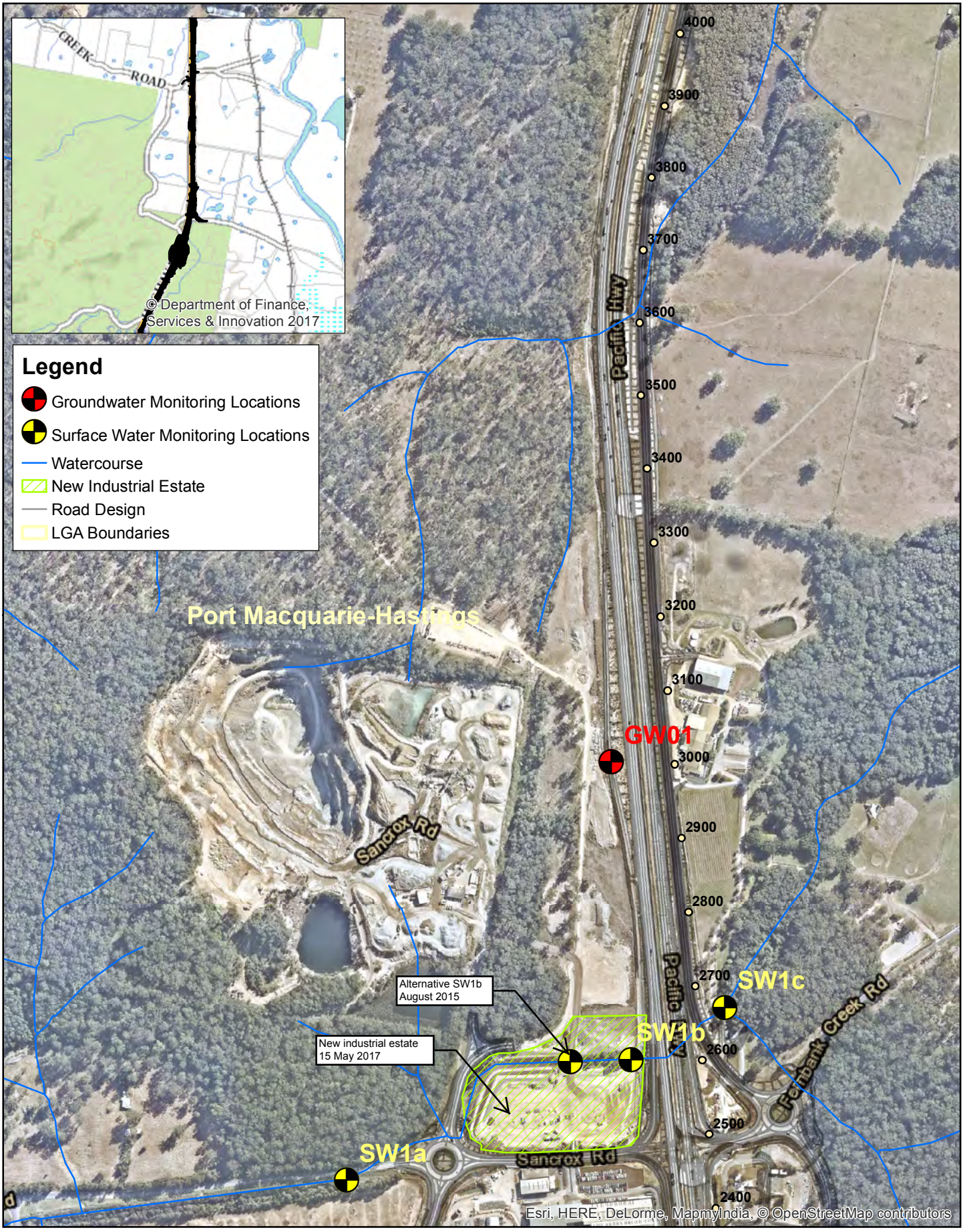
The approved Water Quality Monitoring Program had the primary objective to observe and assess the impact of the project on groundwater throughout construction and up to three year of operation. Monitoring performed for the project has achieved the objectives of the program, has been completed for a period of three years of operation, and demonstrated through observations and results that the project poses negligible ongoing risks or impacts to

groundwater resources. On this basis, further groundwater monitoring is not proposed or considered warranted.

Terms and acronyms

Term	Meaning
CEMP	Construction environmental management plan
Director General	Director General of the NSW Department of Planning and Environment (or delegate)
DPI (Fishing)	The Department of Primary Industry (Fishing) (formally "Department of Primary Industry (Fishing and Aquaculture))
EA	Environmental Assessment
EMS	Environmental management system
EPA	Environmental Protection Authority
EP&A Act	*Environmental Planning and Assessment Act 1979*
ER	Environmental Representative
K2K	Kundabung to Kempsey stage of the Oxley Highway to Kempsey project
MCoA	The Department of Planning and Infrastructure Ministers Condition of Approval
Minister, the	Minister for Planning and Environment (formerly "Minister for Planning and Infrastructure")
NOW	The NSW Office of Water
OH2K	Oxley Highway to Kempsey, also referred to as the project
OH2Ku	Oxley Highway to Kundabung stage of the Oxley Highway to Kempsey project
OEH	Office of Environment and Heritage
P&E	The Department of Planning and the Environment (formerly P&I)
P&I	The Department of Planning and Infrastructure
project, the	Oxley Highway to Kempsey Pacific Highway Upgrade
Roads and Maritime	Roads and Maritime Services
SoC	Revised statement of commitments (March 2011)
Stage 1	Sancrox Traffic Arrangement works
Stage 2	Kundabung to Kempsey stage of the Oxley Highway to Kempsey project
Stage 3	Oxley Highway to Kundabung stage of the Oxley Highway to Kempsey project

Appendix A – Site locality maps



Pacific Highway Upgrade
Oxley Highway to Kempsey

0 60 120 240 360 480 Meters

NSW GOVERNMENT | Transport Roads & Maritime Services

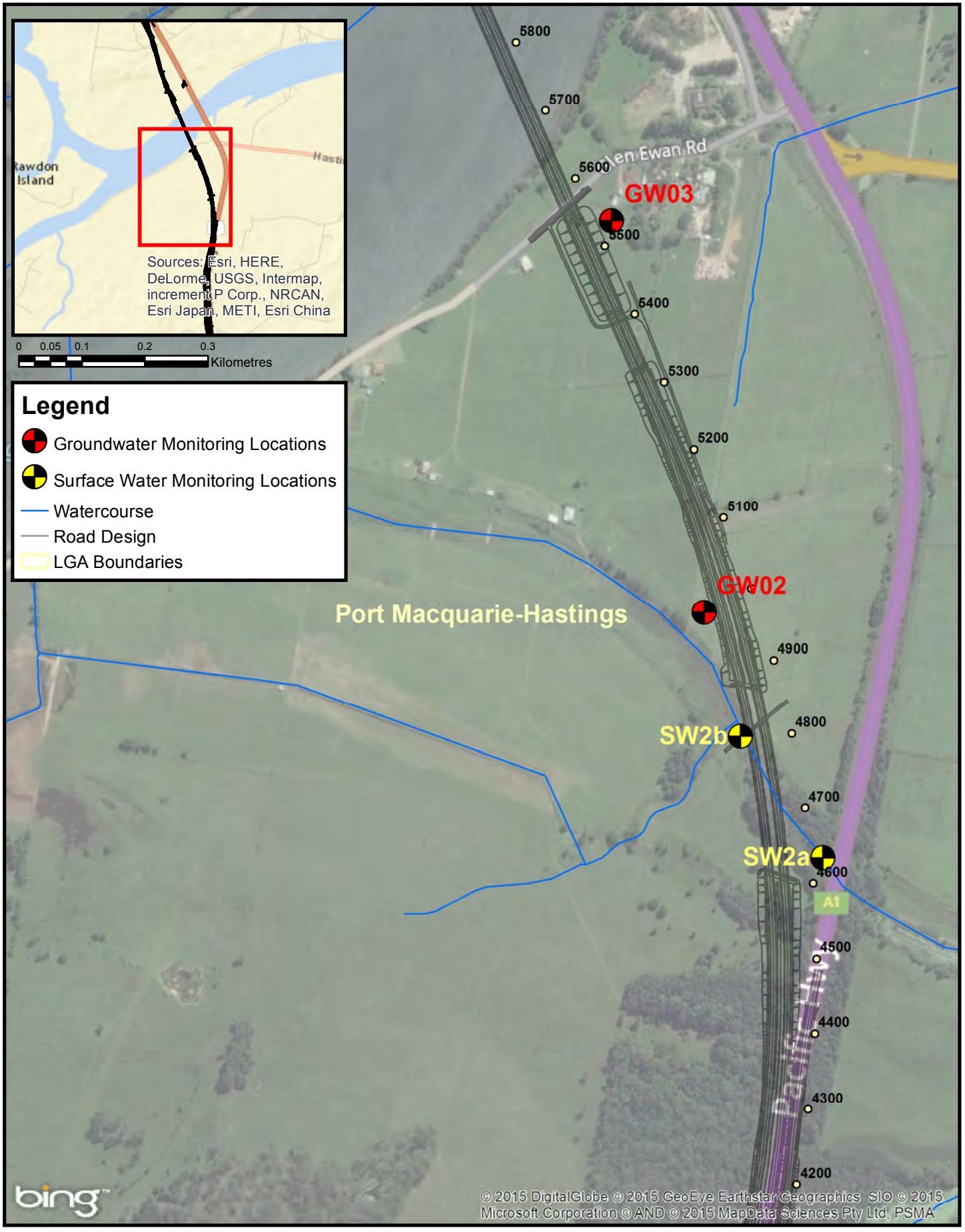
Surface & groundwater monitoring locations

Drawn By: Stuart Hill

Sheet 1 of 17

Prepared for: Roads and Maritime Services (Hunter)

Date: 29/11/2017



Pacific Highway Upgrade
Oxley Highway to Kempsey

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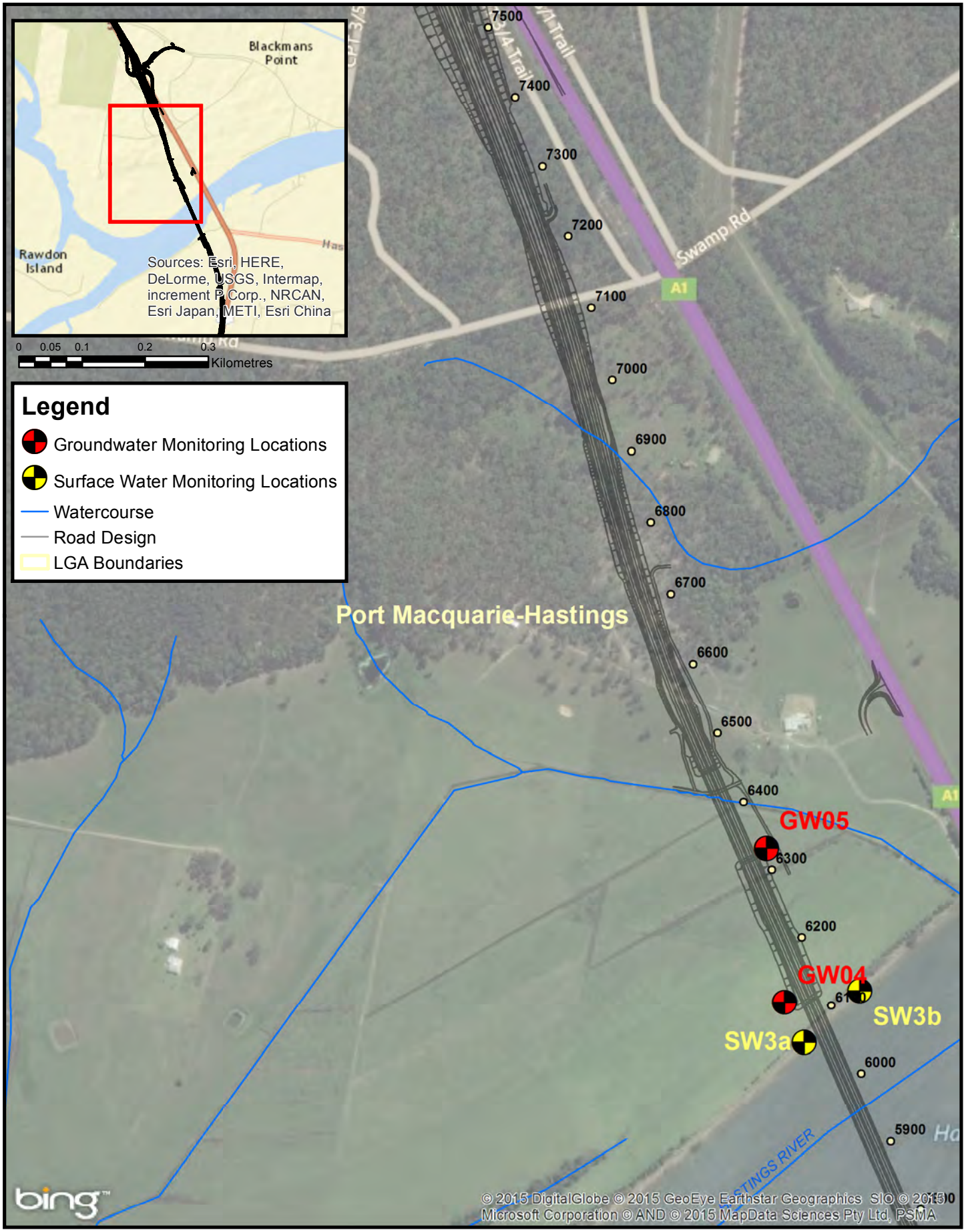
Surface & groundwater monitoring locations

Drawn By: Stuart Hill

Sheet 2 of 17

Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

120 60 0 120 240 360
Meters

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Surface & groundwater monitoring locations

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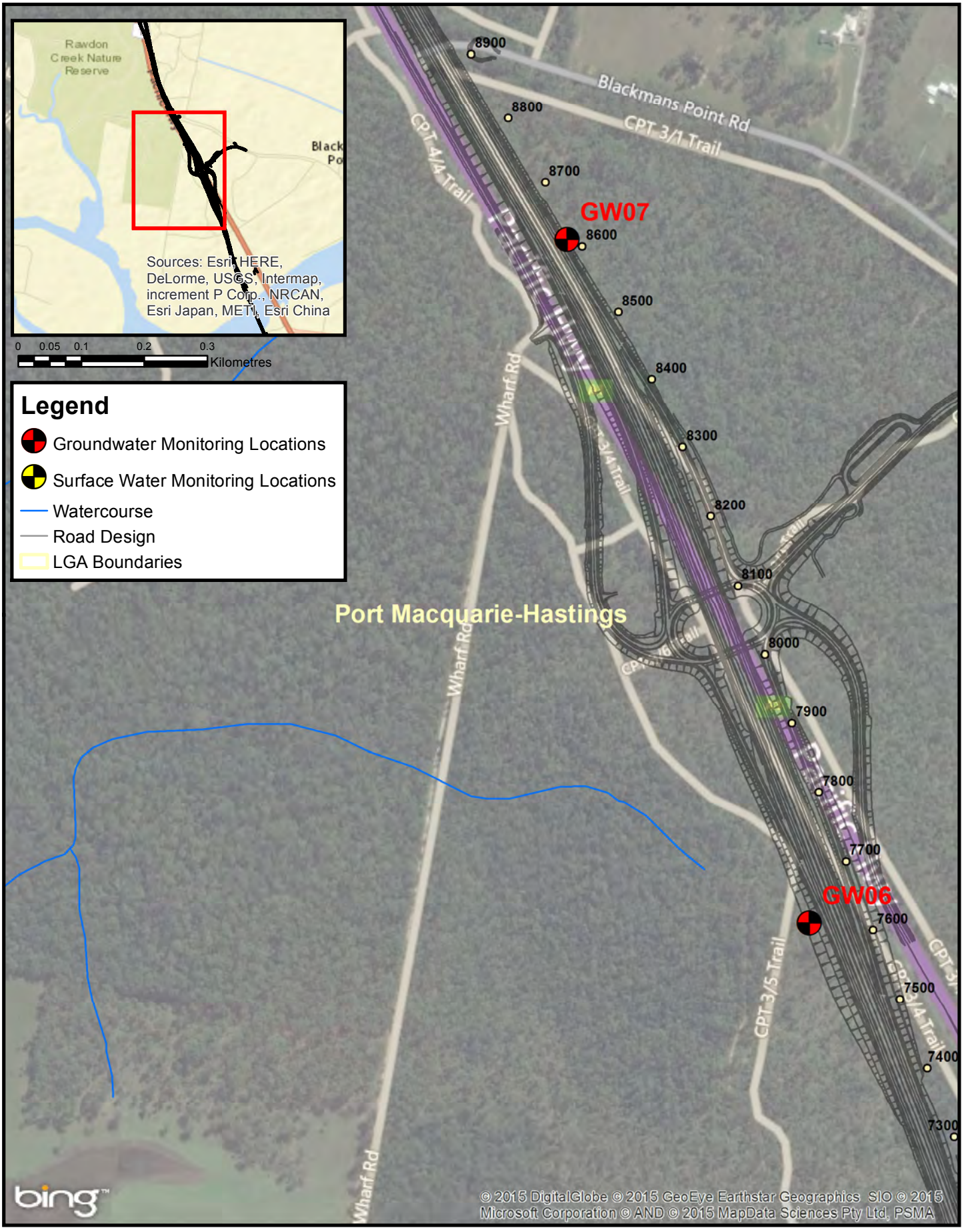
Sheet 3 of 17

Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

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Surface & groundwater monitoring locations

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Sheet 4 of 17

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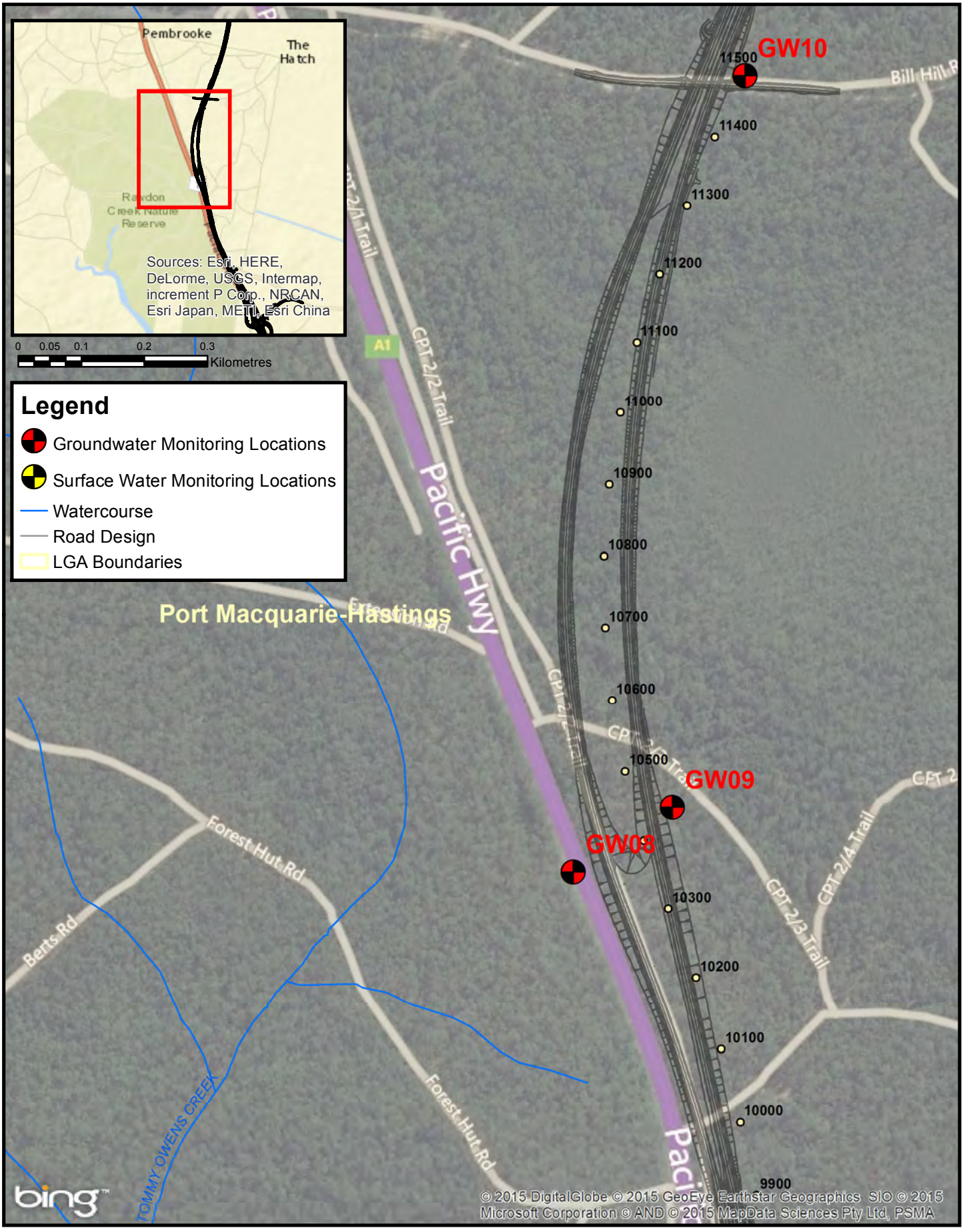
Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

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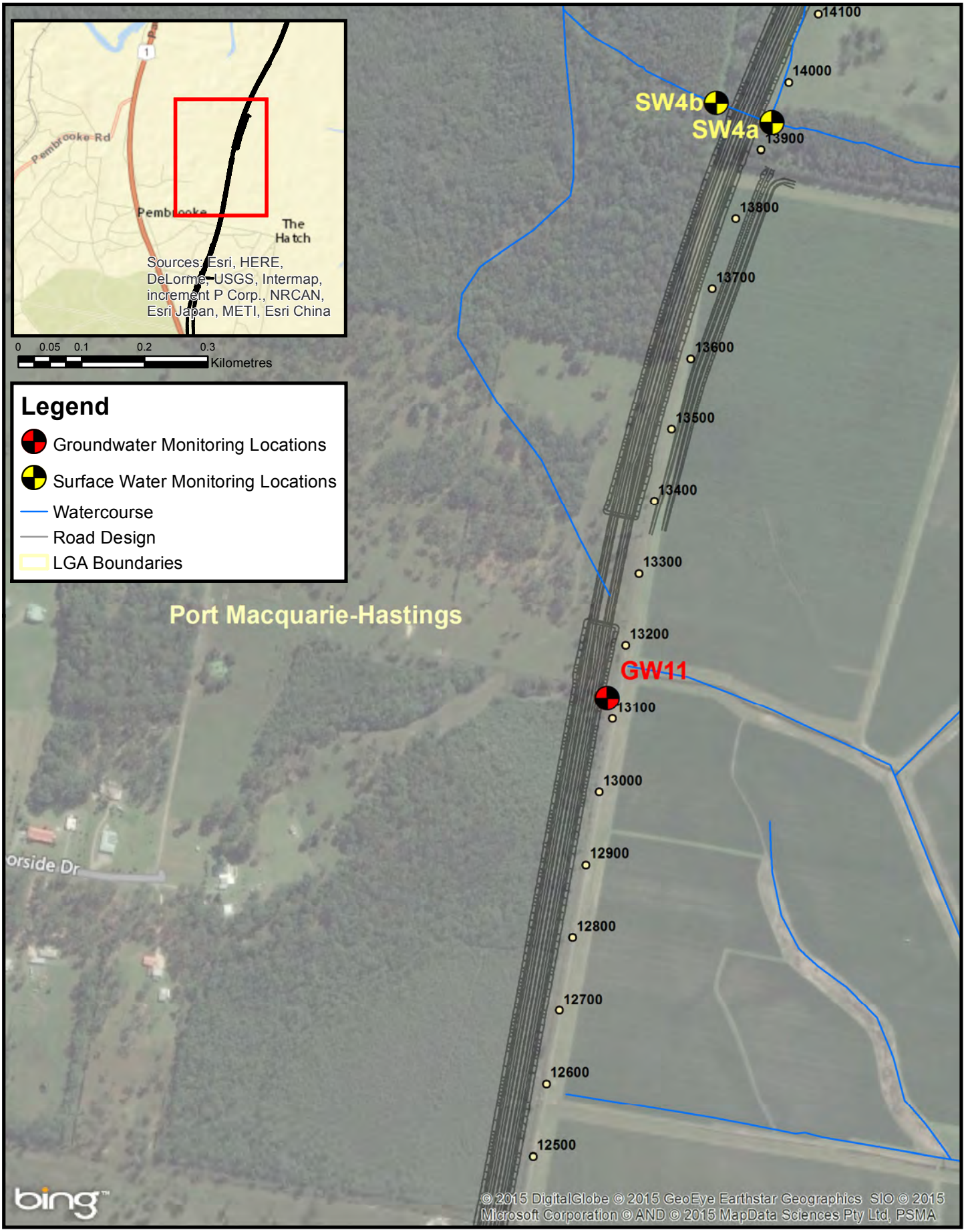
Surface & groundwater monitoring locations

Drawn By: Stuart Hill

Sheet 5 of 17

Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

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Surface & groundwater monitoring locations

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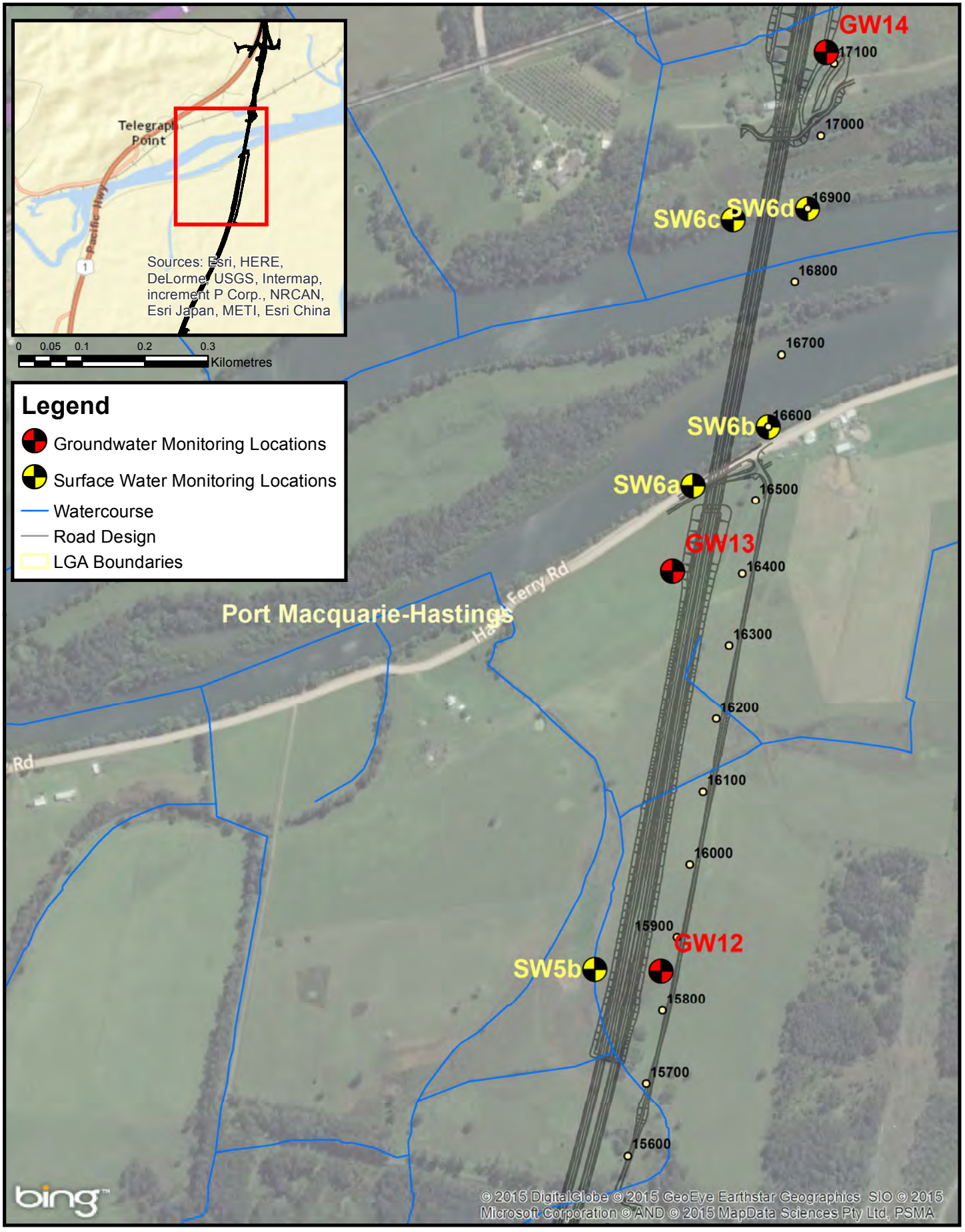
Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

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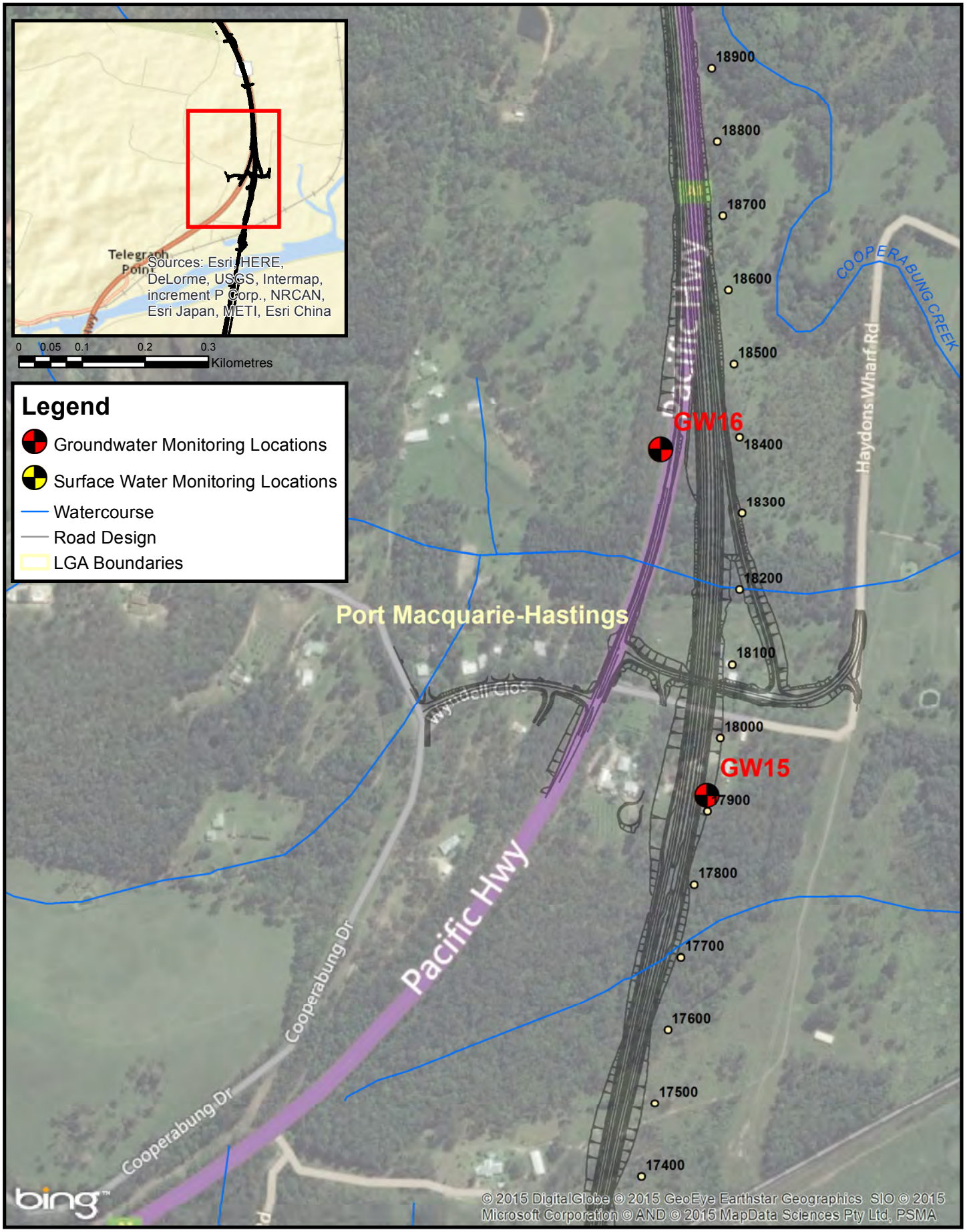
Surface & groundwater monitoring locations

Drawn By: Stuart Hill

Sheet 7 of 17

Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

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Surface & groundwater monitoring locations

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Sheet 8 of 17

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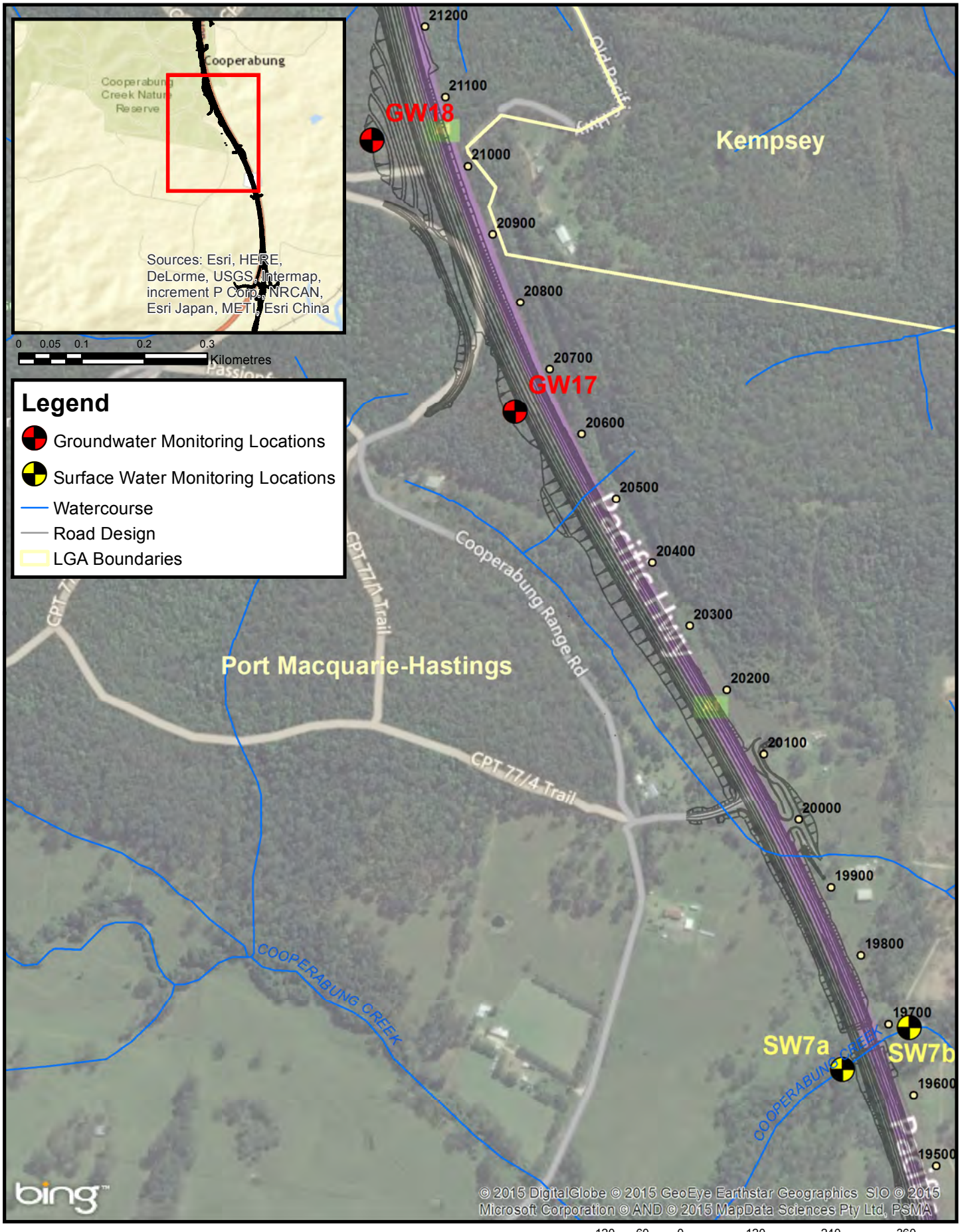
Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

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Date: 22/04/2015

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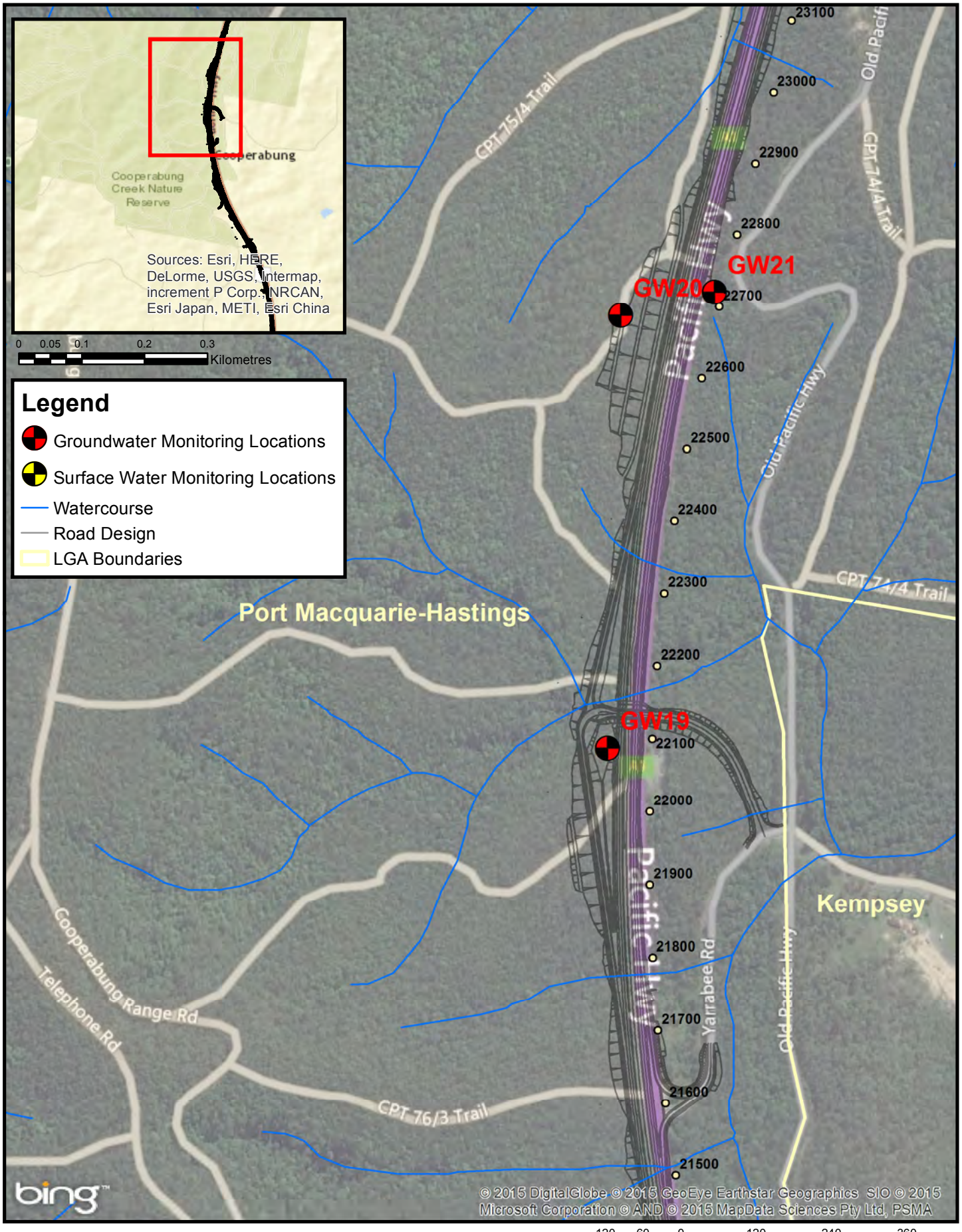


Pacific Highway Upgrade
Oxley Highway to Kempsey

NSW GOVERNMENT | Transport Roads & Maritime Services

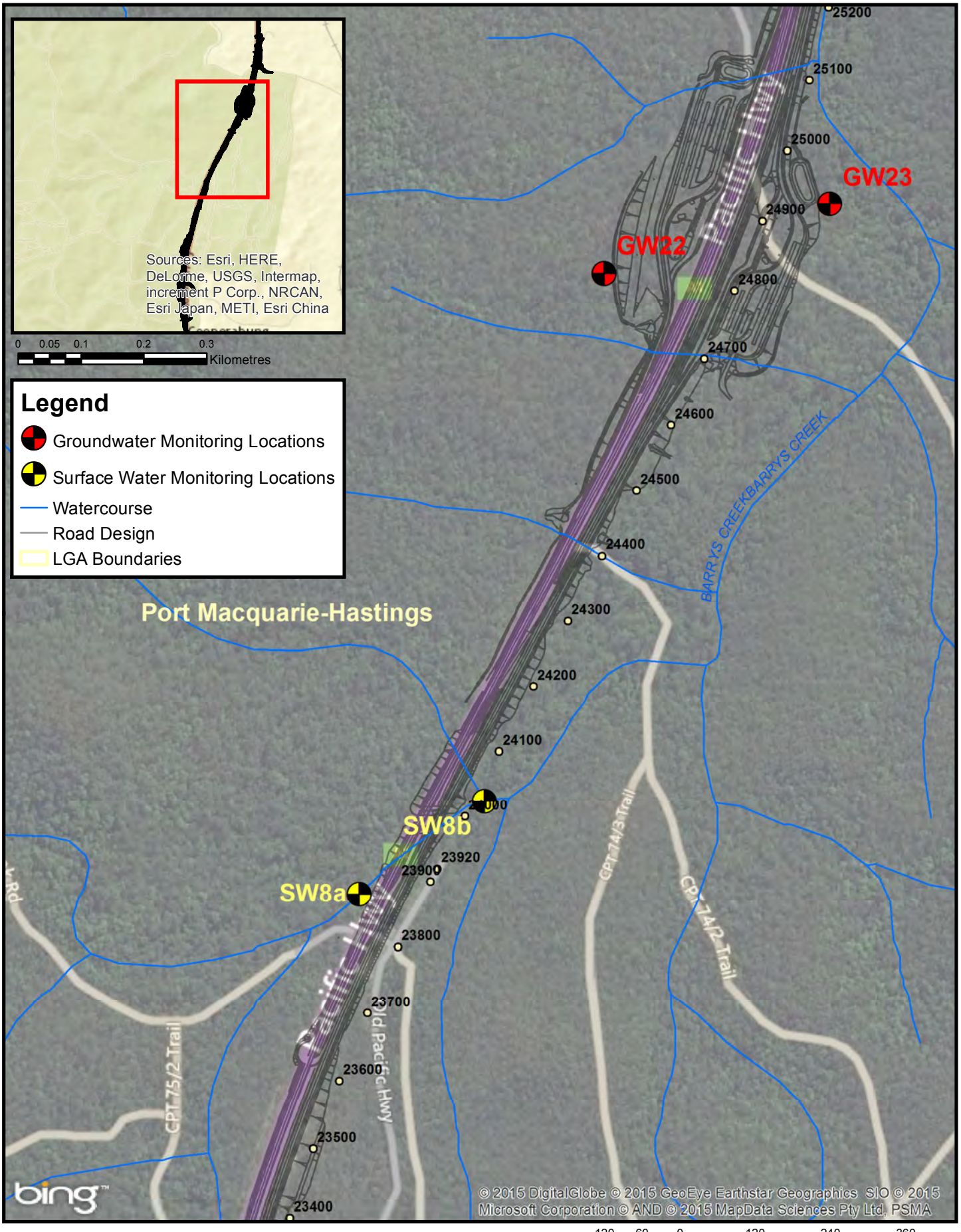
Surface & groundwater monitoring locations

Drawn By: Stuart Hill

Sheet 10 of 17

Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

NSW GOVERNMENT Transport Roads & Maritime Services

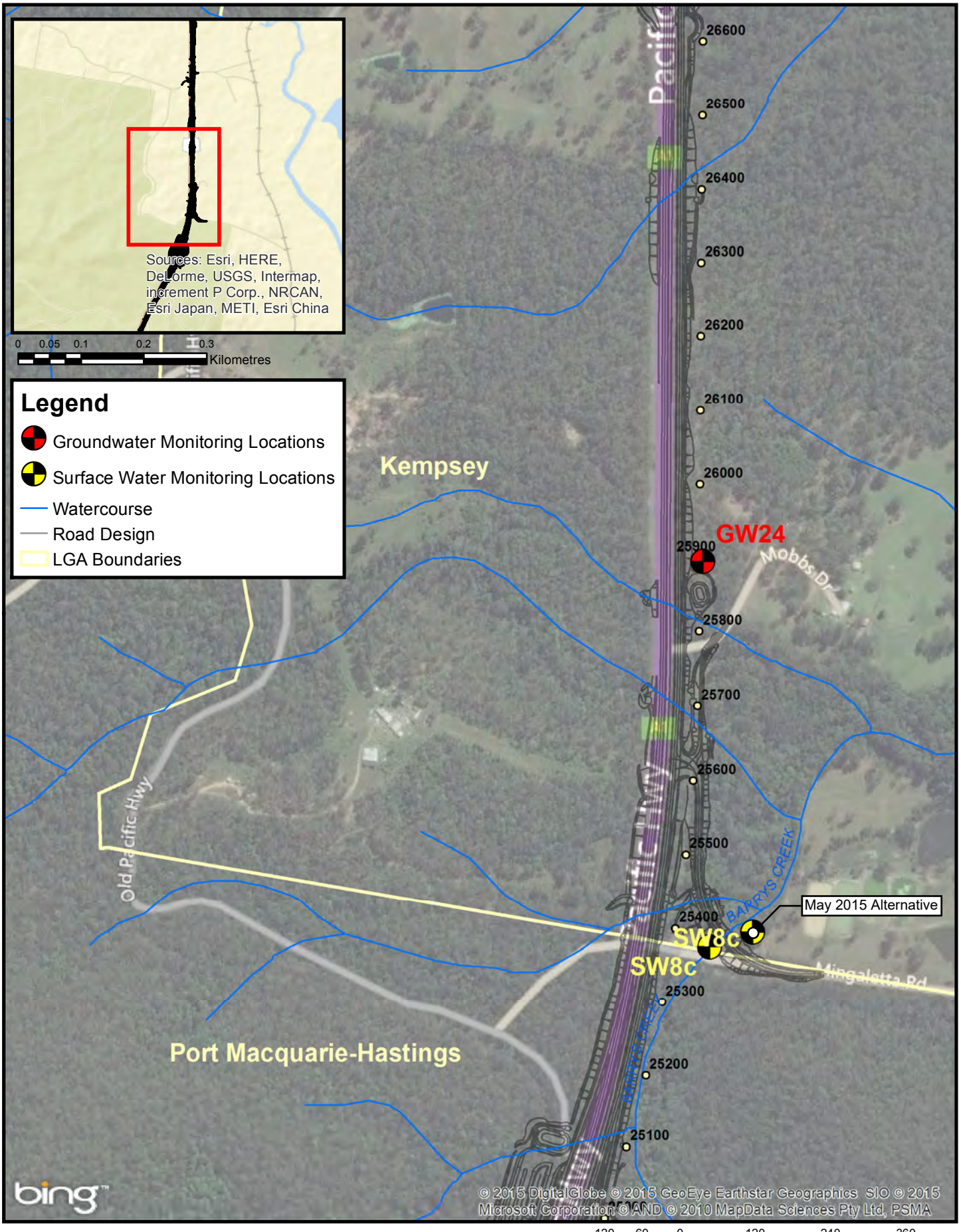
Surface & groundwater monitoring locations

Drawn By: Stuart Hill

Sheet 11 of 17

Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

NSW GOVERNMENT | Transport Roads & Maritime Services

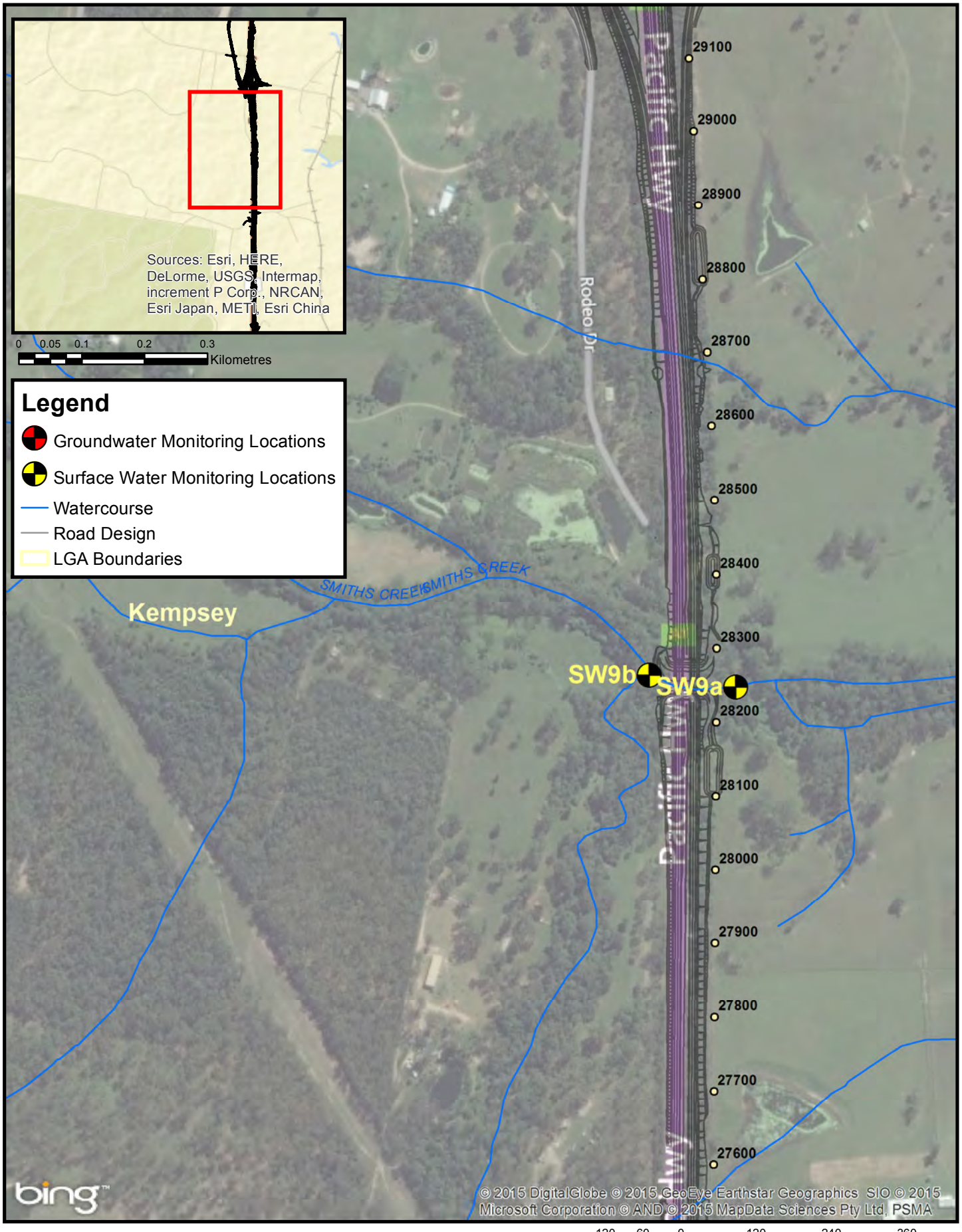
Surface & groundwater monitoring locations

Drawn By: Stuart Hill

Sheet 12 of 17

Prepared for: Roads and Maritime Services (Hunter)

Date: 25/11/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

NSW GOVERNMENT | Transport Roads & Maritime Services

Surface & groundwater monitoring locations

Drawn By: Stuart Hill

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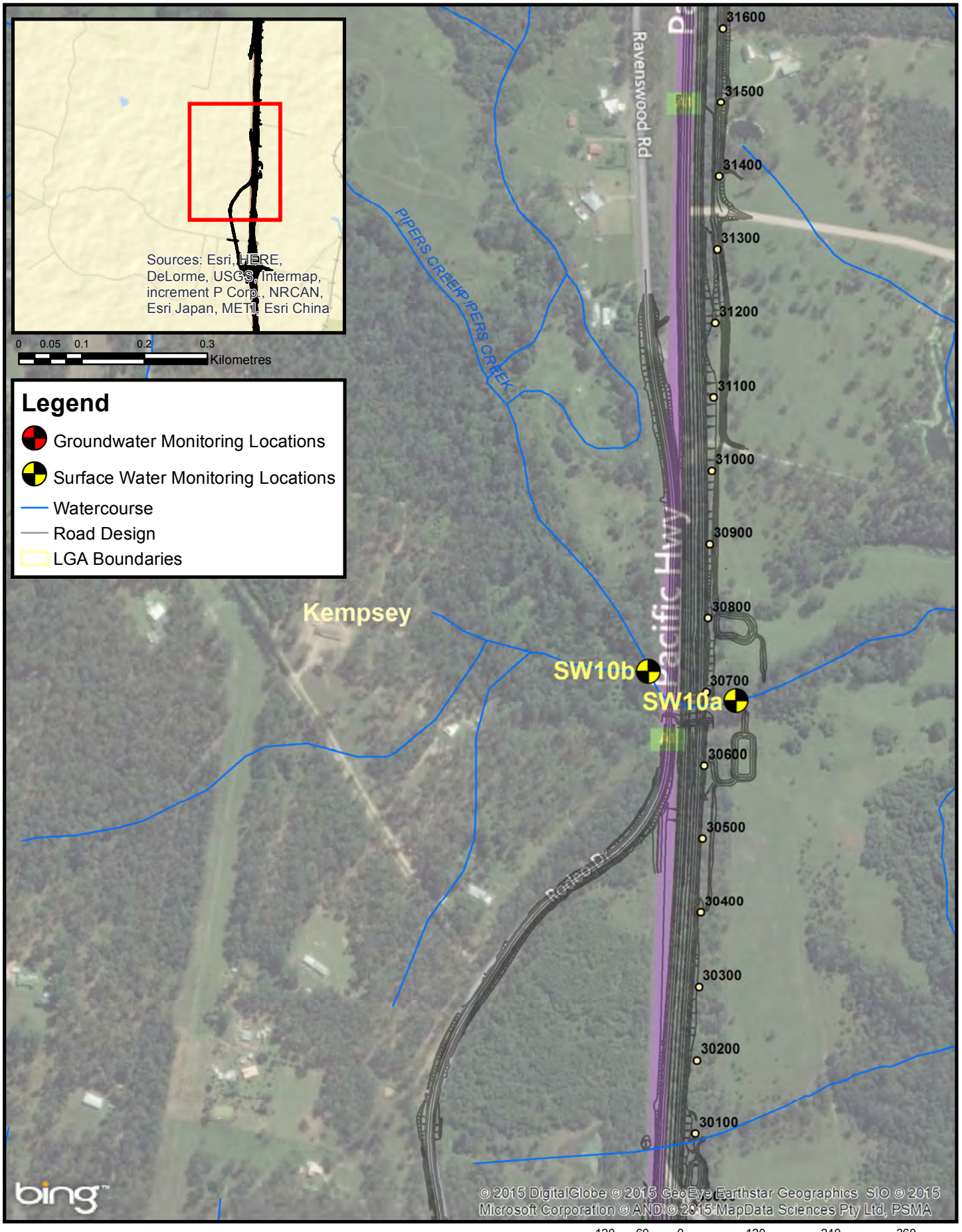
Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

NSW GOVERNMENT Transport Roads & Maritime Services

Surface & groundwater monitoring locations

Drawn By: Stuart Hill

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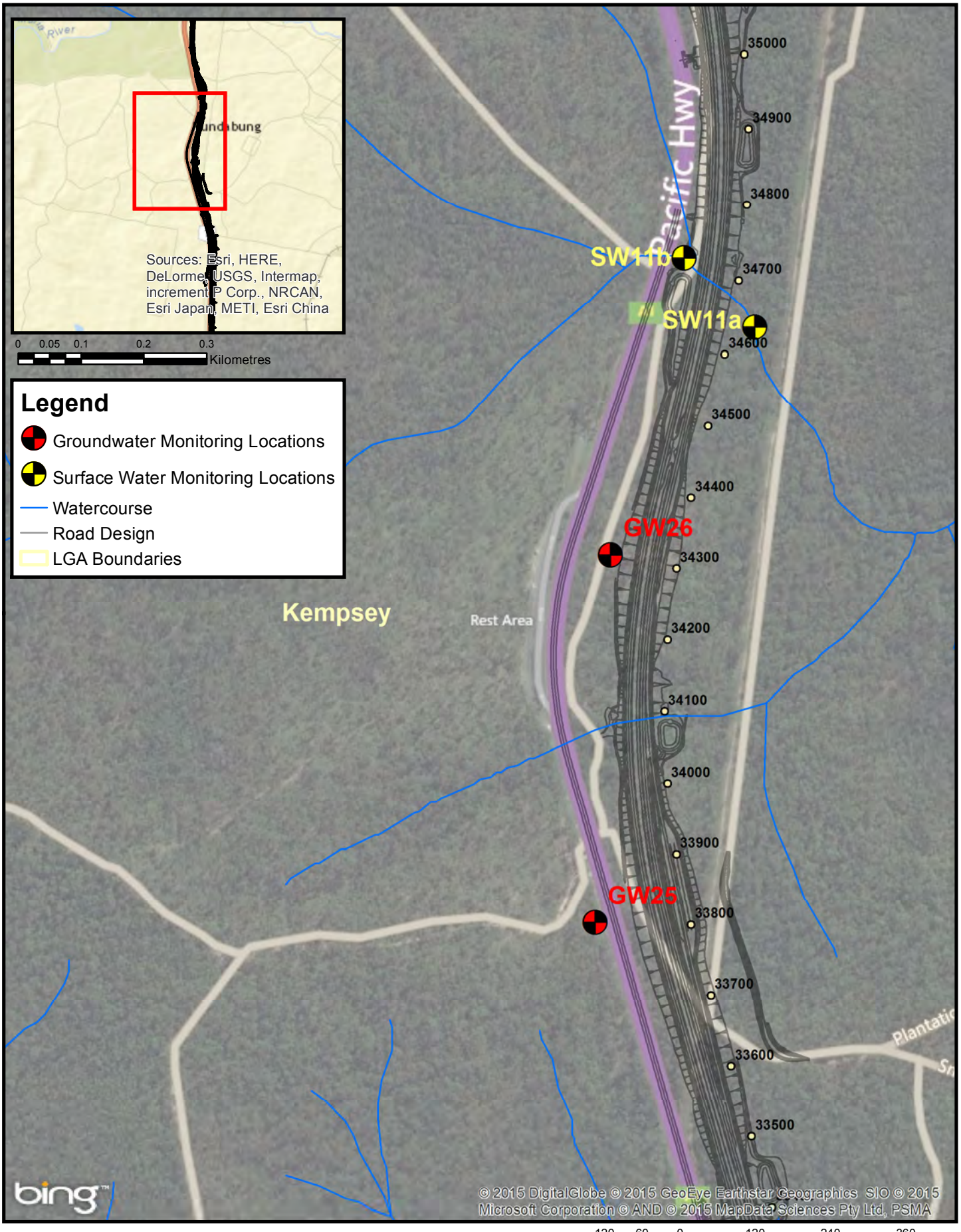
Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

NSW GOVERNMENT | Transport Roads & Maritime Services

Surface & groundwater monitoring locations

Drawn By: Stuart Hill

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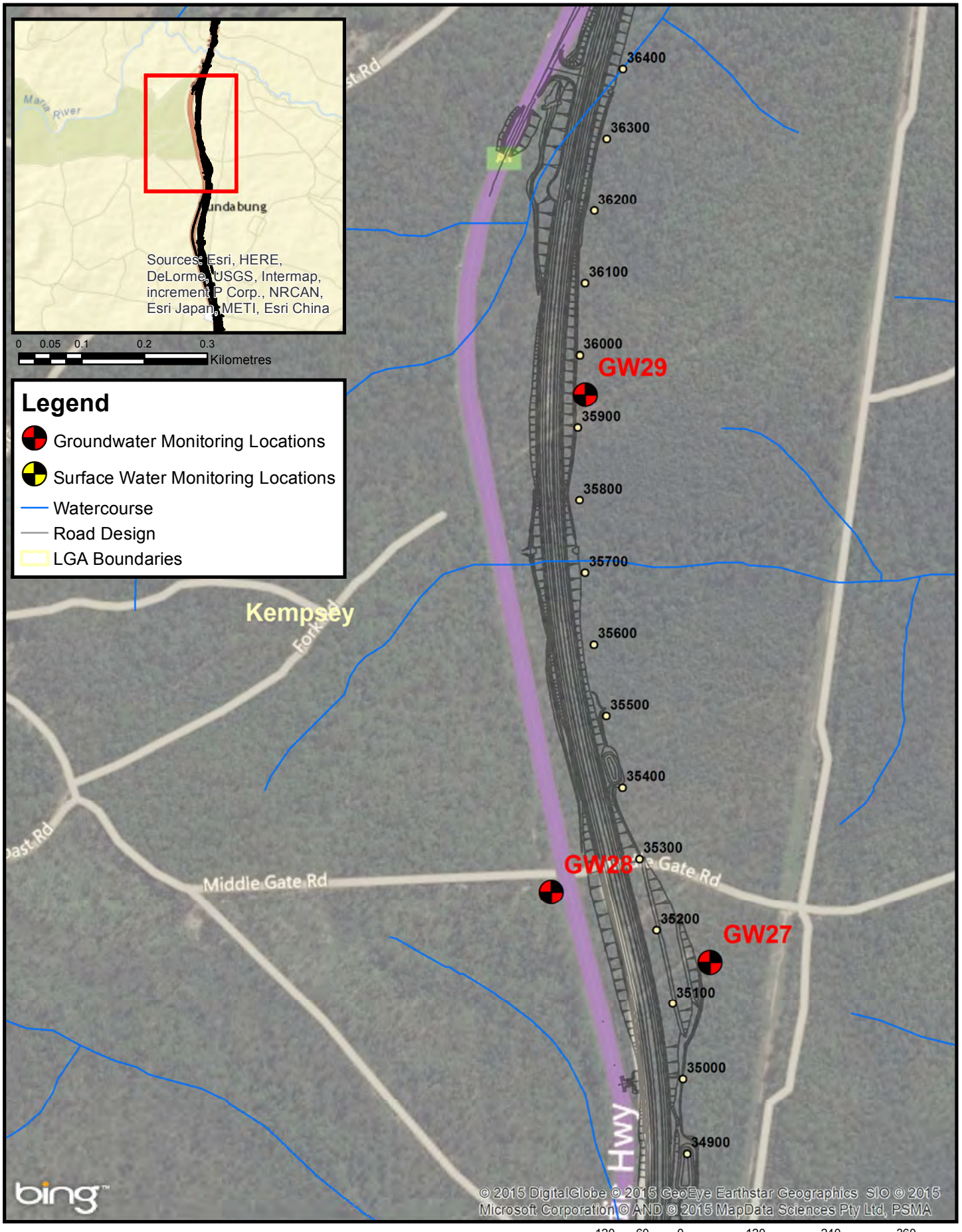
Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

NSW GOVERNMENT | Transport Roads & Maritime Services

Surface & groundwater monitoring locations

Drawn By: Stuart Hill

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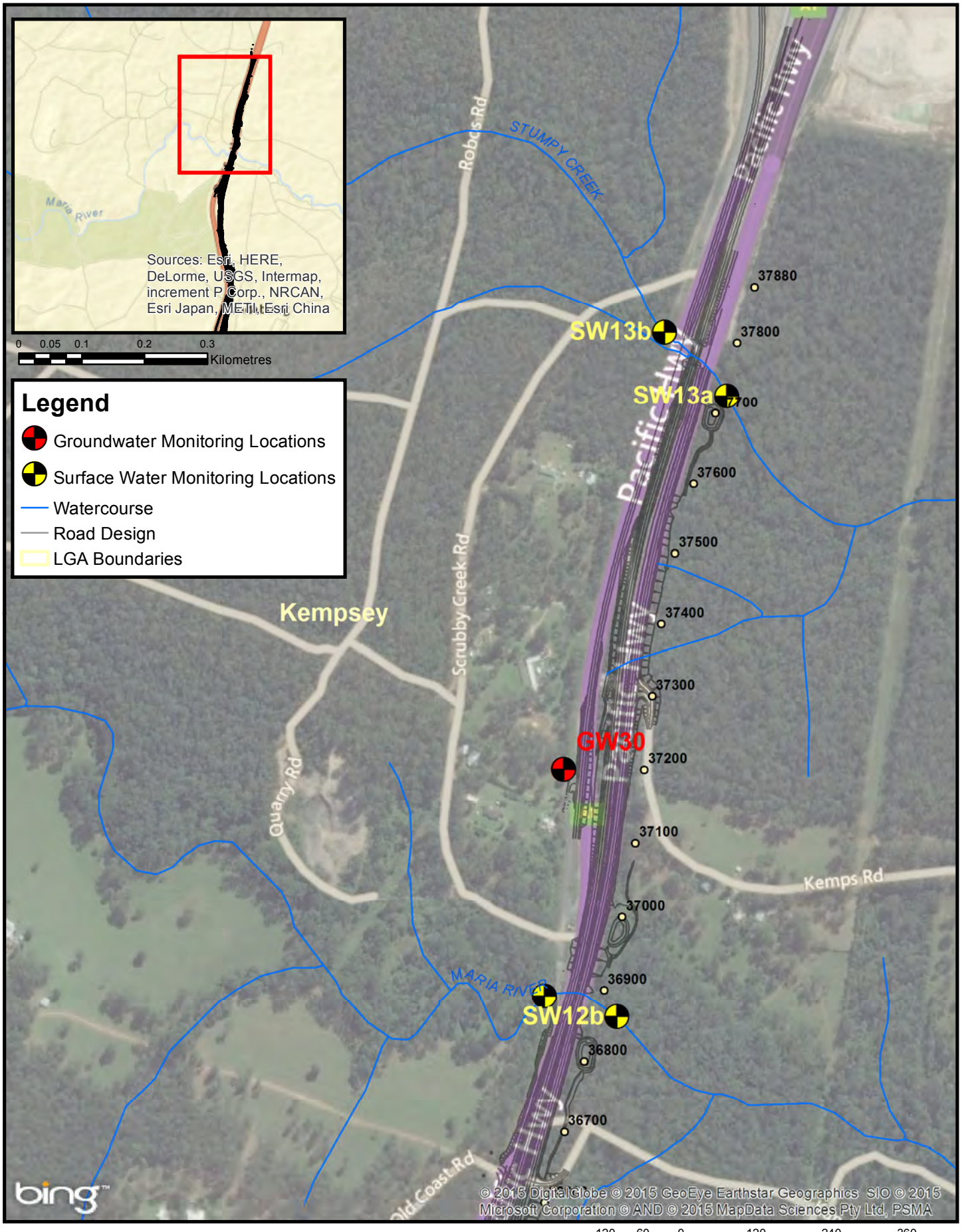
Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015



Pacific Highway Upgrade
Oxley Highway to Kempsey

NSW GOVERNMENT | Transport Roads & Maritime Services

Surface & groundwater monitoring locations

Drawn By: Stuart Hill

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Prepared for: Roads and Maritime Services (Hunter)

Date: 22/04/2015

Appendix B – Rainfall records

Port Macquarie Airport rainfall records from April 2020 to March 2021

Day of month	Apr 20	May 20	Jun 20	Jul 20	Aug 20	Sep 20	Oct 20	Nov 20	Dec 20	Jan 21	Feb 21	Mar 21
1	0	0	0.2	0	0	0.2	0.2	0.4	0	35.8	0.4	0.8
2	0	0	0	0	0	0	0	0	3.4	7.8	0	0.2
3	0.4	0	0	0	0	0	0	1	1.8	14.8	0	1.6
4	13	0	0	3.2	0	0.2	0	0	4.4	14.2	0	4.4
5	0	0	0	0.4	0.2	0	0	0	0	26.8	0	0
6	0	0	0	0	0	0	0	4.6	3.4	0	0	0.2
7	1.6	0	0	0	0	0.4	0	0	0	46.8	5	1.6
8	2.6	0.2	8	0.2	8.2	0	0	0.8	0	1.6	0	0
9	6.6	0	1	0.4	0	0	0	0	0	4.6	1.2	5
10	0.6	0.2	71.8	0.2	0.2	29	0	0	0	1	2.6	4.8
11	4	0	36.4	0	11	18	0	0	23	0	2.2	8.2
12	0	0	1	0.4	0	0.2	0	0	82.2	0	0	21.4
13	0	0	3.2	0.2	0	0	0	0.2	1	0	0	0.4
14	0	0	1.6	1.2	0	0	0	5.2	5	0	31.2	0
15	0	0	5.2	5.2	10.4	0		0	30.2	18.4	0.2	8.6
16	0.2	10.8	0	0	0	0	0	0	131.4	6.2	3.6	0
17	0	4	0.2	0	0	0	0	0.2	1.2	0	6.6	14.8
18	0	7	8.4	0	0	0.2	0	0	1.2	0	15.8	56.4
19	0	2	2.6	0	0	0	3.6	0	23.8	0	12.4	89.2
20	0.4	0	0	0.2	0	0	12	0	8.4	16.6	55.6	174.6
21	0	1.4	0.2	0	0	1.4	0	0	9	0.2	50	57.8
22	0	4.8	1.4	0	0	0	0	0	41.6	0	118.4	45.8
23	0	0	0.2	0	0	0	0	0.6	0	0	0.2	28
24	0	0	0	0	0	0	2.4	1.2	0	0	16.4	19.6
25	0	0	0	0.2	0	0	2.4	0	0	0	3.6	0
26	0.2	10.6	0	69.6	0	0	7	0	5.2	0	0.2	0
27	0.6	3.2	0	17.4	0	0	16.6	0	10.8	0	0.2	0
28	30.8	0	0	0	0	0	0	0	14.6	0.2	29.6	0.2
29	1.6	0	0.2	0.4	0	0	22.4	0	0	23.8		0
30	0	3.6	0	0	0	0	6.6	0	3.4	7.6		0.6
31		0.2		0	0		3.2		2	0		3.8
Highest daily	30.8	10.8	71.8	69.6	11	29	22.4	5.2	131.4	46.8	118.4	174.6
Monthly total	62.6	48	141.6	99.2	30	49.6	76.4	14.2	407	226.4	355.4	548

Statistics for all years												
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	145.9	175.1	197	131	104.4	138.2	63.1	60.5	58.8	75.4	139.7	120.6
Median	123.3	152.8	177.2	103.3	59.8	138.8	66.1	31.7	45.6	59.5	125.7	97.5

Telegraph Point rainfall records from April 2020 to March 2021

Day of month	Apr 20	May 20	Jun 20	Jul 20	Aug 20	Sep 20	Oct 20	Nov 20	Dec 20	Jan21	Feb 21	Mar 21
1	0	0	0	0	0	No data	No data	No data	0	67.2	0	No data
2	0.8	0	0	0	0				2.8	24.8	0.2	
3	0.6	0	0	0	0				0	0.8	5.3	
4	11.6	0	0	9.2	0				0.7	38.4	0	
5	0	0	0	0	0				8	27.2	0	
6	0	0	0	0	0				7.8	0.2	0	
7	1.8	0	0	0	0				0	30	7.3	
8	5.2	0	0	0.8	10.2				0	8.4	0	
9	0	0	1.3	0.8	0.5				0	1.7	0.6	
10	1.8	0	20.6	0.6	1				0	0	3	
11	5	0	33.7	0.1	8				7	0	1	
12	0	0	1.6	0	0				83.6	0	0	
13	0	0	0	0	0				3.4	0	0	
14	0	0	4.6	1.1	0				19.3	0.4	19.6	
15	0	0	0	1.7	10				43.4	6.2	0	
16	0	5.3	11	0	0				161.4	6	0	
17	0	1.5	0	0	0				9	0	3	
18	3.1	7	4	0	0				1.6	0	21	
19	0	0.2	0	0	0				21.8	0	20.8	
20	0	2.8	0	1	0				8.8	1.7	76.8	
21	0	0	0	0	0				13.4	0	36.2	
22	0	5	0	0	0.2				27	0	55	
23	0	0	0	0	0				0	0	13.3	
24	0	0	0	0	0				0	0	0	
25	0	0	0	0	0				0	0	4.1	
26	0	5.2	0	43.4	0				3.4	0	0.8	
27	0.8	0.1	0	9.2	0				0.9	0	3.6	
28	32	0.1	0	0	0				8	0	0.6	
29	3.2	0	0	0	0				0	12.2		
30	0	0.9	0	0	0				9.8	9.6		
31		0		0	0				0.4	0		
Highest daily	32	7	33.7	43.4	10.2				161.4	67.2	76.8	
Monthly total	65.9	28.1	76.8	67.9	29.9				441.5	234.8	272.2	

Statistics for all years												
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	137	174.9	168.9	124.4	102.1	108.9	66.7	57.3	59.3	84	107.7	115.8
Median	109.7	148.2	149.4	78.2	59	74.2	37	25.8	42	55.3	88.2	95.2

Kempsey airport rainfall records from April 2020 to March 2021

Day of month	Apr 20	May 20	Jun 20	Jul 20	Aug 19	Sep 20	Oct 20	Nov 20	Dec 20	Jan 21	Feb 21	Mar 21
1	0	0	0	0	0	0	0.6	0	0	55.4	0.2	0.6
2	0	0	0	0	0	0	0	0	0	26.4	0	0.2
3	0	0	0	0	0	0	0	0	2.2	5.8	0	0.8
4	4	0	0	0.6	0	0	0	0	11.8	25.6	0	0.4
5	0	0	0	0.6	0	0	0	0	0	0.6	0	0
6	0	0	0	0	0	4.2	0	27.6	8.2	3.8	0	0
7	1.2	0	0	0	0	6.8	0	0	0	18.6	5.4	0
8	2.4	0	0.2	0	16.6	0	0	0	0	6.2	0	0
9	4.4	0	0.6	2.8	0.2	0	0	0	0	4	0	13
10	3.6	0.8	35.8	0.2	2.2	11.6	0	0	0	1.6	2	6
11	3.8	0	33.8	0.2	2.4	15.8	0	0	24.6	1.6	3.2	10.2
12	0	0	0.4	0.8	0	0.8	0	0	60.8	0	0	3.8
13	0	0	0.2	0	0	0	0	0	4.8	0	0	2
14	0	0	5.2	13.6	0	0	0	16.4	15	0	13.8	0
15	0	0	3.2	0.4	11.8	0	0	0	60.6	0.2	0	24
16	0	0.8	0	0	0	0	0	0	109.2	0.6	7.2	0.2
17	0	0.4	0	0	0	0.2	0	0	0.8	0	17.2	19.6
18	0	3.6	5.4	0	0	0	0	0	8.4	0	7.2	40.6
19	0.2	1.4	1.2	0	0	0	9	0	3.6	0	45.6	225.8
20	6.4	0	0	0	0	0	6.8	0	0.4	0.8	26.8	141
21	0	2.2	0	0	0	0.2	0	0	3.4	0	19.6	72
22	0	5.4	1	0	0	0	0	0	21.6	0	16	179.6
23	0	0	0	0	0	0	7.6	0.4	0	0	0	61.2
24	0	0	0	0	0	0	2.2	0	0	0	18	18.2
25	0	0.2	0	0	0	0	2.4	0	0	0	11.4	0
26	0	0.6	0	14.8	0	0	10	0	0.8	0	5.8	0
27	0.2	0	0	23.6	0	0	8.2	0	2.2	0	0.2	0
28	8	0	0	0	0	0	0	0	14.6	0.4	2.6	0
29	0	0	0	0	0	0	64.4	0	0.2	1.8		1.8
30	0	3	0	0	0	0	5.8	0	17.8	2.8		0
31		0		0	0		7.2		3.4	0.2		1
Highest daily	8	5.4	35.8	23.6	16.6	15.8	64.4	27.6	109.2	55.4	45.6	225.8
Monthly total	34.2	18.4	87	57.6	33.2	39.6	124.2	44.4	374.4	156.4	202.2	822

Statistics for all years												
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	115	147.8	195.8	69	59.8	108.4	25.6	49.8	39.7	82.4	101.4	112.4
Median	76.6	118.4	146.4	40	27.4	87	23	17.6	26.2	68	92.3	92.9

Appendix C – Surface water quality sampling results

Table 1 SW1 – Unnamed tributary or Fernbank Creek (Chainage 2500 to 2650)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW1a# (US)	SW1c# (DS)	SW1a (US)	SW1c (DS)	SW1a# (US)	SW1c# (DS)	SW1a # (US)	SW1c# (DS)	SW1a# (US)	SW1c# (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)
1	Temperature	^{0}C	17.1	17.8	20.3	20.4	15.5	16.0	15.3	16.1	13.7	13.8	15.5	15.6	12.1	12.9	11.9	12.5	11.7	12.5
2	Electrical conductivity (EC)	uS/cm	715	1380	86	215	514	1417	398	787	672	1277	151	454	482	1132	615	1334	472	1123
3	Dissolved oxygen (DO)	%	11	35	84	92	10	53	40	75	9	58	68	74	25	76	8	65	49	81
4	pH		6.0	6.2	5.8	6.3	6.4	6.7	6.2	6.7	6.4	6.8	7.0	6.9	6.7	7.1	6.6	7.0	5.9	6.5
5	Turbidity (NTU)	NTU	19	7	840	232	78	15	23	15	11	11	62	48	15	16	14	13	27	11
6	Total suspended solids (TSS)	mg/L	8	<5	257	77	17	9	8	6	11	8	<5	11	<5	8	12	<5	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.04	<0.01	0.04	0.01										
9	Arsenic (As)	mg/L					0.002	<0.001	<0.001	<0.001										
10	Cadmium (Cd)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					0.002	0.001	0.001	0.001										
12	Copper (Cu)	mg/L					<0.001	<0.001	<0.001	<0.001										
13	Iron (Fe)	mg/L					20.6	0.24	1.83	0.16										
14	Lead (Pb)	mg/L					<0.001	<0.001	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.994	0.33	0.221	0.067										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.002	<0.001	<0.001	<0.001										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					<0.005	0.008	<0.005	0.005										
20	Total Nitrogen (TN)	mg/L	0.4	0.3	1	0.7	0.7	0.2	0.3	<0.1	0.4	0.2	1	0.8	0.3	0.2	0.4	0.4	0.3	0.1
21	Total Phosphorous (TP)	mg/L	<0.01	0.06	0.11	0.2	<0.01	0.14	<0.01	0.04	<0.01	0.03	0.04	15.6	<0.01	0.04	<0.01	0.03	<0.01	0.06

- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

DNS (did not sample) - Clearing and earthworks for industrial development commenced. No access to SW1b sampling point from 15 May 2017.

Table 2 SW1 – Unnamed tributary or Fernbank Creek (Chainage 2500 to 2650) Cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a# (US)	SW1c# (DS)	SW1a# (US)	SW1c# (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)
1	Temperature	^{0}C	12.1	12.5	15.0	15.4	16.1	16.6	16.0	16.5	17.8	18.9	17.8	18.0	19.7	20.3	22.8	23.1	21.7	22.0
2	Electrical conductivity (EC)	uS/cm	521	1314	259	423	701	1044	1093	1204	595	796	828	997	376	783	187	392	86	152
3	Dissolved oxygen (DO)	%	10	84	58	75	5	34	8	36	10	59	4	46	17	63	28	47	79	77
4	pH		6.3	6.8	6.5	6.8	7.5	7.6	6.2	6.9	7.2	7.7	6.4	6.9	6.7	6.9	6.9	7.0	6.6	6.6
5	Turbidity (NTU)	NTU	39	8	111	83	16	28	115	17	29	17	31	18	31	23	21	22	62	72
6	Total suspended solids (TSS)	mg/L	15	13	8	8	10	14	22	<5	<5	10	46	6	6	6	<5	5	10	4
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.08	0.03	0.05	<0.01							0.02	<0.01	0.5	0.23		
9	Arsenic (As)	mg/L			<0.001	<0.001	0.002	<0.001							<0.001	<0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							0.002	0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	0.001	<0.001		
13	Iron (Fe)	mg/L			0.32	0.18	16.9	0.13							0.15	0.35	0.7	0.6		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.024	0.057	0.919	0.632							0.042	0.22	0.01	0.091		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	0.001		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			0.006	0.009	<0.005	0.006							0.012	0.028	0.008	0.007		
20	Total Nitrogen (TN)	mg/L	0.3	<0.1	0.3	0.2	0.6	0.3	0.3	0.3	0.2	0.4	0.4	0.3	0.2	0.2	0.6	0.4	1	0.9
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.02	0.06	0.03	0.07	<0.01	0.02	<0.01	0.07	<0.01	0.03	0.01	0.02	<0.01	0.02	0.04	0.03

- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

DNS - Clearing and earthworks for industrial development commenced. No access to SW1b sampling point from 15 May 2017.

Table 3 SW1 – Unnamed tributary or Fernbank Creek (Chainage 2500 to 2650) Cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		29/03/21 (D)									
			SW1a # (US)	SW1c (DS)	SW1a # (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)	SW1a (US)	SW1c (DS)
1	Temperature	^{0}C	21.1	21.5	21.8	23.9	21.2	22.1	21.4	22.3	20.1	21.2								
2	Electrical conductivity (EC)	uS/cm	350	487	484	1184	301	805	212	804	198	610								
3	Dissolved oxygen (DO)	%	2	53	3	55	19	59	40	60	7	54								
4	pH		6.8	7.2	6.8	7.2	6.9	7.0	7.0	7.0	6.6	7.0								
5	Turbidity (NTU)	NTU	14	12	12	7	29	6	39	12	34	10								
6	Total suspended solids (TSS)	mg/L	10	<5	10	<5	9	<5	<5	<5	16	7								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.08	<0.01	0.05	0.01												
9	Arsenic (As)	mg/L			0.005	<0.001	<0.001	<0.001												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			0.002	<0.001	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	0.001	0.001												
13	Iron (Fe)	mg/L			25.4	0.23	1.7	0.26												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			1.26	0.295	0.297	0.121												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			<0.005	0.006	0.007	<0.005												
20	Total Nitrogen (TN)	mg/L	0.6	0.4	0.9	0.3	0.4	0.2	0.6	0.2	0.7	0.2								
21	Total Phosphorous (TP)	mg/L	<0.01	0.02	0.02	0.05	<0.01	<0.01	0.05	0.02	0.04	<0.01								

- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

DNS - Clearing and earthworks for industrial development commenced. No access to SW1b sampling point from 15 May 2017.

Table 4 SW2 – Fernbank Creek (Chainage 4620 to 4800)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)
1	Temperature	^{0}C	17.4	17.5	19.6	19.8	15.2	15.7	15.2	16.3	12.5	12.7	15.3	15.4	11.6	11.7	11.9	12.4	11.9	12.1
2	Electrical conductivity (EC)	uS/cm	531	870	488	645	597	837	564	737	674	1033	369	456	464	813	653	914	476	656
3	Dissolved oxygen (DO)	%	13	50	21	53	29	74	31	73	30	48	56	128	59	71	58	60	69	93
4	pH		5.8	6.0	6.1	6.3	6.3	6.7	6.3	6.7	5.2	6.4	6.3	6.9	6.3	6.4	4.9	4.5	4.3	4.7
5	Turbidity (NTU)	NTU	97	44	107	41	123	63	47	43	27	30	21	20	22	19	12	23	8	14
6	Total suspended solids (TSS)	mg/L	7	<5	<5	9	8	10	10	14	14	9	14	15	<5	13	10	3	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.07	0.04	0.06	0.03										
9	Arsenic (As)	mg/L					<0.001	<0.001	<0.001	<0.001										
10	Cadmium (Cd)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					0.002	0.001	0.003	0.002										
12	Copper (Cu)	mg/L					<0.001	<0.001	<0.001	<0.001										
13	Iron (Fe)	mg/L					6.3	4.41	2.97	1.89										
14	Lead (Pb)	mg/L					<0.001	<0.001	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.449	0.122	0.47	0.272										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.005	0.002	0.005	0.003										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					0.01	<0.005	0.012	0.007										
20	Total Nitrogen (TN)	mg/L	1.9	1.4	2.0	1.6	1.9	1.6	2.2	1.6	2.0	1.0	1.4	1.8	1.6	0.9	1.8	1.0	0.3	0.3
21	Total Phosphorous (TP)	mg/L	0.14	0.06	0.12	0.14	0.09	0.05	0.04	0.05	0.04	0.03	0.15	0.2	0.05	0.06	0.01	0.02	0.01	0.02

DNS –Sample not collected due to insufficient water depth.

Note 1 - No obvious movement of water between sampling points at any stage during the monitoring period.

Table 5 SW2 – Fernbank Creek (Chainage 4620 to 4800) Cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)
1	Temperature	^{0}C	11.8	12.1	15.4	16.6	16.9	18.1	18.0	18.1	18.7	19.8	21.0	21.3	20.1	20.6	26.3	24.9	24.1	24.4
2	Electrical conductivity (EC)	uS/cm	435	723	619	898	602	888	928	1025	954	1136	1131	1261	1433	1461	267	256	292	453
3	Dissolved oxygen (DO)	%	41	69	59	56	16	16	9	6	8	8	37	22	85	87	58	62	20	40
4	pH		5.2	4.4	4.3	3.8	5.4	4.8	3.8	3.7	4.3	4.0	3.4	3.4	3.8	3.7	6.1	6.5	6.8	7.0
5	Turbidity (NTU)	NTU	12	23	15	23	35	39	61	119	71	69	67	104	10	8	10	13	32	15
6	Total suspended solids (TSS)	mg/L	12	12	8	9	28	26	31	46	18	25	25	26	<5	<5	7	7	20	20
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.13	0.17	0.09	0.11							8.92	10.4	0.28	0.28		
9	Arsenic (As)	mg/L			<0.001	<0.001	<0.001	<0.001							0.001	0.002	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							0.0008	0.0009	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001							0.003	0.004	<0.001	<0.001		
13	Iron (Fe)	mg/L			0.98	2.25	4.34	4.11							3.66	3.78	0.75	0.67		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.651	1.11	0.603	1.09							4.47	4.47	0.5	0.455		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			0.006	0.005	0.006	0.005							0.108	0.109	0.007	0.006		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			0.017	0.014	0.015	0.018							0.471	0.456	0.042	0.038		
20	Total Nitrogen (TN)	mg/L	0.7	0.4	0.6	0.4	0.8	0.6	1.4	0.8	2.8	2.8	2.8	2.7	5	5.0	0.8	0.7	1.8	1.6
21	Total Phosphorous (TP)	mg/L	0.07	0.04	0.04	0.03	0.07	0.04	0.06	0.04	0.04	0.05	0.08	0.05	0.02	0.02	0.13	0.13	0.25	0.36

DNS –Sample not collected due to insufficient water depth.

Note 1 - No obvious movement of water between sampling points at any stage during the monitoring period.

Table 6 SW2 – Fernbank Creek (Chainage 4620 to 4800) Cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		12/03/21 (D)									
			SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)	SW2a (DS)	SW2b (US)
1	Temperature	^{0}C	21.4	22.0	22.7	23.5	21.1	21.7	22.0	22.5	20.7	20.5								
2	Electrical conductivity (EC)	uS/cm	397	487	362	434	345	408	467	544	200	221								
3	Dissolved oxygen (DO)	%	35	23	34	33	47	34	28	35	16	19								
4	pH		7.1	6.9	7.4	7.3	7.3	7.1	7.2	7.2	7.2	7.3								
5	Turbidity (NTU)	NTU	67	106	74	120	55	98	58	46	46	30								
6	Total suspended solids (TSS)	mg/L	16	26	12	18	13	29	9	14	31	28								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.03	0.02	0.04	0.03												
9	Arsenic (As)	mg/L			0.001	0.001	0.001	0.001												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	0.001	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	0.01												
13	Iron (Fe)	mg/L			1.91	2.36	2.92	3.63												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.208	0.505	0.185	0.475												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			0.001	0.001	0.001	0.002												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			0.008	0.01	<0.005	0.01												
20	Total Nitrogen (TN)	mg/L	1.4	1.8	1.5	2.0	1.2	2.6	1.4	1.5	0.9	0.6								
21	Total Phosphorous (TP)	mg/L	0.12	0.14	0.13	0.17	0.08	0.26	0.15	0.18	0.09	0.1								

DNS –Sample not collected due to insufficient water depth.

Note 1 - No obvious movement of water between sampling points at any stage during the monitoring period.

Table 7 SW3 – Hastings River north bank (Chainage 6040 to 6080)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)
1	Temperature	^{0}C	21.0	21.1	21.7	21.7	18.5	18.6	17.4	17.3	16.4	16.4	16.8	16.8	14.9	14.9	15.4	15.4	15.8	15.9
2	Electrical conductivity (EC)	uS/cm	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
3	Dissolved oxygen (DO)	%	85	88	83	83	89	88	93	91	87	88	93	94	93	93	94	94	88	87
4	pH		7.0	7.1	7.0	7.1	7.2	7.3	7.2	7.5	7.4	7.6	7.0	7.3	7.7	7.9	7.5	7.8	6.9	7.0
5	Turbidity (NTU)	NTU	6	4	20	25	8	7	5	4	7	6	8	8	21	35	8	8	6	5
6	Total suspended solids (TSS)	mg/L	<5	5	14	14	15	8	5	<5	54	<5	<5	<5	10	13	<5	<5	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					<0.10	<0.10	<0.10	0.03										
9	Arsenic (As)	mg/L					<0.010	<0.010	<0.010	<0.001										
10	Cadmium (Cd)	mg/L					<0.0010	<0.0010	<0.0010	<0.0001										
11	Chromium (Cr)	mg/L					<0.010	<0.010	<0.010	<0.001										
12	Copper (Cu)	mg/L					<0.010	<0.010	<0.010	<0.001										
13	Iron (Fe)	mg/L					<0.10	<0.10	<0.10	0.28										
14	Lead (Pb)	mg/L					<0.010	<0.010	<0.010	<0.001										
15	Manganese (Mn)	mg/L					0.033	0.025	0.053	0.104										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					<0.010	<0.010	<0.010	0.002										
18	Silver (Ag)	mg/L					<0.010	<0.010	<0.010	<0.001										
19	Zinc (Zn)	mg/L					<0.050	<0.050	<0.050	<0.005										
20	Total Nitrogen (TN)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5
21	Total Phosphorous (TP)	mg/L	<0.05	<0.05	<0.05	0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.10	0.1	0.02	<0.05	<0.05	<0.10	<0.10	<0.05	<0.05

Note: Elevated turbidity levels for a number of sampling events appeared attributable to factors unrelated to construction eg wind, wave and long-shore water movement, and/or flood events.

Table 8 SW3 – Hastings River north bank (Chainage 6040 to 6080) cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)
1	Temperature	^{0}C	16.3	16.4	19.1	19.0	21.3	21.2	21.7	22.0	22.4	22.6	23.6	23.6	22.9	23.0	22.7	23.8	23.2	23.0
2	Electrical conductivity (EC)	uS/cm	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	843	933	684	514
3	Dissolved oxygen (DO)	%	92	93	87	87	86	87	83	85	76	77	90	89	85	85	74	72	82	81
4	pH		7.4	7.8	7.3	7.5	7.3	7.7	7.8	8.0	8.0	8.2	7.3	7.6	7.3	7.7	6.9	7.0	7.1	7.3
5	Turbidity (NTU)	NTU	5	6	11	6	57	8	6	5	12	13	9	8	7	9	38	33	85	82
6	Total suspended solids (TSS)	mg/L	5	6	10	10	7	9	<5	<5	<5	<5	7	10	<5	<5	8	8	32	36
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			<0.01	<0.01	<0.01	<0.01							<0.10	<0.10	0.2	0.21		
9	Arsenic (As)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.010	<0.010	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0010	<0.0010	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.010	<0.010	<0.001	<0.001		
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.010	<0.010	<0.001	<0.001		
13	Iron (Fe)	mg/L			<0.05	<0.05	<0.05	<0.05							<0.10	<0.10	0.97	1.23		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.010	<0.010	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.049	0.048	0.052	0.052							<0.010	<0.010	0.08	0.097		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.010	<0.010	0.001	0.002		
18	Silver (Ag)	mg/L			<0.001	<0.001	0.001	<0.001							<0.010	<0.010	<0.001	<0.001		
19	Zinc (Zn)	mg/L			<0.005	<0.005	<0.005	0.005							<0.050	<0.050	0.006	0.007		
20	Total Nitrogen (TN)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1.0	<1.0	<0.5	<0.5	<1.0	<1.0	1.6	1.7	1.0	1.0
21	Total Phosphorous (TP)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.06	<0.10	<0.10	0.06	<0.05	0.12	<0.10	0.1	0.11	0.1	0.13

Note: Elevated turbidity levels for a number of sampling events appeared attributable to factors unrelated to construction eg wind, wave and long-shore water movement, and/or flood events.

Table 9 SW3 – Hastings River north bank (Chainage 6040 to 6080) cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		29/03/21 (D)									
			SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)	SW3a (US)	SW3b (DS)
1	Temperature	^{0}C	23.8	24.0	25.2	25.4	24.8	25.0	24.0	24.0	21.2	21.2								
2	Electrical conductivity (EC)	uS/cm	8000	8000	8000	8000	8000	8000	8000	8000	386	381								
3	Dissolved oxygen (DO)	%	90	88	83	83	80	79	68	71	65	67								
4	pH		7.4	7.7	7.8	8.2	7.4	7.6	7.3	7.4	7.4	7.3								
5	Turbidity (NTU)	NTU	10	8	10	13	13	16	7	7	30	29								
6	Total suspended solids (TSS)	mg/L	8	<5	<5	<5	8	12	<5	<5	14	13								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			<0.01	<0.01	0.01	0.01												
9	Arsenic (As)	mg/L			0.001	0.001	0.001	0.002												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	0.001	0.001												
13	Iron (Fe)	mg/L			<0.05	<0.05	<0.05	<0.05												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.034	0.031	0.077	0.077												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001												
18	Silver (Ag)	mg/L			0.001	0.001	0.002	0.001												
19	Zinc (Zn)	mg/L			0.005	0.006	<0.005	<0.005												
20	Total Nitrogen (TN)	mg/L	<0.2	0.3	<0.05	<0.5	<0.5	<0.5	0.4	0.4	0.7	0.6								
21	Total Phosphorous (TP)	mg/L	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	0.03	0.02	0.03	0.03								

Note: Elevated turbidity levels for a number of sampling events appeared attributable to factors unrelated to construction eg wind, wave and long-shore water movement, and/or flood events.

Table 10 SW5 – Unnamed tributary of the Wilson River (Chainage 15820)

No.	Parameter	Unit	23/04/20 (D) SW5b (DS)	23/04/20 (W) SW5b (DS)	6/05/20 (D) SW5b (DS)	27/05/20 (W) SW5b (DS)	5/06/20 (D) SW5b (DS)	12/06/20 (W) SW5b (DS)	15/07/20 (W) SW5b (DS)	23/07/20 (D) SW5b (DS)	8/08/20 (W) SW5b (DS)
1	Temperature	^{0}C	19.6	20.4	16.1	16.1	13.0	15.6	12.2	12.1	13.5
2	Electrical conductivity (EC)	uS/cm	791	490	739	690	764	383	722	792	609
3	Dissolved oxygen (DO)	%	58	66	51	45	40	77	62	53	78
4	pH		6.9	7.2	7.5	7.5	7.6	7.8	7.9	7.8	7.4
5	Turbidity (NTU)	NTU	7	6	6	3	5	5	14	8	5
6	Total suspended solids (TSS)	mg/L	<5	<5	<5	7	<5	<5	<5	<5	<5
7	Total Petroleum Hydrocarbons	mg/L									
8	Aluminium (Al)	mg/L			<0.01	<0.01					
9	Arsenic (As)	mg/L			<0.001	<0.001					
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001					
11	Chromium (Cr)	mg/L			0.002	0.001					
12	Copper (Cu)	mg/L			<0.001	<0.001					
13	Iron (Fe)	mg/L			<0.05	0.06					
14	Lead (Pb)	mg/L			<0.001	<0.001					
15	Manganese (Mn)	mg/L			0.059	0.181					
16	Mercury (Hg)	mg/L			<0.0001	<0.0001					
17	Nickel (Ni)	mg/L			0.003	0.001					
18	Silver (Ag)	mg/L			<0.001	<0.001					
19	Zinc (Zn)	mg/L			0.006	<0.005					
20	Total Nitrogen (TN)	mg/L	0.5	0.7	0.6	0.2	0.4	0.5	0.3	0.2	0.2
21	Total Phosphorous (TP)	mg/L	0.02	0.04	<0.01	0.13	0.02	0.03	<0.01	<0.01	<0.01

DNS –Sample not collected due to insufficient water depth.

Table 11 SW5 – Unnamed tributary of the Wilson River (Chainage 15820) cont.

No.	Parameter	Unit	21/08/20 (D) SW5b (DS)	11/09/20 (W) SW5b (DS)	24/09/20 (D) SW5b (DS)	15/10/20 (D) SW5b (DS)	20/10/20 (W) SW5b (DS)	12/11/20 (D) SW5b (DS)	13/12/20 (W) SW5b (DS)	18/12/20 (D) SW5b (DS)	5/01/21 (W) SW5b (DS)
1	Temperature	^{0}C	13.3	16.5	17.8	DNS	DNS	DNS	20.6	26.2	24.3
2	Electrical conductivity (EC)	uS/cm	675	526	742				349	263	259
3	Dissolved oxygen (DO)	%	65	57	18				57	30	16
4	pH		7.7	7.7	7.9				8.1	6.5	7.0
5	Turbidity (NTU)	NTU	10	6	9				17	23	9
6	Total suspended solids (TSS)	mg/L	29	5	8				<5	7	12
7	Total Petroleum Hydrocarbons	mg/L									
8	Aluminium (Al)	mg/L		<0.01	<0.01				0.03	0.28	
9	Arsenic (As)	mg/L		<0.001	<0.001				<0.001	<0.001	
10	Cadmium (Cd)	mg/L		<0.0001	<0.0001				<0.0001	<0.0001	
11	Chromium (Cr)	mg/L		<0.001	<0.001				<0.001	<0.001	
12	Copper (Cu)	mg/L		<0.001	<0.001				<0.001	<0.001	
13	Iron (Fe)	mg/L		<0.05	<0.05				0.05	0.21	
14	Lead (Pb)	mg/L		<0.001	<0.001				<0.001	<0.001	
15	Manganese (Mn)	mg/L		0.047	0.48				0.058	0.39	
16	Mercury (Hg)	mg/L		<0.0001	<0.0001				<0.0001	<0.0001	
17	Nickel (Ni)	mg/L		<0.001	0.002				0.002	0.003	
18	Silver (Ag)	mg/L		<0.001	<0.001				<0.001	<0.001	
19	Zinc (Zn)	mg/L		<0.005	<0.005				0.009	0.036	
20	Total Nitrogen (TN)	mg/L	0.3	0.3	0.3				1	0.5	1.3
21	Total Phosphorous (TP)	mg/L	<0.01	0.02	0.01				0.03	0.04	0.13

DNS –Sample not collected due to insufficient water depth.

Table 12 SW5 – Unnamed tributary of the Wilson River (Chainage 15820) cont.

No.	Parameter	Unit	21/01/21 (D) SW5b (DS)	8/02/21 (D) SW5b (DS)	15/02/21 (W) SW5b (DS)	12/03/21 (W) SW5b (DS)	29/03/21 (D) SW5b (DS)	SW5b (DS)	SW5b (DS)	SW5b (DS)	SW5b (DS)
1	Temperature	^{0}C	23.1	DNS	DNS	21.8	21.1				
2	Electrical conductivity (EC)	uS/cm	513			278	99				
3	Dissolved oxygen (DO)	%	33			30	13				
4	pH		7.8			7.4	7.1				
5	Turbidity (NTU)	NTU	11			16	32				
6	Total suspended solids (TSS)	mg/L	7			<5	19				
7	Total Petroleum Hydrocarbons	mg/L									
8	Aluminium (Al)	mg/L									
9	Arsenic (As)	mg/L									
10	Cadmium (Cd)	mg/L									
11	Chromium (Cr)	mg/L									
12	Copper (Cu)	mg/L									
13	Iron (Fe)	mg/L									
14	Lead (Pb)	mg/L									
15	Manganese (Mn)	mg/L									
16	Mercury (Hg)	mg/L									
17	Nickel (Ni)	mg/L									
18	Silver (Ag)	mg/L									
19	Zinc (Zn)	mg/L									
20	Total Nitrogen (TN)	mg/L	0.8			0.5	0.5				
21	Total Phosphorous (TP)	mg/L	0.04			0.04	0.05				

DNS –Sample not collected due to insufficient water depth.

Table 13 SW6 – Wilson River south bank (Chainage 16460 to 16600)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)
1	Temperature	^{0}C	22.6	22.8	22.6	22.4	20.8	20.9	17.8	17.6	17.4	16.9	16.7	16.8	14.2	14.1	15.4	15.4	15.9	15.6
2	Electrical conductivity (EC)	uS/cm	1122	1101	1158	1164	1306	1275	8000	8000	8000	8000	4352	4355	2959	3003	6143	6081	3539	3554
3	Dissolved oxygen (DO)	%	73	74	76	76	89	88	99	97	94	91	96	96	98	99	104	101	97	97
4	pH		6.3	6.3	6.7	6.7	6.6	6.7	6.9	7.0	6.9	7.0	6.8	6.9	6.9	7.0	7.0	7.0	6.2	6.2
5	Turbidity (NTU)	NTU	21	17	15	17	12	12	8	7	7	6	14	12	7	8	7	5	10	10
6	Total suspended solids (TSS)	mg/L	7	<5	<5	<5	<5	<5	<5	<5	<5	<5	6	6	<5	<5	6	5	5	5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.15	0.15	0.04	0.04										
9	Arsenic (As)	mg/L					<0.001	0.002	<0.001	<0.001										
10	Cadmium (Cd)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					<0.001	<0.001	<0.001	<0.001										
12	Copper (Cu)	mg/L					<0.001	<0.001	<0.001	<0.001										
13	Iron (Fe)	mg/L					0.9	0.93	0.28	0.3										
14	Lead (Pb)	mg/L					<0.001	<0.001	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.073	0.069	0.109	0.101										
16	Mercury (Hg)	mg/L					0.0001	<0.0001	0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.003	0.003	0.001	0.002										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					0.006	<0.005	<0.005	<0.005										
20	Total Nitrogen (TN)	mg/L	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.3	0.4	0.4	0.7	0.5	0.4	0.4	<0.5	<0.5	0.2	0.2
21	Total Phosphorous (TP)	mg/L	0.02	<0.01	0.02	0.03	<0.01	<0.01	<0.02	<0.02	<0.02	0.09	0.01	<0.01	<0.01	<0.01	<0.05	<0.05	<0.01	<0.01

Note: Elevated turbidity levels for a number of sampling events were attributable to flood events.

Table 14 SW6 – Wilson River south bank (Chainage 16460 to 16600) cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)
1	Temperature	^{0}C	15.8	15.8	19.8	19.5	23.7	23.6	24.7	24.2	23.3	23.5	25.8	25.2	25.1	24.5	24.9	26.2	22.5	22.1
2	Electrical conductivity (EC)	uS/cm	3211	3069	5501	5516	5613	5640	8000	8000	8000	8000	8000	8000	8000	8000	359	359	127	133
3	Dissolved oxygen (DO)	%	96	99	104	100	105	101	99	92	85	86	105	99	87	88	72	71	91	88
4	pH		6.7	6.7	7.0	7.0	7.2	7.3	7.2	7.3	7.6	7.6	7.1	7.2	7.3	7.4	7.3	7.2	7.2	7.2
5	Turbidity (NTU)	NTU	6	5	4	7	6	11	5	6	6	7	9	10	5	7	25	20	127	100
6	Total suspended solids (TSS)	mg/L	20	22	<5	6	14	15	<5	<5	<5	<5	8	<5	<5	<5	10	6	53	44
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.01	0.02	0.02	0.02							<0.01	0.02	0.31	0.33		
9	Arsenic (As)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L			<0.05	0.08	<0.05	<0.05							<0.05	0.06	0.36	0.38		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.136	0.147	0.139	0.154							0.114	0.118	0.065	0.064		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			0.003	0.003	0.003	0.003							0.001	0.002	<0.001	<0.001		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			0.008	0.01	0.01	0.006							<0.005	<0.005	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	<0.1	0.3	0.2	0.1	0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2	0.2	0.2	0.8	0.9	0.8	0.9
21	Total Phosphorous (TP)	mg/L	<0.01	0.01	<0.01	0.06	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.01	0.01	0.07	0.08

Note: Elevated turbidity levels for a number of sampling events were attributable to flood events.

Table 15 SW6 – Wilson River south bank (Chainage 16460 to 16600) cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		12/03/21 (D)									
			SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)	SW6a (US)	SW6b (DS)
1	Temperature	^{0}C	27.1	27.8	28.5	27.6	25.9	25.3	24.5	24.2	21.6	21.8								
2	Electrical conductivity (EC)	uS/cm	348	357	641	644	1218	1275	282	321	127	127								
3	Dissolved oxygen (DO)	%	87	87	83	74	81	75	90	80	76	74								
4	pH		7.6	7.5	7.5	7.6	7.2	7.3	7.0	7.0	6.8	6.8								
5	Turbidity (NTU)	NTU	12	14	18	18	15	15	16	15	29	27								
6	Total suspended solids (TSS)	mg/L	10	9	6	8	8	12	<5	5	10	10								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.1	0.09	0.07	0.07												
9	Arsenic (As)	mg/L			0.002	0.002	0.002	0.002												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	0.001	0.001												
13	Iron (Fe)	mg/L			1.33	1.37	1.14	1.19												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.044	0.051	0.062	0.055												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			<0.005	<0.005	<0.005	<0.005												
20	Total Nitrogen (TN)	mg/L	0.5	0.5	0.6	0.6	0.4	0.5	0.4	0.4	0.6	0.6								
21	Total Phosphorous (TP)	mg/L	0.02	<0.01	0.04	0.04	0.01	0.04	0.02	0.02	0.04	0.04								

Note: Elevated turbidity levels for a number of sampling events were attributable to flood events.

Table 16 SW6 – Wilson River north bank (Chainage 16830 to 16840)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)
1	Temperature	^{0}C	22.5	22.0	22.2	22.2	20.6	20.1	17.8	17.6	16.7	16.4	16.4	16.4	13.9	13.8	15.2	14.9	16.1	15.6
2	Electrical conductivity (EC)	uS/cm	1119	1115	1001	1012	1283	1195	8000	8000	8000	8000	2892	2924	2167	2190	6039	6050	3446	3419
3	Dissolved oxygen (DO)	%	75	69	82	82	95	90	101	100	93	91	97	99	102	99	103	102	95	95
4	pH		6.0	6.1	6.4	6.5	6.5	6.7	6.6	6.8	6.7	6.8	6.7	6.8	6.8	6.9	6.6	6.8	6.0	6.1
5	Turbidity (NTU)	NTU	26	28	13	11	13	12	9	6	9	6	17	12	12	8	8	7	10	8
6	Total suspended solids (TSS)	mg/L	<5	8	<5	<5	6	5	<5	<5	<5	<5	6	<5	<5	<5	6	6	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.15	0.13	0.04	0.04										
9	Arsenic (As)	mg/L					0.001	<0.001	<0.001	<0.001										
10	Cadmium (Cd)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					<0.001	<0.001	<0.001	<0.001										
12	Copper (Cu)	mg/L					<0.001	<0.001	<0.001	<0.001										
13	Iron (Fe)	mg/L					0.87	0.79	0.28	0.27										
14	Lead (Pb)	mg/L					<0.001	<0.001	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.061	0.061	0.095	0.086										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.002	0.001	0.001	<0.001										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					<0.005	<0.005	<0.005	0.006										
20	Total Nitrogen (TN)	mg/L	0.6	0.7	0.6	0.6	0.6	0.6	0.4	0.3	0.4	0.4	0.9	0.9	0.4	0.5	<0.5	0.2	0.2	0.2
21	Total Phosphorous (TP)	mg/L	0.01	0.02	0.05	0.02	<0.01	<0.01	<0.02	<0.02	<0.02	<0.02	0.02	0.05	<0.01	<0.01	<0.05	<0.02	<0.01	<0.01

Note: Elevated turbidity levels for a number of sampling events were attributable to flood events.

Table 17 SW6 – Wilson River north bank (Chainage 16830 to 16840) cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)
1	Temperature	^{0}C	15.8	15.5	18.9	19.1	22.6	22.8	24.3	24.1	23.2	23.2	25.9	25.5	24.6	24.3	25.5	25.6	23.1	23.0
2	Electrical conductivity (EC)	uS/cm	3005	3025	5314	5335	5470	5572	8000	8000	8000	8000	8000	8000	8000	8000	333	341	121	126
3	Dissolved oxygen (DO)	%	98	97	95	96	93	95	87	87	80	82	92	89	91	88	83	80	92	87
4	pH		6.5	6.6	6.7	6.8	6.9	7.1	6.8	7.0	7.1	7.3	6.8	6.9	6.9	7.2	7.2	7.2	7.0	7.1
5	Turbidity (NTU)	NTU	6	5	6	5	5	6	4	5	4	6	8	8	5	5	27	28	91	81
6	Total suspended solids (TSS)	mg/L	19	20	<5	6	14	12	<5	<5	<5	<5	<5	<5	<5	<5	11	8	37	34
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.01	0.01	0.01	0.01							<0.01	<0.01	0.24	0.27		
9	Arsenic (As)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L			<0.05	<0.05	<0.05	<0.05							<0.05	<0.05	0.23	0.26		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.137	0.144	0.148	0.158							0.119	0.109	0.05	0.052		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			0.003	0.004	0.003	0.003							0.001	0.001	0.007	<0.001		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			0.007	0.008	0.007	0.006							<0.005	<0.005	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	<0.1	<0.1	<0.1	<0.1	0.3	0.3	<0.2	<0.2	<0.2	<0.2	0.4	0.5	<0.2	<0.2	1.0	1.0	1.0	0.8
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.02	<0.02	0.02	0.03	0.03	<0.02	<0.02	<0.02	0.02	0.02	0.09	0.06

Note: Elevated turbidity levels for a number of sampling events were attributable to flood events.

Table 18 SW6 – Wilson River north bank (Chainage 16830 to 16840) cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		29/03/21 (D)									
			SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)	SW6c (US)	SW6d (DS)
1	Temperature	^{0}C	26.6	26.6	27.8	27.5	25.0	24.8	24.5	24.2	DNS	DNS								
2	Electrical conductivity (EC)	uS/cm	313	313	570	555	825	824	268	260										
3	Dissolved oxygen (DO)	%	94	93	85	83	89	88	87	87										
4	pH		7.4	7.5	7.1	7.4	7.1	7.2	6.9	7.0										
5	Turbidity (NTU)	NTU	17	27	16	16	14	12	16	15										
6	Total suspended solids (TSS)	mg/L	12	16	5	<5	6	<5	<5	<5										
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.08	0.13	0.05	0.07												
9	Arsenic (As)	mg/L			0.002	0.002	0.002	0.002												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001												
13	Iron (Fe)	mg/L			1.09	1.19	0.59	0.59												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.028	0.028	0.031	0.028												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	0.001												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			<0.005	<0.005	0.01	0.012												
20	Total Nitrogen (TN)	mg/L	0.4	0.8	0.6	0.5	0.4	0.3	0.4	0.3										
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.02	0.04	0.02	0.02	<0.01	0.03										

Note: Elevated turbidity levels for a number of sampling events were attributable to flood events.

Note 2: Waterway not sampled on 29 March 2021 due to elevated water level from flood event. Assessed to be unsafe for access.

Table 19 SW7 – Cooperabung Creek (Chainage 19660)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW7a# (US)	SW7b# (DS)	SW7a (US)	SW7b (DS)	SW7a# (US)	SW7b# (DS)	SW7a# (US)	SW7b# (DS)	SW7a# (US)	SW7b# (DS)	SW7a (US)	SW7b (DS)	SW7a# (US)	SW7b# (DS)	SW7a# (US)	SW7b# (DS)	SW7a (US)	SW7b (DS)
1	Temperature	^{0}C	19.1	19.3	19.7	19.7	17.8	17.9	18.1	17.5	16.5	15.3	16.6	16.5	14.5	14.0	14.0	14.2	13.4	13.1
2	Electrical conductivity (EC)	uS/cm	210	210	98	120	200	205	213	222	238	258	170	176	209	217	217	222	199	212
3	Dissolved oxygen (DO)	%	58	60	71	70	72	71	74	73	68	52	87	86	73	71	82	72	89	85
4	pH		5.9	5.9	6.3	6.4	6.3	6.3	6.1	6.2	6.4	6.5	6.8	6.8	6.7	6.7	6.8	6.7	6.3	6.3
5	Turbidity (NTU)	NTU	19	18	119	110	18	15	11	8	6	6	18	16	14	12	14	13	17	15
6	Total suspended solids (TSS)	mg/L	<5	<5	28	29	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.04	0.03	<0.01	<0.01										
9	Arsenic (As)	mg/L					<0.001	<0.001	<0.001	<0.001										
10	Cadmium (Cd)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					0.001	<0.001	0.001	<0.001										
12	Copper (Cu)	mg/L					<0.001	<0.001	<0.001	<0.001										
13	Iron (Fe)	mg/L					0.69	0.61	0.22	0.33										
14	Lead (Pb)	mg/L					<0.001	<0.001	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.136	0.181	0.254	0.304										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.001	0.002	0.001	<0.001										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					0.006	<0.005	<0.005	0.005										
20	Total Nitrogen (TN)	mg/L	<01	0.4	1.2	1.2	0.1	0.1	0.1	0.1	0.2	0.4	1.2	1.1	0.1	0.1	0.2	<0.1	<0.1	<0.1
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.08	0.09	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	0.02	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.01

- Sampling point present as isolated pond or no visible flow.

Table 20 SW7 – Cooperabung Creek (Chainage 19660) cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW7a# (US)	SW7b# (DS)	SW7a (US)	SW7b (DS)	SW7a# (US)	SW7b# (DS)	SW7a# (US)	SW7b# (DS)	SW7a# (US)	SW7b# (DS)	SW7a# (US)	SW7b# (DS)	SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)
1	Temperature	^{0}C	13.8	13.4	16.6	16.0	18.5	18.3	18.6	17.6	17.8	18.5	22.6	19.7	19.8	19.9	22.5	22.7	21.8	21.9
2	Electrical conductivity (EC)	uS/cm	209	217	222	264	217	218	232	243	231	238	249	281	260	305	151	155	115	114
3	Dissolved oxygen (DO)	%	88	75	69	69	68	72	40	47	20	38	41	37	35	44	87	84	97	95
4	pH		6.6	6.6	6.7	6.7	7.0	7.0	6.7	6.7	7.2	7.2	6.3	6.5	6.7	6.8	7.3	7.3	7.0	7.1
5	Turbidity (NTU)	NTU	14	13	15	18	22	21	17	16	12	9	25	21	47	38	27	25	42	40
6	Total suspended solids (TSS)	mg/L	6	<5	<5	<5	8	8	<5	<5	6	<5	10	7	6	<5	<5	<5	7	6
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.05	0.08	0.01	0.01							0.11	0.11	0.23	0.32		
9	Arsenic (As)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L			0.63	0.61	0.55	0.58							0.57	0.49	0.26	0.29		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.171	0.187	0.242	0.238							0.198	0.181	0.023	0.023		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001							0.001	<0.001	<0.001	<0.001		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			<0.005	<0.005	0.005	0.011							0.008	<0.005	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	0.1	<0.1	0.2	0.2	0.2	0.2	<0.1	0.1	0.2	0.2	0.2	<0.1	0.4	0.3	0.4	0.4	0.6	0.6
21	Total Phosphorous (TP)	mg/L	<0.01	0.06	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.01	0.02	0.02	0.02	0.01	<0.01	<0.01	0.04	0.02

- Sampling point present as isolated pond or no visible flow.

Table 21 SW7 – Cooperabung Creek (Chainage 19660) cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		29/03/21 (D)									
			SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)	SW7a (US)	SW7b (DS)
1	Temperature	^{0}C	22.2	21.9	23.9	23.7	22.8	22.7	21.6	21.7	20.8	20.7								
2	Electrical conductivity (EC)	uS/cm	166	167	188	188	192	202	137	137	120	120								
3	Dissolved oxygen (DO)	%	60	59	36	40	33	39	78	76	86	86								
4	pH		7.2	7.2	6.9	6.9	6.8	6.8	6.9	6.9	6.7	6.8								
5	Turbidity (NTU)	NTU	22	20	13	12	25	19	42	41	34	32								
6	Total suspended solids (TSS)	mg/L	<5	5	<5	<5	<5	6	<5	<5	<5	<5								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.03	0.04	0.03	0.02												
9	Arsenic (As)	mg/L			0.001	0.001	0.001	0.001												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001												
13	Iron (Fe)	mg/L			0.89	0.9	1.02	1.2												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.265	0.258	0.269	0.271												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			<0.005	0.018	<0.005	<0.005												
20	Total Nitrogen (TN)	mg/L	0.2	0.2	0.2	0.3	0.1	0.2	0.5	0.5	0.3	0.2								
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04								

[#] - Sampling point present as isolated pond or no visible flow.

Table 22 SW8 – Barrys Creek (Chainage 23775 to 25325)

No.	Parameter	Unit	23/04/20 (D)			28/04/20 (W)			6/05/20 (D)			27/05/20 (W)			5/06/20 (D)			12/06/20 (W)			15/07/20 (W)		
			SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)
1	Temperature	^{0}C	DNS	20.6	19.0	DNS	20.9	19.7	DNS	19.8	18.2	DNS	18.0	17.5	DNS	15.7	16.3	17.1	17.5	16.6	DNS	15.7	14.1
2	Electrical conductivity (EC)	uS/cm		214	234		186	202		207	232		241	256		261	274	224	266	221		225	252
3	Dissolved oxygen (DO)	%		28	24		36	33		39	34		61	33		36	23	87	72	42		56	43
4	pH			5.6	6.1		5.9	6.4		5.9	6.4		6.1	6.5		6.3	6.5	6.5	6.3	6.6		6.7	6.8
5	Turbidity (NTU)	NTU		8	8		10	13		8	8		6	6		6	3	8	7	8		3	4
6	Total suspended solids (TSS)	mg/L		<5	<5		<5	<5		<5	<5		<5	<5		<5	<5	<5	<5	<5		<5	<5
7	Total Petroleum Hydrocarbons	mg/L																					
8	Aluminium (Al)	mg/L								0.05	0.02		0.02	0.01									
9	Arsenic (As)	mg/L								<0.001	<0.001		<0.001	<0.001									
10	Cadmium (Cd)	mg/L								<0.0001	<0.0001		<0.0001	<0.0001									
11	Chromium (Cr)	mg/L								0.001	<0.001		<0.001	<0.001									
12	Copper (Cu)	mg/L								<0.001	<0.001		<0.001	<0.001									
13	Iron (Fe)	mg/L								0.52	<0.05		0.39	0.14									
14	Lead (Pb)	mg/L								<0.001	<0.001		<0.001	<0.001									
15	Manganese (Mn)	mg/L								0.129	0.017		0.116	0.05									
16	Mercury (Hg)	mg/L								<0.0001	<0.0001		<0.0001	<0.0001									
17	Nickel (Ni)	mg/L								<0.001	<0.001		<0.001	<0.001									
18	Silver (Ag)	mg/L								<0.001	<0.001		<0.001	<0.001									
19	Zinc (Zn)	mg/L								<0.005	<0.005		<0.005	<0.005									
20	Total Nitrogen (TN)	mg/L		<0.1	<0.1		0.2	0.3		<0.1	<0.1		<0.1	<0.1		0.1	0.1	1.1	1.1	0.5		0.1	<0.1
21	Total Phosphorous (TP)	mg/L		<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

- Sample location persisting as an isolated pond.

DNS– Sample not taken due to absence or insufficient water to collect sample.

Table 23 SW8 – Barrys Creek (Chainage 23775 to 25325) cont.

No.	Parameter	Unit	23/07/20 (D)			8/08/20 (W)			21/08/20 (D)			11/09/20 (W)			24/09/20 (D)			15/10/20 (D)			20/10/20 (W)		
			SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)
1	Temperature	^{0}C	DNS	15.9	14.1	DNS	17.0	13.5	DNS	16.1	14.3	DNS	16.8	15.6	DNS	18.5	17.1	DNS	18.1	17.5	DNS	18.2	18.7
2	Electrical conductivity (EC)	uS/cm		235	258		241	234		241	252		247	233		264	246		255	275		255	273
3	Dissolved oxygen (DO)	%		53	41		57	54		66	48		45	57		60	33		20	23		11	39
4	pH			6.5	6.8		5.9	6.4		6.2	6.5		6.2	6.8		6.5	7.0		6.5	6.8		6.9	7.4
5	Turbidity (NTU)	NTU		6	7		4	9		4	6		13	16		10	11		13	13		11	5
6	Total suspended solids (TSS)	mg/L		<5	<5		<5	<5		<5	<5		<5	<5		5	8		<5	<5		5	<5
7	Total Petroleum Hydrocarbons	mg/L																					
8	Aluminium (Al)	mg/L											0.13	0.13		0.02	0.01						
9	Arsenic (As)	mg/L											<0.001	<0.001		<0.001	<0.001						
10	Cadmium (Cd)	mg/L											<0.0001	<0.0001		<0.0001	<0.0001						
11	Chromium (Cr)	mg/L											<0.001	<0.001		<0.001	<0.001						
12	Copper (Cu)	mg/L											<0.001	<0.001		<0.001	<0.001						
13	Iron (Fe)	mg/L											0.18	0.1		0.14	0.06						
14	Lead (Pb)	mg/L											<0.001	<0.001		<0.001	<0.001						
15	Manganese (Mn)	mg/L											0.037	0.005		0.043	0.022						
16	Mercury (Hg)	mg/L											<0.0001	<0.0001		<0.0001	<0.0001						
17	Nickel (Ni)	mg/L											<0.001	<0.001		<0.001	<0.001						
18	Silver (Ag)	mg/L											<0.001	<0.001		<0.001	<0.001						
19	Zinc (Zn)	mg/L											0.006	<0.005		0.005	<0.005						
20	Total Nitrogen (TN)	mg/L		<0.1	<0.1		0.1	<0.1		<0.1	<0.1		0.3	0.1		<0.1	0.2		0.2	<0.1		0.2	0.1
21	Total Phosphorous (TP)	mg/L		<0.01	0.05		<0.01	<0.01		0.09	0.08		<0.01	0.01		<0.01	<0.01		<0.01	0.03		0.01	<0.01

- Sample location persisting as an isolated pond.

DNS – Sample not taken due to absence or insufficient water to collect sample.

Table 24 SW8 – Barrys Creek (Chainage 23775 to 25325) cont.

No.	Parameter	Unit	12/11/20 (D)			13/12/20 (W)			18/12/20 (D)			5/01/21 (W)			21/01/21 (D)			8/02/21 (D)			15/02/21 (W)		
			SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b (DS)	SW8c (DS)	SW8a (US)	SW8b (DS)	SW8c (DS)	SW8a (US)	SW8b (DS)	SW8c (DS)	SW8a (US)	SW8b (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)
1	Temperature	^{0}C	DNS	19.3	19.8	19.0	19.4	19.6	21.5	22.1	22.3	21.5	21.6	21.9	21.8	21.6	21.8	DNS	22.0	23.0	DNS	21.0	22.4
2	Electrical conductivity (EC)	uS/cm		263	260	163	191	171	135	142	146	120	115	119	211	178	182		186	219		195	222
3	Dissolved oxygen (DO)	%		61	36	90	81	72	94	88	91	95	95	98	20	49	11		28	14		34	20
4	pH			6.0	6.2	6.9	6.6	6.9	7.4	7.3	7.2	6.9	6.9	6.9	7.0	7.1	7.2		6.7	6.9		6.5	6.9
5	Turbidity (NTU)	NTU		15	14	26	23	27	25	24	28	31	30	35	17	17	14		16	12		20	13
6	Total suspended solids (TSS)	mg/L		<5	<5	<5	<5	<5	<5	<5	<5	6	5	6	<5	5	6		<5	<5		<5	<5
7	Total Petroleum Hydrocarbons	mg/L																					
8	Aluminium (Al)	mg/L				0.35	0.29	0.43	0.24	0.17	0.16								0.09	0.04		0.1	0.04
9	Arsenic (As)	mg/L				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001								<0.001	<0.001		<0.001	<0.001
10	Cadmium (Cd)	mg/L				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001								<0.0001	<0.0001		<0.0001	<0.0001
11	Chromium (Cr)	mg/L				<0.001	<0.001	<0.001	<0.001	<0.001	0.002								<0.001	<0.001		<0.001	<0.001
12	Copper (Cu)	mg/L				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001								<0.001	<0.001		<0.001	<0.001
13	Iron (Fe)	mg/L				0.15	0.13	0.21	0.11	0.08	0.1								0.43	0.82		0.25	0.41
14	Lead (Pb)	mg/L				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001								<0.001	<0.001		<0.001	<0.001
15	Manganese (Mn)	mg/L				0.002	0.003	0.007	0.002	0.004	0.005								0.18	0.333		0.119	0.152
16	Mercury (Hg)	mg/L				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001								<0.0001	<0.0001		<0.0001	<0.0001
17	Nickel (Ni)	mg/L				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001								<0.001	<0.001		<0.001	<0.001
18	Silver (Ag)	mg/L				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001								<0.001	<0.001		<0.001	<0.001
19	Zinc (Zn)	mg/L				<0.005	0.006	<0.005	0.038	<0.005	<0.005								<0.005	0.011		<0.005	<0.005
20	Total Nitrogen (TN)	mg/L		0.2	0.3	0.7	0.7	0.5	0.4	0.5	0.3	0.4	0.4	0.4	0.1	<0.1	0.1		0.2	0.2		0.1	0.1
21	Total Phosphorous (TP)	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		0.02	0.02		0.01	<0.01

- Sample location persisting as an isolated pond.

DNS (Did not sample) – Sample not taken due to absence or insufficient water to collect sample.

Table 25 SW8 – Barrys Creek (Chainage 23775 to 25325) cont.

No.	Parameter	Unit	12/03/21 (W)			29/03/21 (D)																	
			SW8a (US)	SW8b (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c# (DS)	SW8a (US)	SW8b# (DS)	SW8c# (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)	SW8a (US)	SW8b# (DS)	SW8c (DS)
1	Temperature	^{0}C	23.4	22.7	21.5	20.2	21.0	20.7															
2	Electrical conductivity (EC)	uS/cm	255	182	162	101	99	110															
3	Dissolved oxygen (DO)	%	36	36	54	45	43	82															
4	pH		6.3	6.5	7.0	6.7	6.5	6.9															
5	Turbidity (NTU)	NTU	16	22	23	38	34	38															
6	Total suspended solids (TSS)	mg/L	<5	<5	<5	<5	<5	<5															
7	Total Petroleum Hydrocarbons	mg/L																					
8	Aluminium (Al)	mg/L																					
9	Arsenic (As)	mg/L																					
10	Cadmium (Cd)	mg/L																					
11	Chromium (Cr)	mg/L																					
12	Copper (Cu)	mg/L																					
13	Iron (Fe)	mg/L																					
14	Lead (Pb)	mg/L																					
15	Manganese (Mn)	mg/L																					
16	Mercury (Hg)	mg/L																					
17	Nickel (Ni)	mg/L																					
18	Silver (Ag)	mg/L																					
19	Zinc (Zn)	mg/L																					
20	Total Nitrogen (TN)	mg/L	0.1	0.2	0.2	0.3	0.3	0.3															
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	<0.01	0.05	0.03	0.03															

- Sample location persisting as an isolated pond.

DNS (Did not sample) – Sample not taken due to absence or insufficient water to collect sample.

Table 26 SW9 – Smiths Creek (Chainage 28300)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW9a# (DS)	SW9b# (US)	SW9a (DS)	SW9b (US)	SW9a# (DS)	SW9b# (US)	SW9a# (DS)	SW9b# (US)	SW9a# (DS)	SW9b# (US)	SW9a (DS)	SW9b (US)	SW9a# (DS)	SW9b# (US)	SW9a# (DS)	SW9b# (US)	SW9a (DS)	SW9b (US)
1	Temperature	^{0}C	17.5	17.6	18.5	18.5	15.9	15.9	15.8	15.7	12.9	13.3	15.1	15.1	12.1	12.2	11.8	11.6	11.5	11.3
2	Electrical conductivity (EC)	uS/cm	190	189	180	180	191	221	231	226	243	240	182	182	235	234	243	244	216	217
3	Dissolved oxygen (DO)	%	67	68	78	79	67	38	68	64	50	51	77	77	73	70	69	67	82	81
4	pH		6.5	6.6	6.8	6.8	7.0	7.0	7.0	7.0	7.1	7.2	7.2	7.2	7.3	7.3	7.5	7.5	6.7	6.7
5	Turbidity (NTU)	NTU	14	15	14	15	16	22	13	15	18	19	15	17	13	15	16	18	14	16
6	Total suspended solids (TSS)	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.07	0.09	0.05	0.07										
9	Arsenic (As)	mg/L					<0.001	<0.001	<0.001	<0.001										
10	Cadmium (Cd)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					0.001	0.001	<0.001	<0.001										
12	Copper (Cu)	mg/L					<0.001	<0.001	<0.001	<0.001										
13	Iron (Fe)	mg/L					0.88	0.94	0.77	0.81										
14	Lead (Pb)	mg/L					<0.001	<0.001	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.052	0.054	0.087	0.086										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.001	<0.001	<0.001	<0.001										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					<0.005	<0.005	<0.005	<0.005										
20	Total Nitrogen (TN)	mg/L	0.1	0.1	0.3	0.5	0.3	0.3	0.2	0.2	0.3	0.3	0.4	0.4	0.2	0.2	0.2	0.1	0.2	0.2
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.04	0.03	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

- No obvious movement of water at sampling point.

Table 27 SW9 – Smiths Creek (Chainage 28300) cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW9a# (DS)	SW9b# (US)	SW9a (DS)	SW9b (US)	SW9a# (DS)	SW9b# (US)	SW9a# (DS)	SW9b# (US)	SW9a# (DS)	SW9b# (US)	SW9a# (DS)	SW9b# (US)	SW9a (DS)	SW9b (US)	SW9a (DS)	SW9b (US)	SW9a (DS)	SW9b (US)
1	Temperature	^{0}C	11.8	12.0	14.8	14.6	16.1	17.5	17.2	17.8	18.0	18.3	19.1	20.7	19.3	19.3	21.6	21.6	21.5	21.2
2	Electrical conductivity (EC)	uS/cm	232	231	243	244	241	238	272	273	272	270	269	265	187	187	139	139	101	102
3	Dissolved oxygen (DO)	%	70	69	56	55	34	41	30	30	22	28	18	25	55	58	91	93	95	97
4	pH		7.1	7.1	7.0	7.1	7.6	7.6	7.4	7.4	7.9	8.0	6.9	6.9	6.9	7.0	7.2	7.2	6.9	6.9
5	Turbidity (NTU)	NTU	11	13	21	22	20	18	25	23	15	19	24	21	35	37	29	32	38	41
6	Total suspended solids (TSS)	mg/L	<5	<5	<5	<5	9	9	14	6	10	14	16	8	<5	<5	<5	<5	7	8
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.05	0.04	0.03	0.03							0.26	0.25	0.16	0.27		
9	Arsenic (As)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L			0.77	0.87	1.05	1.07							1.02	1.01	0.21	0.26		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.15	0.154	0.372	0.323							0.04	0.046	0.01	0.01		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			<0.005	<0.005	<0.005	<0.005							<0.005	<0.005	0.008	<0.005		
20	Total Nitrogen (TN)	mg/L	0.1	0.1	0.2	0.2	0.3	0.3	0.8	0.4	0.7	0.8	0.6	0.5	2.9	3	0.7	0.5	0.6	0.7
21	Total Phosphorous (TP)	mg/L	0.05	0.02	0.02	0.02	0.02	0.02	0.07	0.02	0.07	0.08	0.06	0.04	0.01	0.02	0.01	0.22	0.01	0.02

- No obvious movement of water at sampling point

Table 28 SW9 – Smiths Creek (Chainage 28300) cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		29/03/21 (D)									
			SW9a (DS)	SW9b (US)	SW9a# (DS)	SW9b# (US)	SW9a# (DS)	SW9b# (US)	SW9a (DS)	SW9b (US)	SW9a (DS)	SW9b (US)	SW9a (DS)	SW9b (US)	SW9a (DS)	SW9b (US)	SW9a (DS)	SW9b (US)	SW9a (DS)	SW9b (US)
1	Temperature	^{0}C	21.0	21.0	22.5	22.7	21.6	21.1	21.2	21.3	20.1	20.0								
2	Electrical conductivity (EC)	uS/cm	180	180	221	221	226	224	178	178	126	122								
3	Dissolved oxygen (DO)	%	64	64	29	30	35	29	71	72	80	86								
4	pH		7.5	7.6	7.5	7.5	7.4	7.4	7.1	7.1	6.8	6.8								
5	Turbidity (NTU)	NTU	16	18	14	18	17	19	22	23	35	37								
6	Total suspended solids (TSS)	mg/L	6	6	<5	<5	<5	<5	<5	<5	7	6								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.11	0.07	0.06	0.06												
9	Arsenic (As)	mg/L			<0.001	<0.001	0.001	0.001												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001												
13	Iron (Fe)	mg/L			0.95	0.92	1.07	1.07												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.112	0.109	0.112	0.104												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			<0.005	<0.005	<0.005	<0.005												
20	Total Nitrogen (TN)	mg/L	0.2	0.2	0.4	0.4	0.2	0.2	0.2	0.3	0.4	0.3								
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.03	0.03	0.02	0.04	0.02	0.01	0.01	0.01								

- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

Table 29 SW10 – Pipers Creek (Chainage 30700)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)
1	Temperature	^{0}C	17.6	17.5	18.4	18.3	15.8	16.2	16.2	16.8	13.2	13.2	15.2	15.1	12.0	11.7	11.4	11.3	11.0	11.1
2	Electrical conductivity (EC)	uS/cm	235	236	180	175	216	1151	280	276	322	309	217	212	272	281	302	290	250	237
3	Dissolved oxygen (DO)	%	47	45	64	64	36	71	65	59	27	19	73	68	50	57	43	39	58	54
4	pH		6.4	6.5	6.8	6.9	6.8	6.7	7.0	7.2	7.5	7.6	7.2	7.1	7.6	7.3	7.6	7.7	6.6	6.6
5	Turbidity (NTU)	NTU	16	18	88	98	25	23	45	51	56	63	33	35	32	28	31	36	25	26
6	Total suspended solids (TSS)	mg/L	<5	<5	20	19	<5	<5	<5	<5	<5	<5	7	7	<5	<5	<5	<5	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.08	0.09	0.03	0.04										
9	Arsenic (As)	mg/L					<0.001	<0.001	<0.001	<0.001										
10	Cadmium (Cd)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					0.001	0.001	<0.001	<0.001										
12	Copper (Cu)	mg/L					<0.001	<0.001	<0.001	<0.001										
13	Iron (Fe)	mg/L					1.73	1.78	1.04	1.15										
14	Lead (Pb)	mg/L					<0.001	<0.001	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.213	0.219	0.171	0.198										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.002	0.002	<0.001	<0.001										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					<0.005	0.007	<0.005	<0.005										
20	Total Nitrogen (TN)	mg/L	0.2	0.3	0.7	0.9	0.5	0.5	0.3	0.4	0.4	0.4	0.6	0.7	0.3	0.3	0.4	0.2	0.3	0.3
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.04	0.04	0.01	0.02	<0.01	<0.01	0.03	0.03	0.02	0.02	<0.01	0.01	<0.01	<0.01	0.01	0.02

Table 30 SW10 – Pipers Creek (Chainage 30700) cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)
1	Temperature	^{0}C	12.1	12.4	14.9	14.6	17.2	16.8	17.2	18.0	18.1	18.2	19.5	20.1	19.2	19.0	21.8	21.8	21.5	21.6
2	Electrical conductivity (EC)	uS/cm	261	258	282	284	309	291	389	351	370	349	236	233	198	188	139	139	96	96
3	Dissolved oxygen (DO)	%	61	53	57	54	54	59	32	49	32	35	44	42	45	41	84	86	89	88
4	pH		7.2	7.2	6.9	6.9	7.6	7.6	7.3	7.5	8.1	8.3	7.1	7.0	6.8	6.6	7.0	6.9	6.8	6.8
5	Turbidity (NTU)	NTU	18	22	43	48	19	26	38	15	9	13	20	25	129	145	38	39	52	54
6	Total suspended solids (TSS)	mg/L	<5	<5	11	11	7	11	6	<5	5	6	<5	26	18	16	<5	<5	16	16
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.08	0.08	0.03	0.04							0.33	0.37	0.34	0.33		
9	Arsenic (As)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L			0.76	0.75	0.63	0.69							1.51	1.52	0.38	0.39		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.436	0.329	0.4	0.381							0.109	0.11	0.015	0.014		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			0.01	0.006	0.006	0.006							<0.005	<0.005	0.013	<0.005		
20	Total Nitrogen (TN)	mg/L	0.3	0.2	0.5	0.5	0.3	0.4	0.3	0.3	0.5	0.5	0.5	0.6	0.8	0.9	0.5	0.4	0.6	0.6
21	Total Phosphorous (TP)	mg/L	0.05	0.01	0.03	0.02	0.01	0.02	0.01	0.01	0.04	0.04	0.04	0.05	0.05	0.06	0.42	0.36	0.02	0.02

Table 31 SW10 – Pipers Creek (Chainage 30700) cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		29/03/21 (D)									
			SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a# (DS)	SW10b# (US)	SW10a (DS)	SW10b (US)
1	Temperature	^{0}C	21.2	21.2	22.6	22.7	21.1	21.6	21.2	21.3	19.9	19.9								
2	Electrical conductivity (EC)	uS/cm	223	223	273	272	282	284	228	232	142	142								
3	Dissolved oxygen (DO)	%	46	42	24	20	17	25	53	51	77	79								
4	pH		7.5	7.4	7.5	7.5	7.2	7.3	7.0	7.0	6.6	6.6								
5	Turbidity (NTU)	NTU	12	16	17	24	34	36	20	23	34	36								
6	Total suspended solids (TSS)	mg/L	6	8	8	<5	7	9	<5	<5	6	8								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.02	0.03	0.04	0.03												
9	Arsenic (As)	mg/L			0.001	0.001	0.001	0.002												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001												
13	Iron (Fe)	mg/L			1.06	1.02	1.01	0.93												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.492	0.513	0.617	0.605												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			0.001	0.001	<0.001	0.002												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			<0.005	<0.005	<0.005	0.012												
20	Total Nitrogen (TN)	mg/L	0.2	0.3	0.6	0.6	0.4	0.4	0.4	0.4	0.3	0.4								
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.04	0.05	0.03	0.03	0.02	0.02	0.01	0.01								

Table 32 SW11 – Unnamed drainage line (Chainage 34650 to 34700)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a # (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)
1	Temperature	^{0}C	17.3	17.2	19.7	18.3	15.7	16.0	15.9	15.6	13.5	13.4	15.6	15.6	12.6	12.4	12.1	11.8	12.3	12.0
2	Electrical conductivity (EC)	uS/cm	607	191	487	192	216	227	1345	238	1559	252	203	221	1612	374	1814	392	302	408
3	Dissolved oxygen (DO)	%	74	25	77	24	22	10	73	22	68	26	80	37	58	24	82	35	91	34
4	pH		6.1	5.9	6.5	6.1	6.2	6.3	6.8	6.4	7.0	6.8	7.0	6.5	6.9	5.2	7.1	5.4	6.3	5.0
5	Turbidity (NTU)	NTU	12	47	14	52	39	15	14	15	10	14	57	25	26	29	14	24	32	52
6	Total suspended solids (TSS)	mg/L	<5	6	<5	6	<5	<5	<5	6	<5	6	6	8	<5	<5	<5	<5	5	11
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.01	0.06	<0.01	0.03										
9	Arsenic (As)	mg/L					<0.001	0.001	<0.001	0.001										
10	Cadmium (Cd)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					0.001	0.002	<0.001	<0.001										
12	Copper (Cu)	mg/L					<0.001	<0.001	<0.001	<0.001										
13	Iron (Fe)	mg/L					0.49	1.81	0.18	1.77										
14	Lead (Pb)	mg/L					<0.001	<0.001	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.56	0.184	0.326	0.162										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.002	0.002	<0.001	0.002										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					0.006	0.009	<0.005	0.008										
20	Total Nitrogen (TN)	mg/L	0.3	0.3	0.4	0.6	0.2	0.4	0.2	0.6	0.2	0.6	0.6	0.4	0.2	0.3	0.3	0.4	0.3	0.2
21	Total Phosphorous (TP)	mg/L	<0.01	0.02	0.01	0.02	<0.01	<0.01	<0.01	0.02	0.01	0.04	0.04	0.03	<0.01	<0.01	<0.01	11.8	<0.01	0.02

- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

Table 33 SW11 – Unnamed drainage line (Chainage 34650 to 34700) cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW11a # (DS)	SW11b# (US)	SW11a (DS)	SW11b (US)	SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a (DS)	SW11b (US)	SW11a (DS)	SW11b (US)	SW11a (DS)	SW11b (US)
1	Temperature	^{0}C	12.0	12.2	16.2	15.1	16.3	15.5	16.0	15.3	17.6	16.9	18.7	17.6	19.6	19.2	23.9	24.2	22.7	22.7
2	Electrical conductivity (EC)	uS/cm	865	424	191	286	1031	400	2130	452	2219	446	704	326	140	142	105	104	89	89
3	Dissolved oxygen (DO)	%	83	11	83	50	77	19	67	36	66	28	84	19	90	91	97	99	100	102
4	pH		6.7	5.4	7.0	6.4	7.3	5.9	7.3	6.9	8.1	7.5	6.8	6.1	6.4	6.3	6.6	6.6	6.5	6.5
5	Turbidity (NTU)	NTU	29	93	62	23	16	52	12	39	6	25	36	49	70	67	40	41	34	34
6	Total suspended solids (TSS)	mg/L	15	20	8	7	8	13	<5	7	6	14	8	16	<5	<5	<5	<5	6	6
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.25	0.2	0.04	0.01							0.84	0.72	0.71	0.74		
9	Arsenic (As)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L			0.21	2.39	0.17	0.06							0.5	0.57	0.37	0.39		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.017	0.183	0.309	0.635							0.029	0.028	0.011	0.011		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			<0.001	0.001	0.001	0.002							<0.001	<0.001	<0.001	<0.001		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			0.007	0.011	0.007	0.012							<0.005	<0.005	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	0.1	0.1	0.4	0.2	0.2	0.3	0.4	0.8	0.2	1.4	0.4	0.6	0.8	0.8	0.6	0.4	0.6	0.6
21	Total Phosphorous (TP)	mg/L	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.1	<0.01	0.04	0.02	0.04	0.02	<0.01	0.01	0.01

- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

Table 34 SW11 – Unnamed drainage line (Chainage 34650 to 34700) cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		29/03/21 (D)									
			SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a# (DS)	SW11b# (US)	SW11a (DS)	SW11b (US)	SW11a (DS)	SW11b (US)	SW11a (DS)	SW11b (US)	SW11a (DS)	SW11b (US)	SW11a (DS)	SW11b (US)	SW11a (DS)	SW11b (US)
1	Temperature	^{0}C	20.5	20.8	21.7	21.4	20.9	20.3	21.9	21.2	20.2	20.2								
2	Electrical conductivity (EC)	uS/cm	207	612	1358	251	959	252	337	208	116	106								
3	Dissolved oxygen (DO)	%	17	52	57	21	58	26	63	45	81	81								
4	pH		6.5	7.0	7.3	6.9	7.1	7.0	6.7	6.3	6.5	6.4								
5	Turbidity (NTU)	NTU	26	21	22	21	16	25	44	27	40	38								
6	Total suspended solids (TSS)	mg/L	9	16	9	5	<5	6	7	8	8	6								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			<0.01	0.08	0.09	0.05												
9	Arsenic (As)	mg/L			<0.001	0.002	<0.001	0.001												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001												
13	Iron (Fe)	mg/L			0.54	2.39	0.31	2.18												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.601	0.169	0.305	0.123												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			0.001	0.001	<0.001	0.001												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			<0.005	0.007	<0.005	0.006												
20	Total Nitrogen (TN)	mg/L	0.4	0.4	0.3	0.6	0.3	0.4	0.5	0.4	0.5	0.6								
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	<0.01	0.02	<0.01	0.03	0.04	0.02	0.01	0.02								

- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

Table 35 SW12 – Maria River (Chainage 36850)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)
1	Temperature	^{0}C	17.0	17.2	18.5	19.1	15.2	15.2	15.5	16.0	13.0	13.3	15.1	15.4	11.5	12.2	10.8	11.5	10.8	12.0
2	Electrical conductivity (EC)	uS/cm	186	179	185	166	243	225	210	224	217	234	288	169	245	259	243	257	220	237
3	Dissolved oxygen (DO)	%	9	13	16	38	59	9	16	49	7	21	54	50	12	16	12	27	36	17
4	pH		6.2	6.0	6.3	6.1	6.9	6.4	6.7	6.6	6.7	6.7	7.3	6.9	6.9	6.7	7.2	7.0	6.9	6.1
5	Turbidity (NTU)	NTU	30	13	19	11	10	45	28	8	26	7	82	25	38	27	48	19	63	26
6	Total suspended solids (TSS)	mg/L	22	12	10	<5	24	7	21	6	17	<5	26	6	8	<5	11	<5	17	6
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.23	0.17	0.21	0.1										
9	Arsenic (As)	mg/L					0.002	0.002	0.002	0.002										
10	Cadmium (Cd)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					0.003	0.002	<0.001	<0.001										
12	Copper (Cu)	mg/L					<0.001	<0.001	<0.001	<0.001										
13	Iron (Fe)	mg/L					6.06	1.9	4.6	1.35										
14	Lead (Pb)	mg/L					<0.001	<0.001	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.204	0.22	0.221	0.179										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.002	0.003	0.002	0.002										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					<0.005	0.006	0.008	<0.005										
20	Total Nitrogen (TN)	mg/L	0.6	0.6	0.9	0.6	1.1	0.9	1.8	0.7	1.2	0.8	1.3	0.4	1	0.7	0.7	0.6	0.7	0.4
21	Total Phosphorous (TP)	mg/L	0.03	0.02	0.06	0.02	0.05	0.01	0.16	0.03	0.09	0.05	0.12	0.02	0.06	0.02	0.02	<0.01	0.04	<0.01

Note - Sampling points generally persisting as isolated ponds with the exception of 13.12.2020, 18.12.2020, 5.01.2021, 21.01.2021, 12.02.2021 and 29.03.2021 events.

Table 36 SW12 – Maria River (Chainage 36850) cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)
1	Temperature	^{0}C	11.3	12.8	14.9	16.7	15.9	18.5	16.9	17.3	17.2	18.7	18.9	19.4	19.0	19.0	22.0	22.2	22.1	22.1
2	Electrical conductivity (EC)	uS/cm	242	238	282	156	247	238	269	245	283	242	214	212	122	122	119	118	114	114
3	Dissolved oxygen (DO)	%	30	26	61	66	31	23	13	12	7	15	40	23	50	51	65	66	74	74
4	pH		7.2	6.8	7.2	7.2	7.8	7.3	7.4	7.2	7.9	7.8	6.9	6.5	6.4	6.3	6.5	6.5	6.4	6.3
5	Turbidity (NTU)	NTU	29	28	55	18	24	16	22	17	20	13	15	12	36	35	34	32	25	24
6	Total suspended solids (TSS)	mg/L	8	9	6	<5	9	14	6	6	10	9	8	<5	<5	<5	<5	<5	5	6
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.13	0.14	0.11	0.06							0.74	0.65	0.69	0.67		
9	Arsenic (As)	mg/L			<0.001	<0.001	<0.001	0.001							<0.001	<0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L			1.73	0.54	1.95	1.6							0.86	0.83	0.58	0.56		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.14	0.091	0.121	0.295							0.036	0.034	0.027	0.025		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			0.001	<0.001	0.001	0.002							0.001	<0.001	<0.001	0.001		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			0.01	0.01	0.014	0.007							<0.005	<0.005	<0.005	0.009		
20	Total Nitrogen (TN)	mg/L	0.5	0.4	0.7	0.2	0.9	0.6	0.7	0.6	0.8	0.8	0.8	0.6	0.9	0.9	0.7	0.5	0.7	0.7
21	Total Phosphorous (TP)	mg/L	0.04	0.03	0.05	0.01	0.04	0.02	0.04	0.02	0.1	0.06	0.04	0.02	0.02	0.03	<0.01	0.01	0.01	0.02

Note - Sampling points generally persisting as isolated ponds with the exception of 13.12.2020, 18.12.2020, 5.01.2021, 21.01.2021, 12.02.2021 and 29.03.2021 events..

Table 37 SW12 – Maria River (Chainage 36850) cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		29/03/21 (D)									
			SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)	SW12a (US)	SW12b (DS)
1	Temperature	^{0}C	21.7	21.7	22.4	23.0	21.1	21.9	21.4	21.5	19.7	19.8								
2	Electrical conductivity (EC)	uS/cm	187	192	227	219	228	210	207	206	117	117								
3	Dissolved oxygen (DO)	%	14	26	36	23	27	20	17	29	43	48								
4	pH		6.8	6.8	7.5	7.1	7.6	7.1	6.7	6.7	6.4	6.3								
5	Turbidity (NTU)	NTU	12	8	7	17	14	24	20	20	35	32								
6	Total suspended solids (TSS)	mg/L	11	5	<5	7	8	10	8	10	10	9								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.15	0.13	0.13	0.11												
9	Arsenic (As)	mg/L			0.001	0.002	0.002	0.002												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	<0.001	0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001												
13	Iron (Fe)	mg/L			1.02	1.42	1.34	1.67												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.116	0.188	0.205	0.216												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			0.002	0.002	0.002	0.002												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			<0.005	0.007	<0.005	0.006												
20	Total Nitrogen (TN)	mg/L	0.7	0.7	1	0.8	0.9	0.6	0.7	0.7	0.6	0.5								
21	Total Phosphorous (TP)	mg/L	0.01	<0.01	0.05	0.04	0.03	0.03	0.04	0.05	0.02	0.01								

Note - Sampling points generally persisting as isolated ponds with the exception of 13.12.2020, 18.12.2020, 5.01.2021, 21.01.2021, 12.02.2021 and 29.03.2021 events.

Table 38 SW13 – Stumpy Creek (Chainage 37700 to 37750)

No.	Parameter	Unit	23/04/20 (D)		28/04/20 (W)		6/05/20 (D)		27/05/20 (W)		5/06/20 (D)		12/06/20 (W)		15/07/20 (W)		23/07/20 (D)		8/08/20 (W)	
			SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a (DS)	SW13b (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)
1	Temperature	^{0}C	16.2	16.8	19.8	19.6	15.1	16.2	15.9	15.1	12.8	12.2	15.7	14.8	12.1	11.5	11.2	10.8	12.1	12.3
2	Electrical conductivity (EC)	uS/cm	208	175	158	175	201	190	323	194	306	241	400	160	470	207	399	198	346	266
3	Dissolved oxygen (DO)	%	47	9	79	80	10	68	85	15	78	21	77	38	78	36	88	37	88	83
4	pH		6.5	6.7	6.9	7.1	6.9	7.0	7.1	7.0	7.5	7.5	7.0	6.9	7.5	7.5	7.6	7.6	7.1	7.1
5	Turbidity (NTU)	NTU	10	25	35	30	26	15	8	52	5	32	25	31	28	30	15	28	36	34
6	Total suspended solids (TSS)	mg/L	6	12	6	6	<5	14	<5	12	<5	6	5	9	<5	<5	<5	<5	8	6
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L					0.15	0.12	0.03	0.11										
9	Arsenic (As)	mg/L					0.002	0.011	<0.001	0.001										
10	Cadmium (Cd)	mg/L					<0.0001	0.001	<0.0001	<0.0001										
11	Chromium (Cr)	mg/L					<0.001	0.011	0.001	0.002										
12	Copper (Cu)	mg/L					<0.001	0.013	<0.001	<0.001										
13	Iron (Fe)	mg/L					2.4	0.13	0.66	1.68										
14	Lead (Pb)	mg/L					<0.001	0.012	<0.001	<0.001										
15	Manganese (Mn)	mg/L					0.088	0.013	0.044	0.253										
16	Mercury (Hg)	mg/L					<0.0001	<0.0001	<0.0001	<0.0001										
17	Nickel (Ni)	mg/L					0.001	0.01	<0.001	0.001										
18	Silver (Ag)	mg/L					<0.001	<0.001	<0.001	<0.001										
19	Zinc (Zn)	mg/L					<0.005	0.054	0.006	<0.005										
20	Total Nitrogen (TN)	mg/L	0.6	0.9	0.5	0.5	0.7	1.2	0.3	0.8	0.5	0.8	0.9	0.8	6.2	0.7	3.5	0.7	6.6	0.2
21	Total Phosphorous (TP)	mg/L	0.02	0.04	0.03	0.02	<0.01	0.04	<0.01	0.02	0.03	0.05	0.04	0.02	0.04	<0.01	<0.01	0.02	0.09	<0.01

- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

Note, trend in elevated total nitrogen and total phosphorous commenced in May 2017 and continued at times during this reporting period. There have been no changes or works (ie fertiliser application, spills etc on the project that would likely contribute the elevated levels. It is considered other localised land use activities are contributing to these results.

Table 39 SW13 – Stumpy Creek (Chainage 37700 to 37750) cont.

No.	Parameter	Unit	21/08/20 (D)		11/09/20 (W)		24/09/20 (D)		15/10/20 (D)		20/10/20 (W)		12/11/20 (D)		13/12/20 (W)		18/12/20 (D)		5/01/21 (W)	
			SW13a# (DS)	SW13b# (US)	SW13a (DS)	SW13b (US)	SW13a# (DS)	SW13b# (US)	SW13a (DS)	SW13b (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a (DS)	SW13b (US)	SW13a (DS)	SW13b (US)	SW13a (DS)	SW13b (US)
1	Temperature	^{0}C	11.9	11.5	16.1	15.4	15.8	15.1	16.0	15.1	17.5	17.6	18.3	18.1	18.7	18.7	22.3	22.2	22.3	22.3
2	Electrical conductivity (EC)	uS/cm	347	302	384	256	270	241	269	202	217	264	166	145	102	97	104	104	99	99
3	Dissolved oxygen (DO)	%	99	35	86	67	50	30	35	34	33	50	42	21	63	62	73	72	73	72
4	pH		7.4	7.2	7.4	7.3	7.9	7.9	7.7	7.8	8.2	8.2	6.9	6.9	6.6	6.6	6.5	6.6	6.3	6.6
5	Turbidity (NTU)	NTU	14	38	33	66	16	51	11	29	14	24	28	36	47	55	43	45	37	40
6	Total suspended solids (TSS)	mg/L	<5	7	<5	12	12	12	<5	<5	6	7	16	19	<5	<5	<5	5	<5	6
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.2	0.13	0.06	0.04							1.14	1.12	1.14	1.09		
9	Arsenic (As)	mg/L			<0.001	<0.001	0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L			<0.001	<0.001	<0.001	<0.001							0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L			0.002	<0.001	<0.001	<0.001							0.001	0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L			0.27	0.69	1.79	0.93							0.81	0.79	0.69	0.66		
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L			0.015	0.077	0.378	0.311							0.039	0.039	0.029	0.029		
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001							<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L			0.001	<0.001	0.001	0.001							<0.001	<0.001	<0.001	<0.001		
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001							<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L			0.029	0.026	0.008	0.007							<0.005	<0.005	0.011	0.006		
20	Total Nitrogen (TN)	mg/L	0.3	0.2	3.0	0.5	0.8	0.7	1.2	0.6	0.5	0.6	1.0	1.1	1.9	1.9	0.8	0.8	0.9	1.0
21	Total Phosphorous (TP)	mg/L	0.02	0.02	0.07	0.02	0.03	0.02	0.04	0.01	0.09	0.04	0.04	0.05	0.02	0.02	0.03	0.01	0.02	0.02

- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

Note, trend in elevated total nitrogen and total phosphorous commenced in May 2017 and continued at times during this reporting period. There have been no changes or works (ie fertiliser application, spills etc on the project that would likely contribute the elevated levels. It is considered other localised land use activities are contributing to these results.

Table 40 SW13 – Stumpy Creek (Chainage 37700 to 37750) cont.

No.	Parameter	Unit	21/01/21 (D)		8/02/21 (D)		15/02/21 (W)		12/03/21 (W)		29/03/21 (D)									
			SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a (DS)	SW13b (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a# (DS)	SW13b# (US)	SW13a (DS)	SW13b (US)
1	Temperature	^{0}C	20.3	20.8	22.2	22.0	20.6	20.9	21.2	21.1	19.9	19.7								
2	Electrical conductivity (EC)	uS/cm	143	127	280	219	226	288	163	119	71	66								
3	Dissolved oxygen (DO)	%	44	3	39	17	53	51	53	40	74	71								
4	pH		7.3	7.3	7.7	7.8	7.7	7.8	6.9	6.9	6.6	6.9								
5	Turbidity (NTU)	NTU	16	26	8	22	18	19	23	28	42	44								
6	Total suspended solids (TSS)	mg/L	9	14	<5	<5	<5	<5	10	12	6	8								
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L			0.08	0.16	0.1	0.06												
9	Arsenic (As)	mg/L			0.002	0.002	<0.001	0.001												
10	Cadmium (Cd)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
11	Chromium (Cr)	mg/L			<0.001	0.002	<0.001	<0.001												
12	Copper (Cu)	mg/L			<0.001	<0.001	<0.001	<0.001												
13	Iron (Fe)	mg/L			1.32	1.39	0.8	1.02												
14	Lead (Pb)	mg/L			<0.001	<0.001	<0.001	<0.001												
15	Manganese (Mn)	mg/L			0.121	0.227	0.061	0.101												
16	Mercury (Hg)	mg/L			<0.0001	<0.0001	<0.0001	<0.0001												
17	Nickel (Ni)	mg/L			0.001	0.002	<0.001	<0.001												
18	Silver (Ag)	mg/L			<0.001	<0.001	<0.001	<0.001												
19	Zinc (Zn)	mg/L			<0.005	<0.005	0.01	0.006												
20	Total Nitrogen (TN)	mg/L	1.0	1.0	0.6	0.8	0.3	0.4	0.7	0.7	0.6	0.7								
21	Total Phosphorous (TP)	mg/L	0.02	0.03	0.02	0.04	<0.01	<0.01	0.04	0.05	<0.01	<0.01								

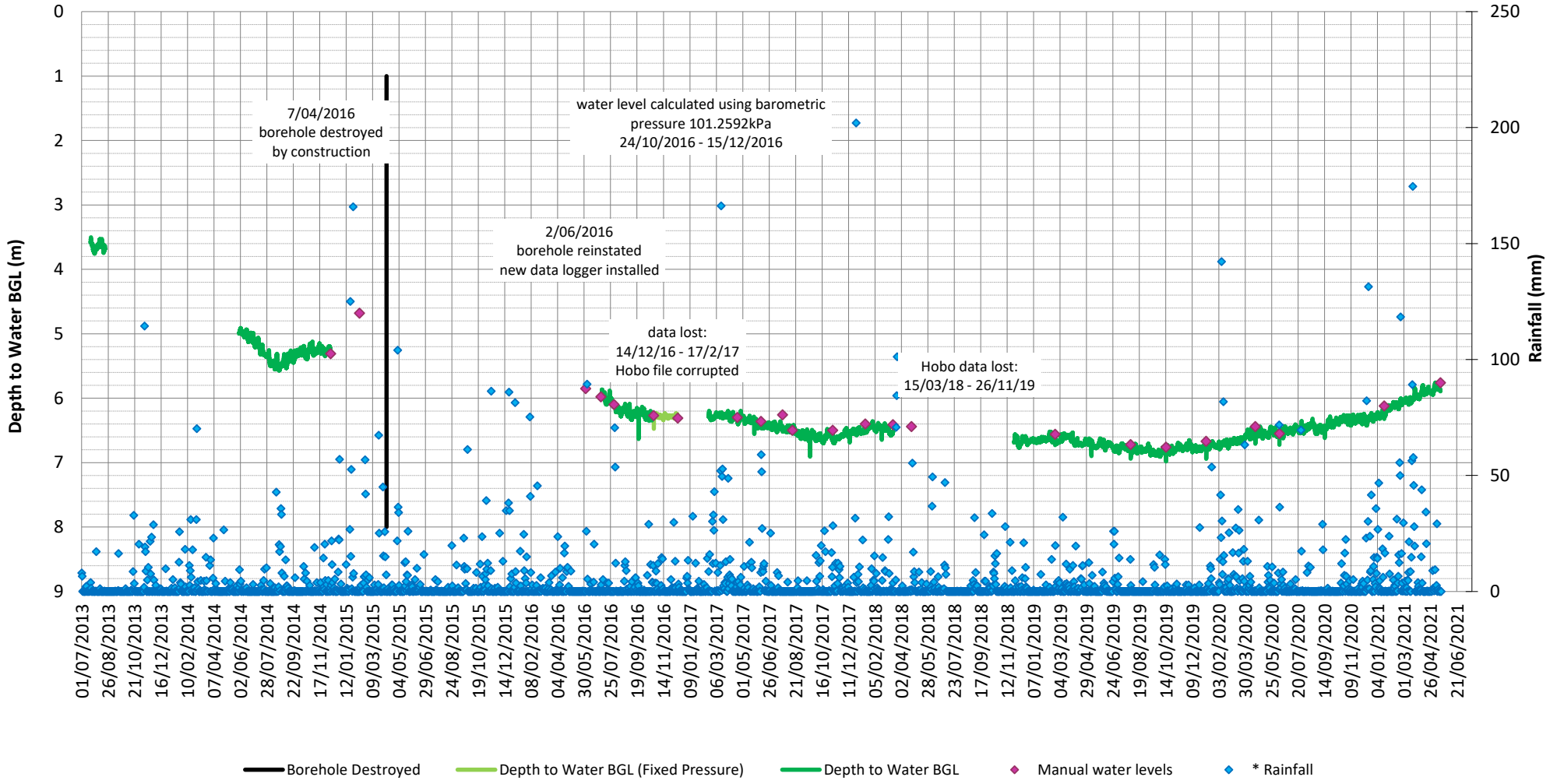
- No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

Note, trend in elevated total nitrogen and total phosphorous commenced in May 2017 and continued at times during this reporting period. There have been no changes or works (ie fertiliser application, spills etc on the project that would likely contribute the elevated levels. It is considered other localised land use activities are contributing to these results.

Appendix D – Borehole water level data plots

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW01 (A-BH3101) Water Level BGL



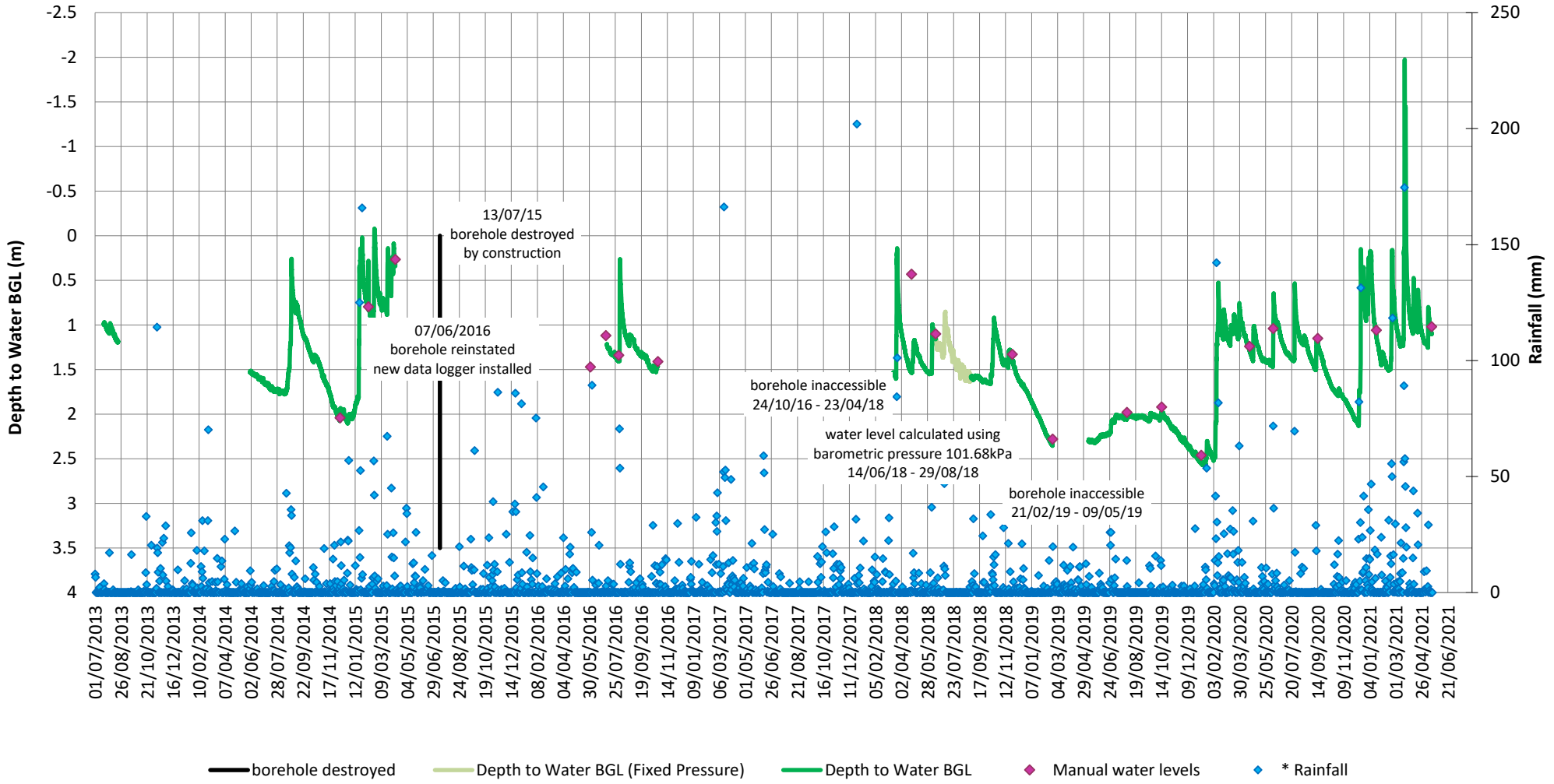
Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10699259	
			BH ID	**A-BH3101**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure No: **B-1**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW04 (A-BH3104) Water Level BGL



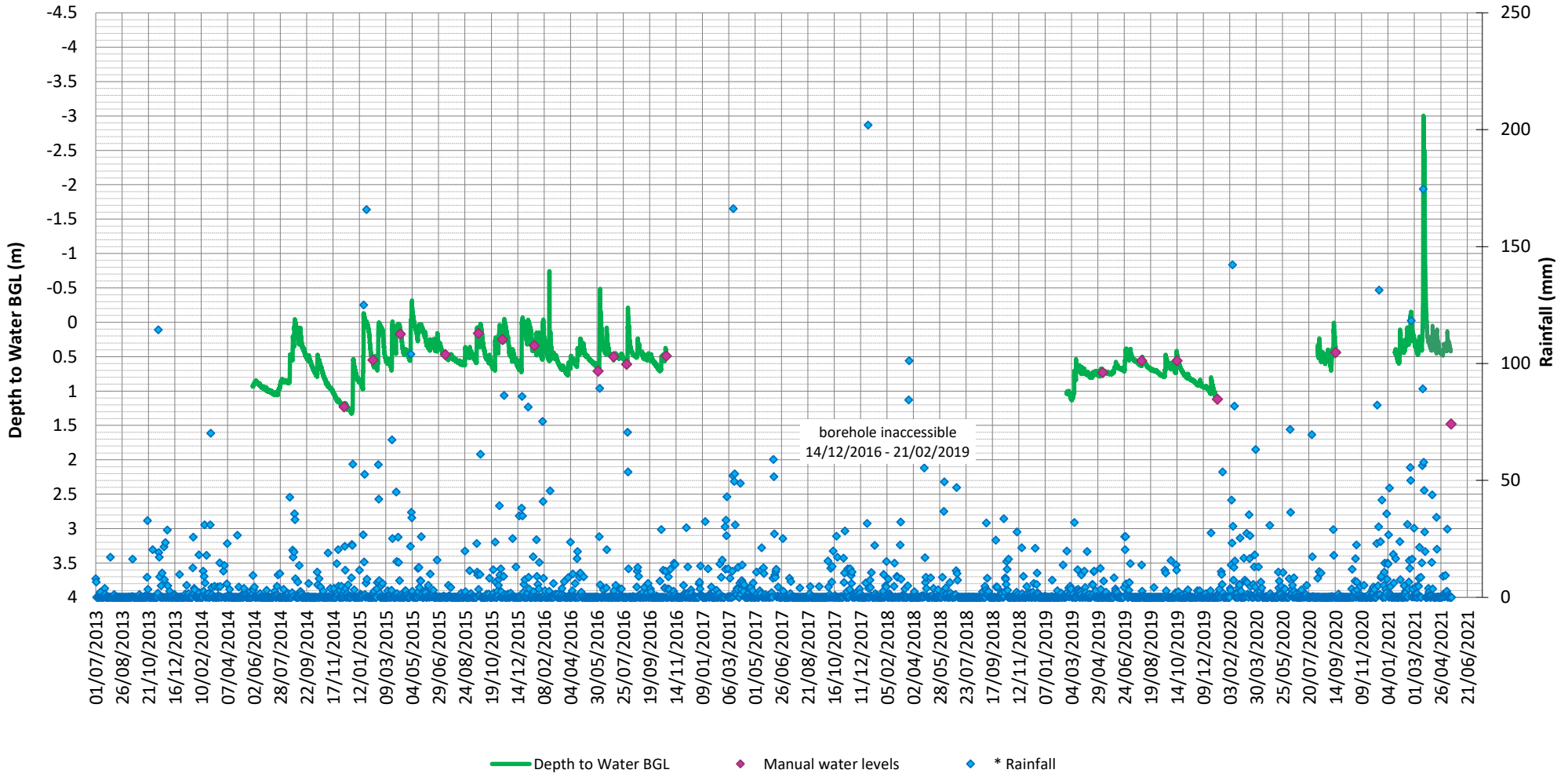
Drawn	**NS**	Transport for NSW Roads & Maritime Services	Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn 10932422	
			BH ID	**A-BH3104**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-4**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW05 (A-BH3105) Water Level BGL



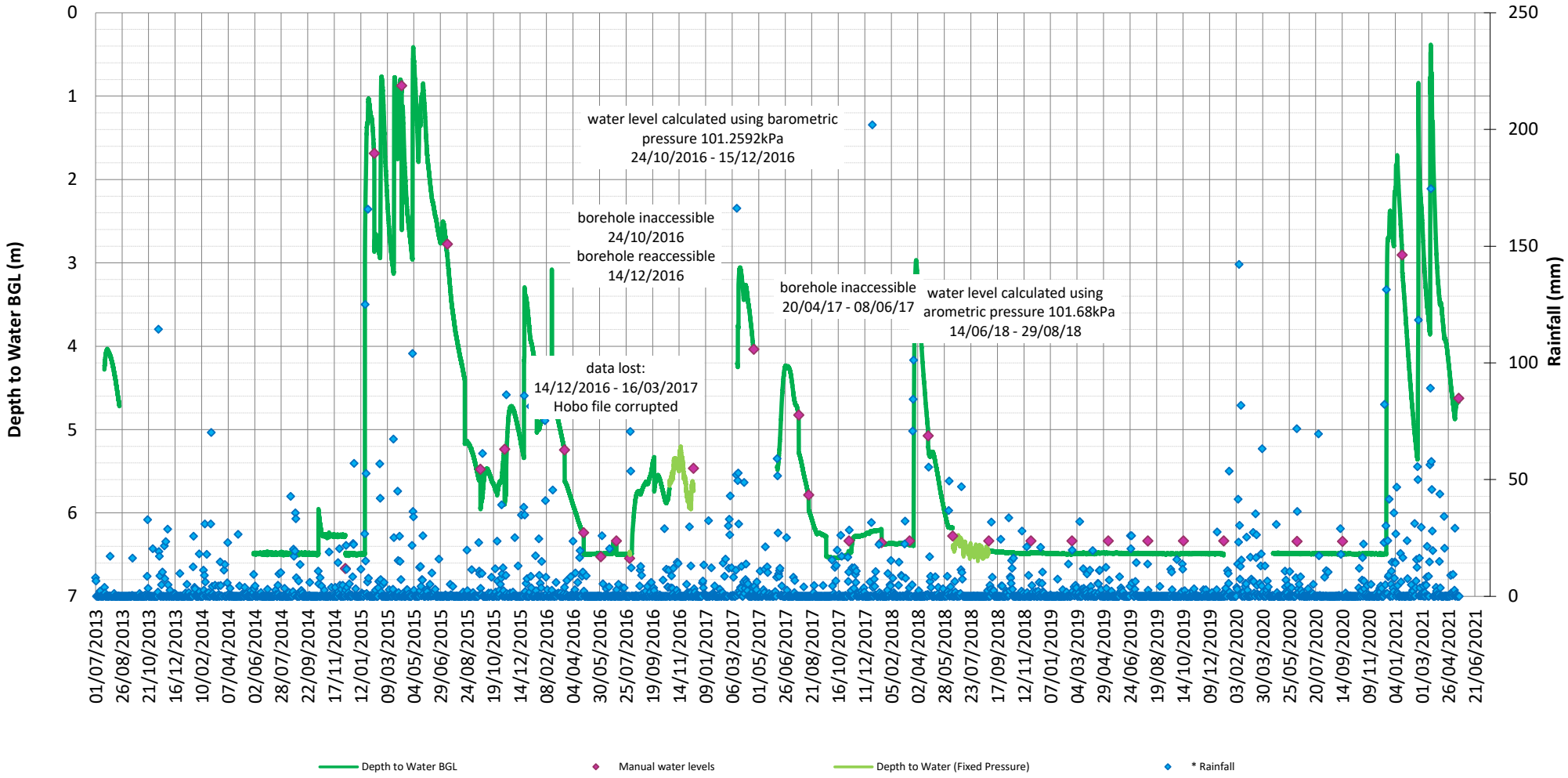
Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262196	
			BH ID	**A-BH3105**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-5**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW07 (A-BH3107) Water Level BGL



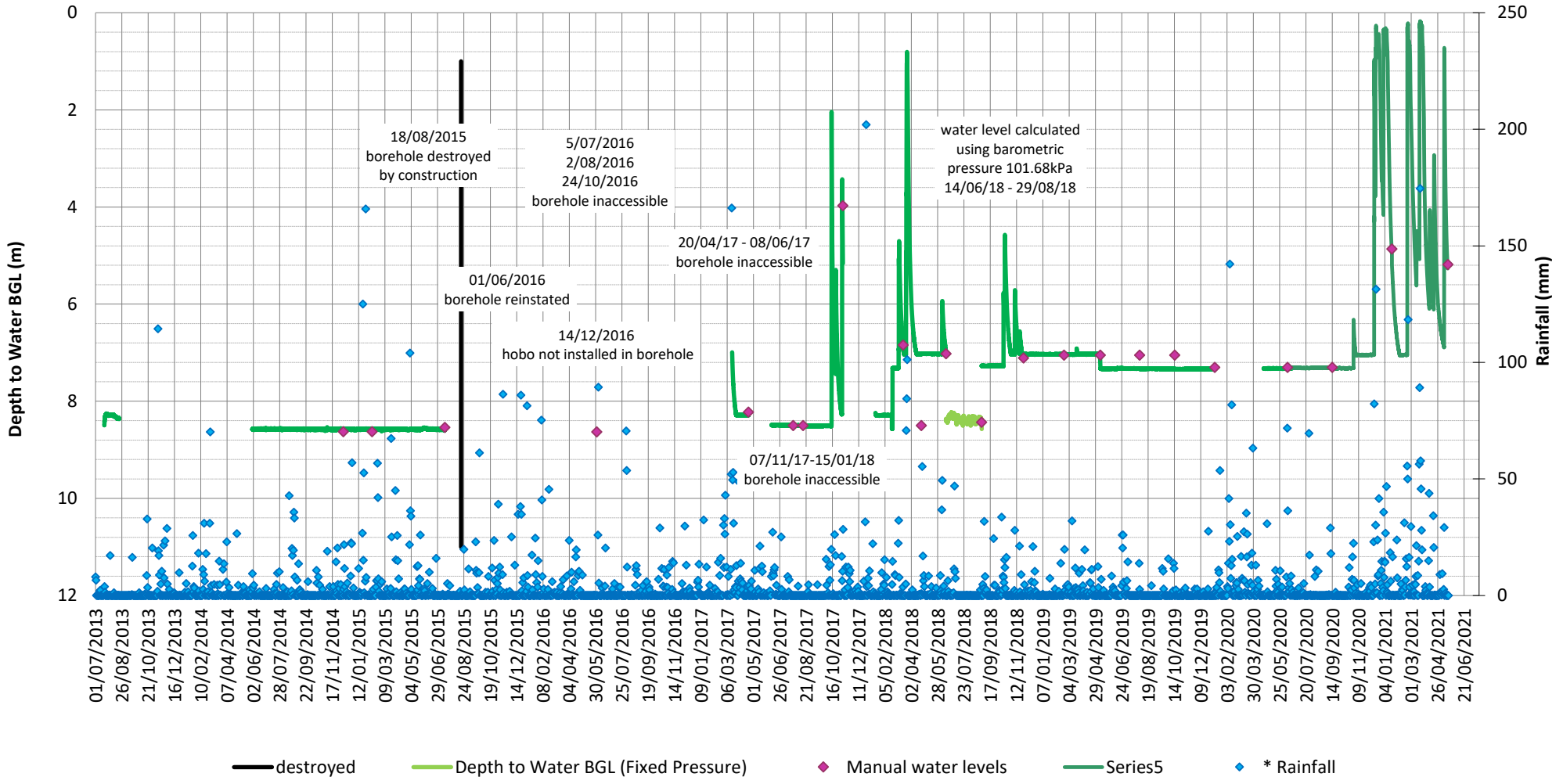
Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn20370339	
			BH ID	**A-BH3107**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-4**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW09 (B-BH3102) Water Level BGL



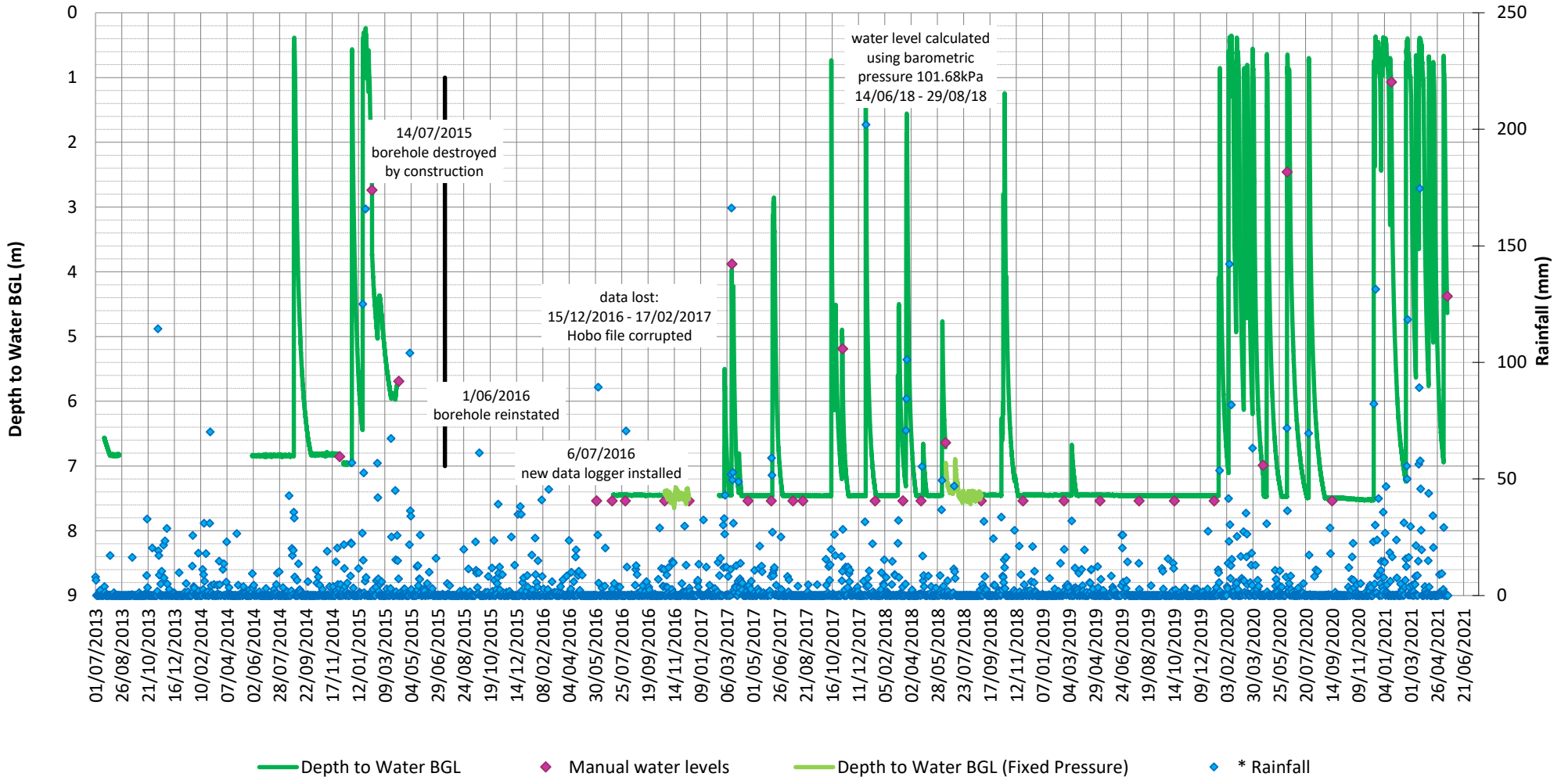
Drawn	**NS**	Transport Roads & Maritime Services (NSW GOVERNMENT)	Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn 10952125	
			BH ID	**B-BH3102**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-5**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW10 (B-BH3103) Water Level BGL



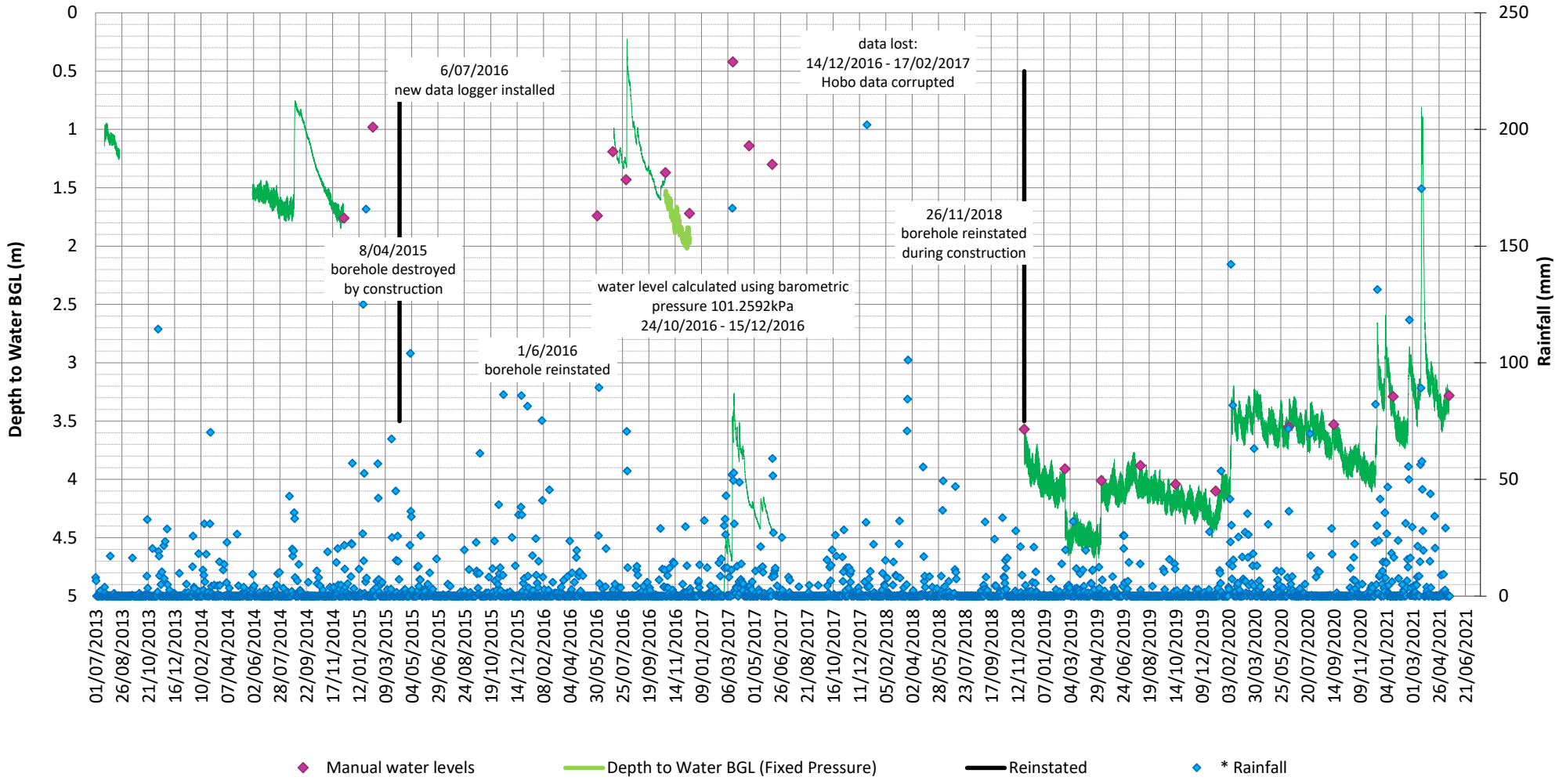
Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10932425	
			BH ID	**B-BH3103**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-6**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW13 (B-BH3106) Water Level BGL



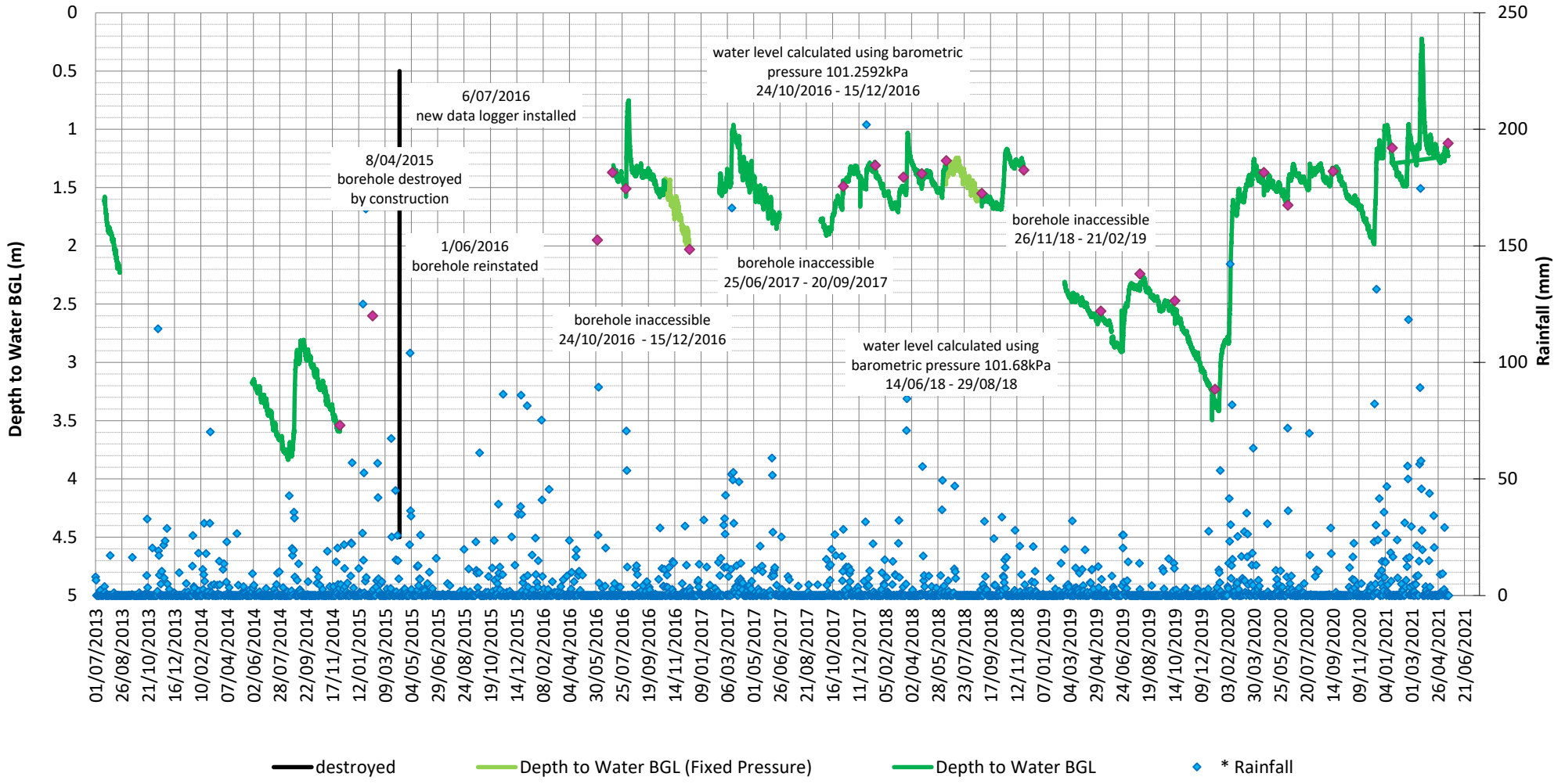
Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn2038	
			BH ID	**B-BH3106**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-12**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW14 (B-BH3107) Water Level BGL



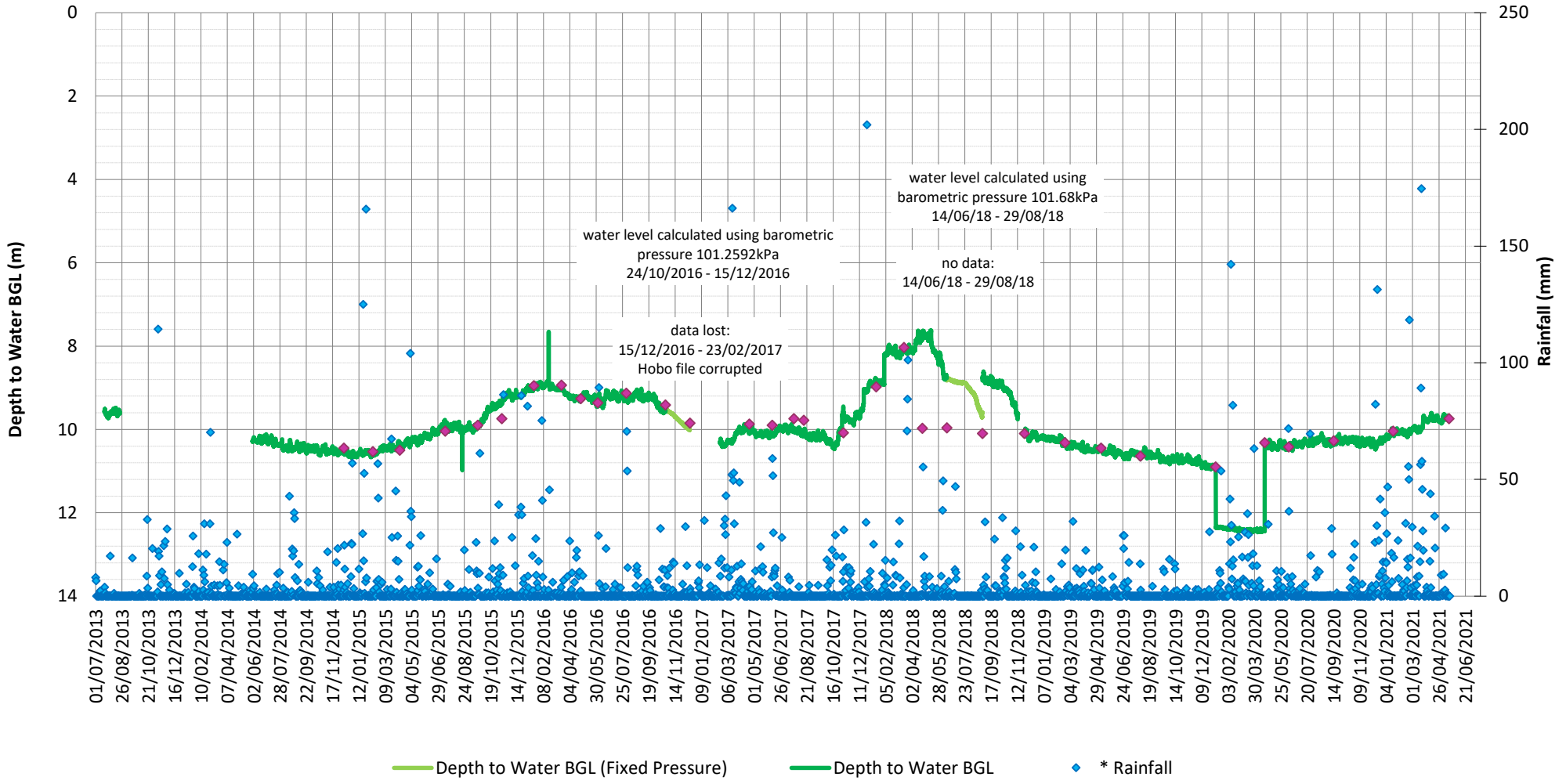
Drawn	**NS**	Transport Roads & Maritime Services	Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10932419	
			BH ID	**B-BH3107**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-9**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW15 (B-BH3108) Water Level BGL



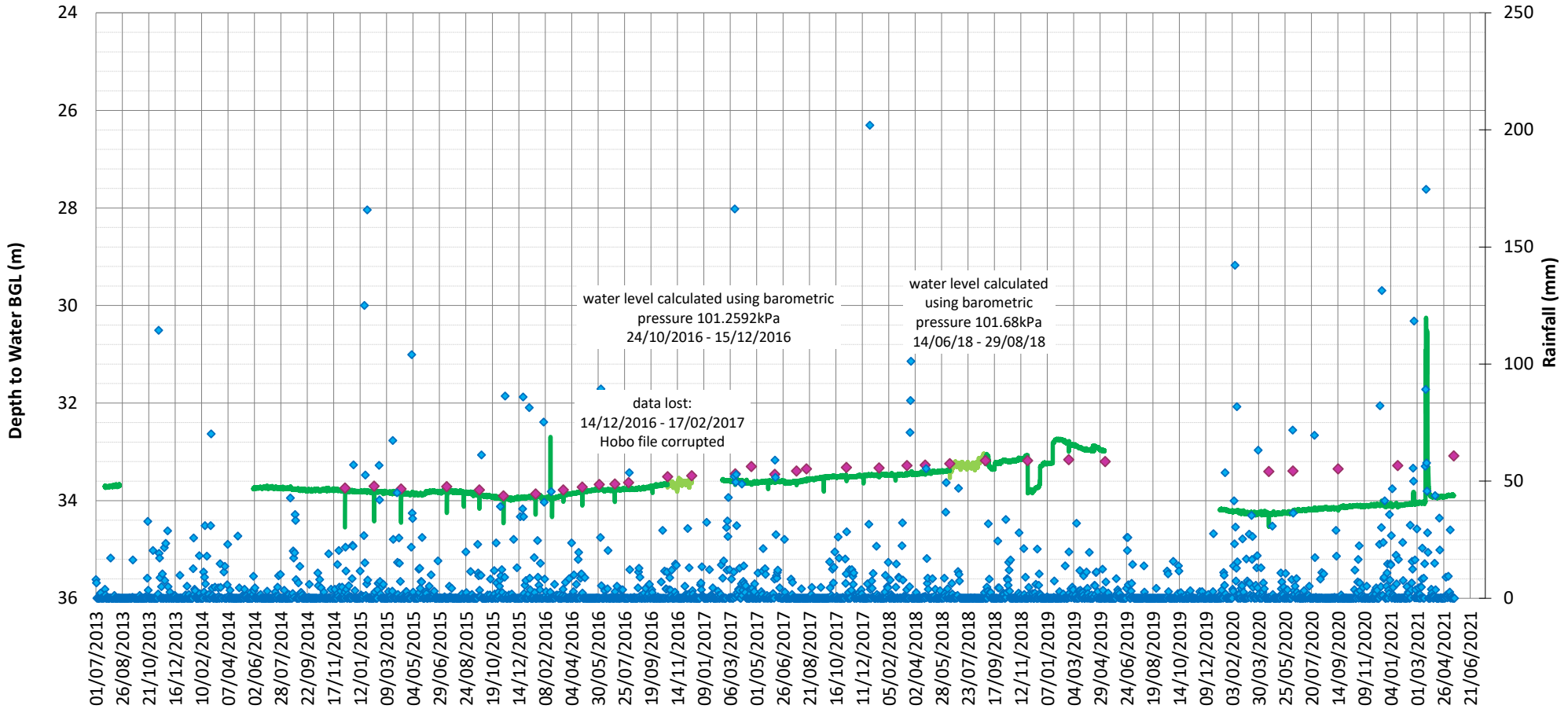
Drawn	**NS**	Transport Roads & Maritime Services	Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10238352	
			BH ID	**B-BH3108**	
Date	**27/01/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-10**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW18 (C-BH3102) Water Level BGL



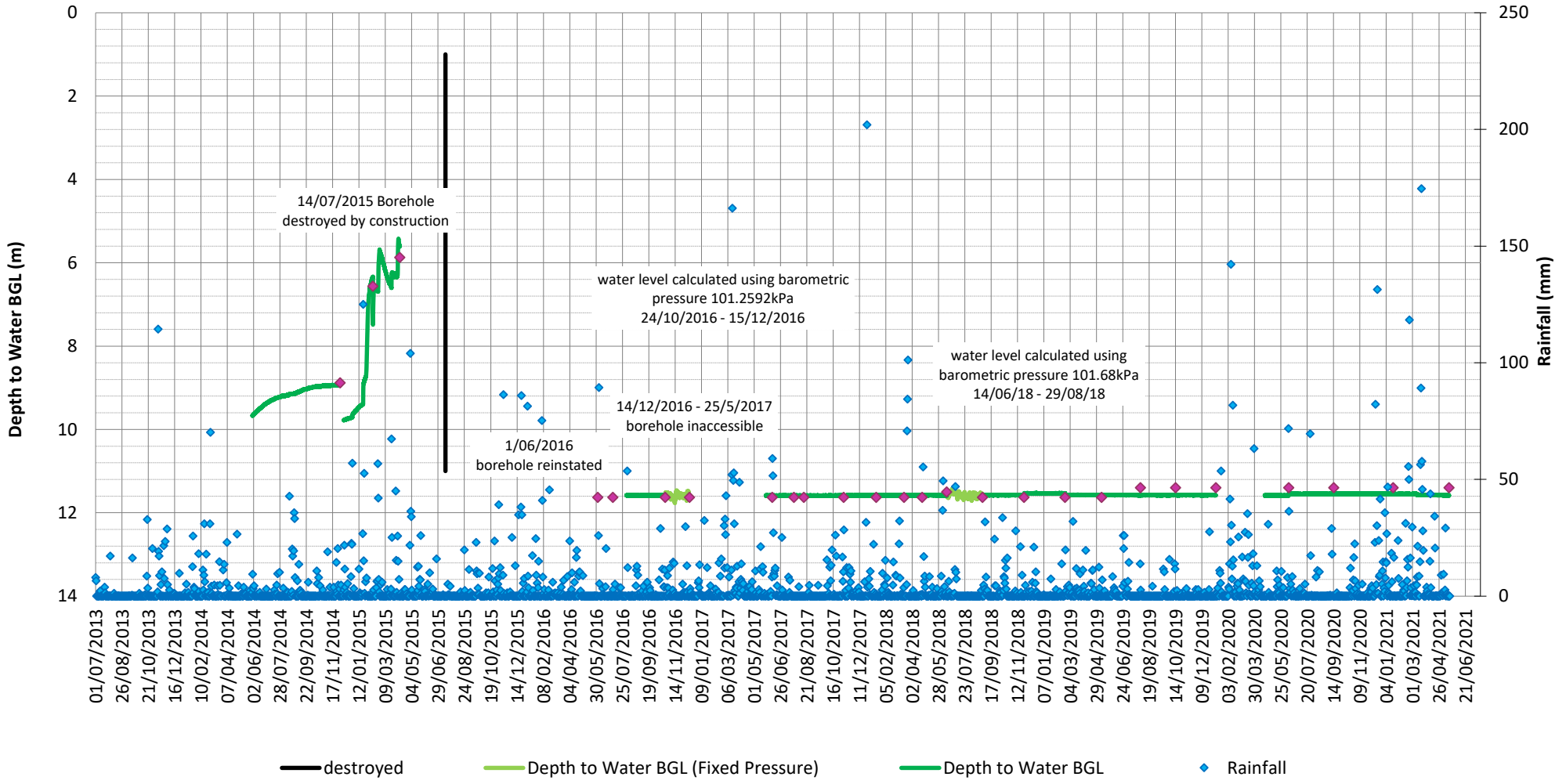
Drawn	**NS**	Transport for NSW Roads & Maritime Services	Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262195	
			BH ID	**C-BH3102**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-11**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW19 (C-BH3103) Water Level BGL



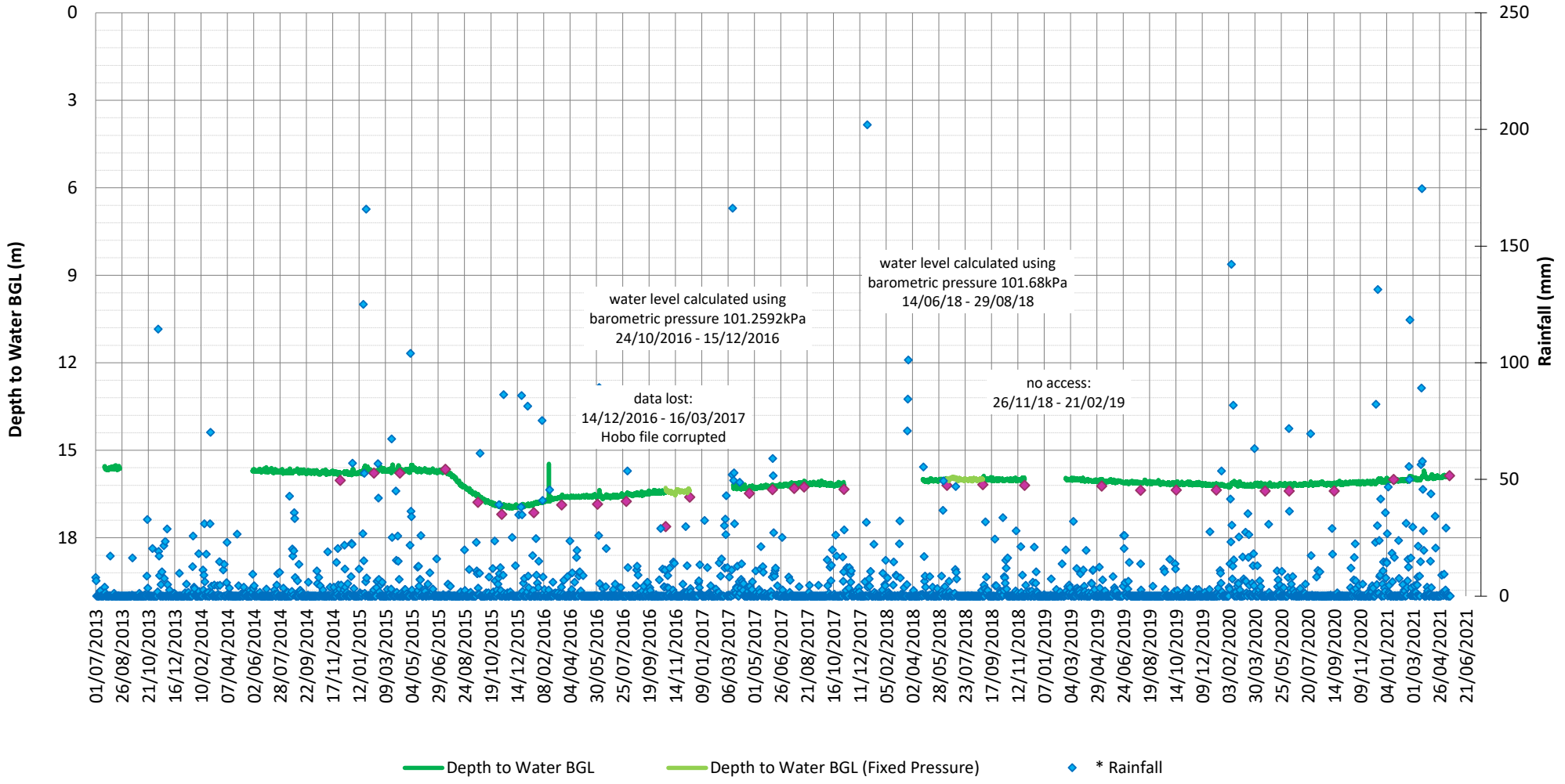
Drawn	**NS**	Transport Roads & Maritime Services	Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger**	
			BH ID	**C-BH3103**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-12**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW22 (C-BH3107) Water Level BGL

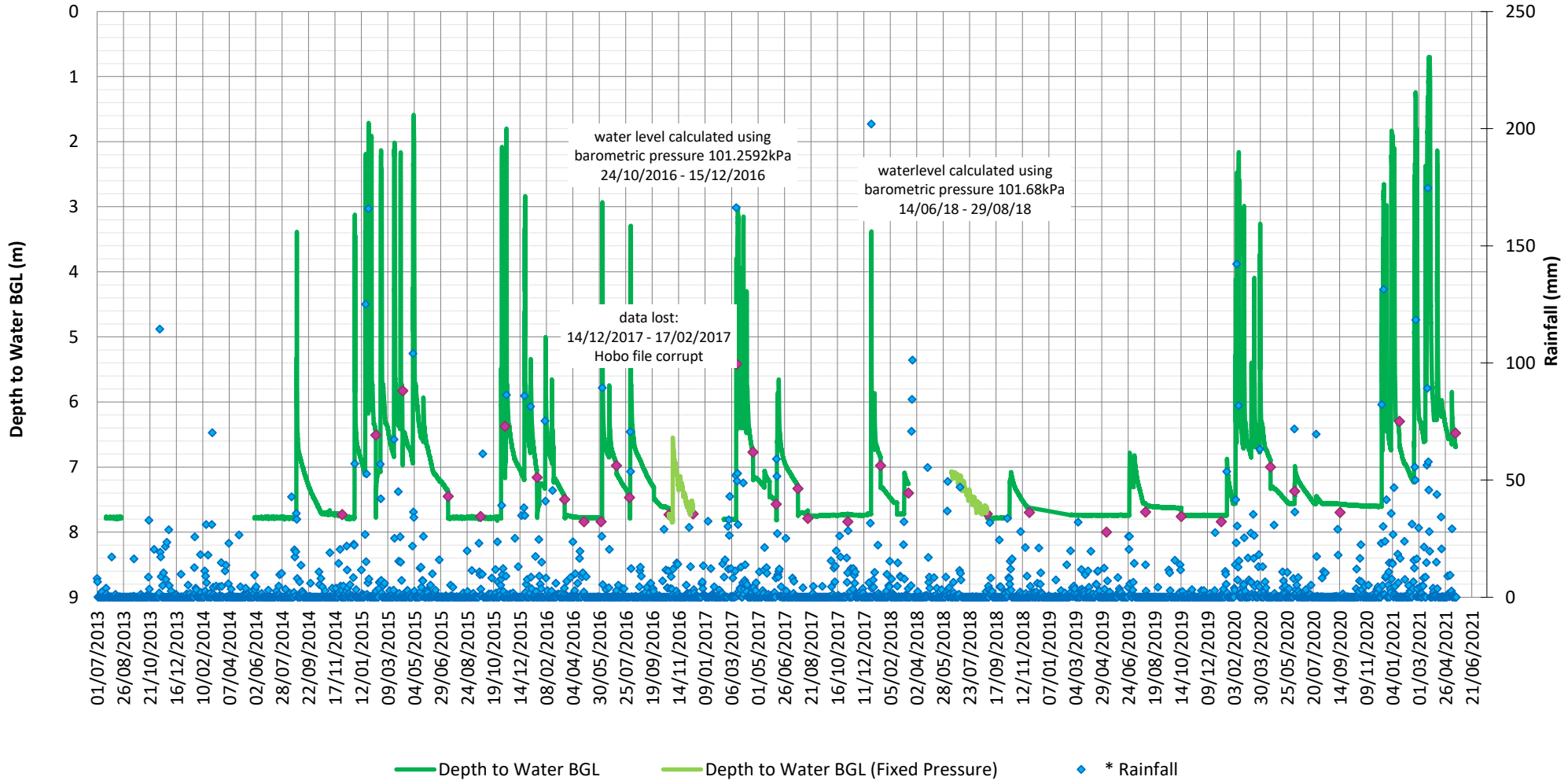


Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn20142676	
			BH ID	**C-BH3107**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-13**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey
GW24 (C-BH3108) Water Level BGL



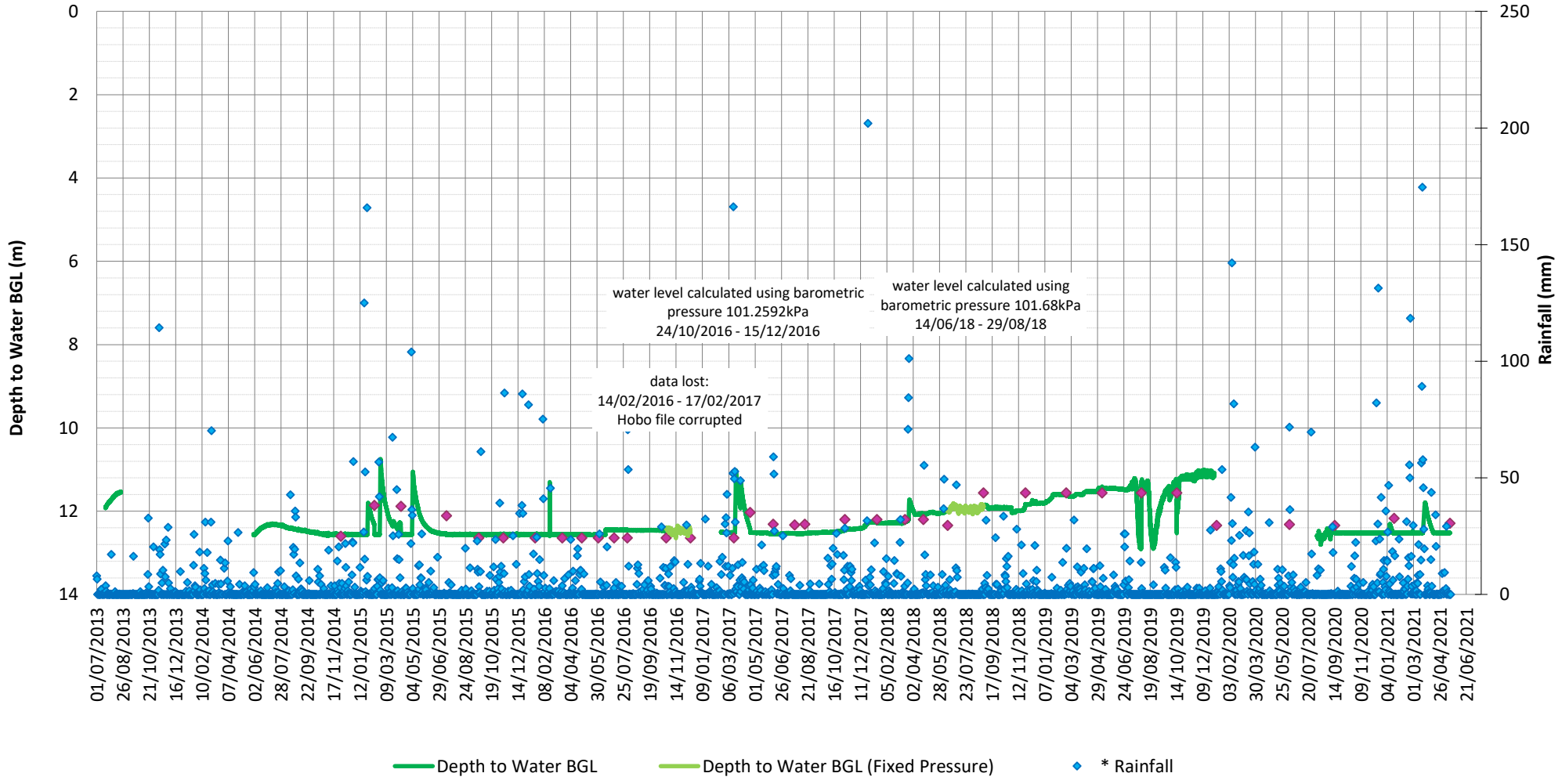
Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262197	
			BH ID	**C-BH3108**	
Date	**27/01/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-14**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW25 (D-BH3101) Water Level BGL



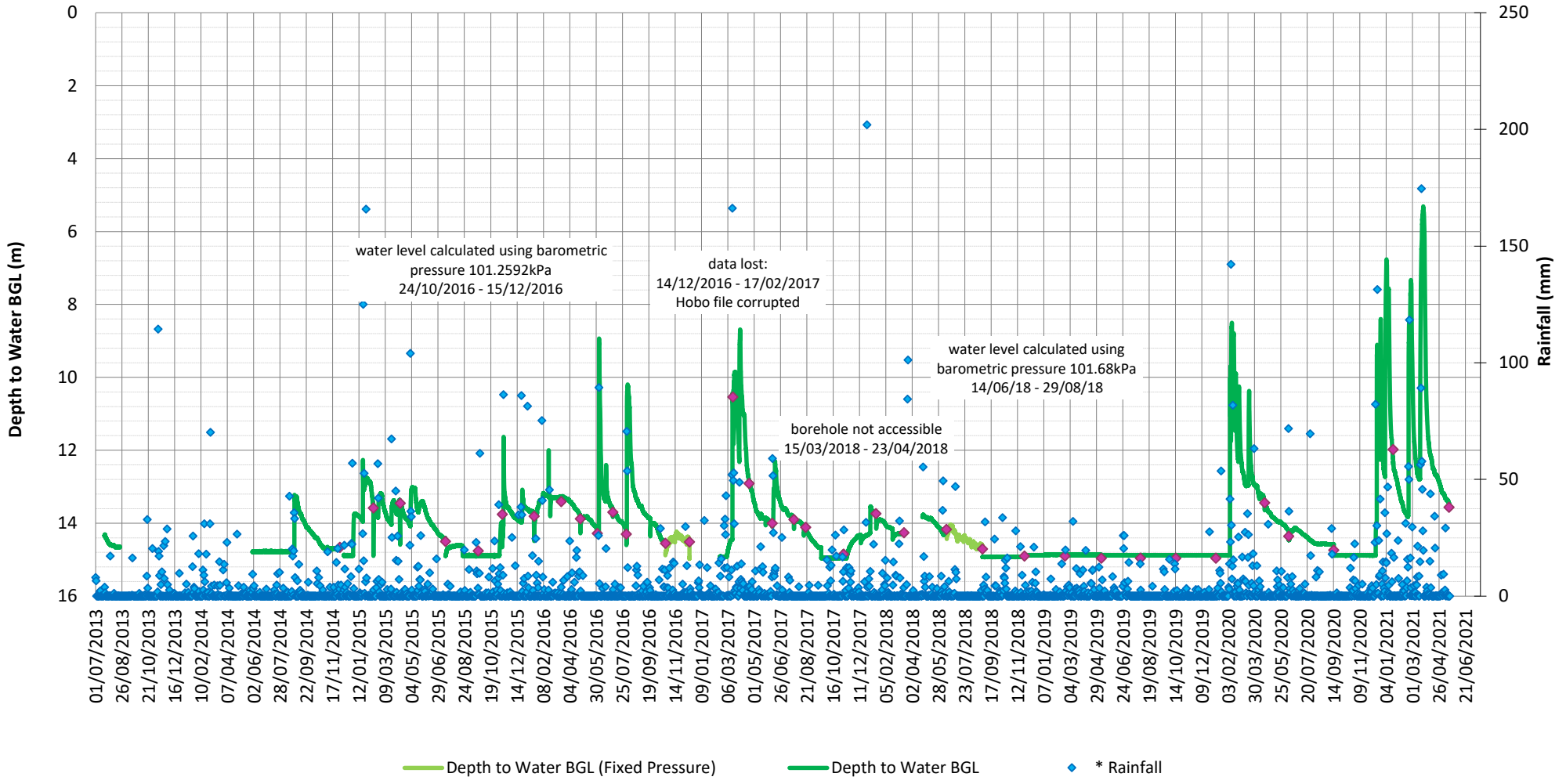
Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262203	
			BH ID	**D-BH3101**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-15**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW26 (D-BH3106) Water Level BGL



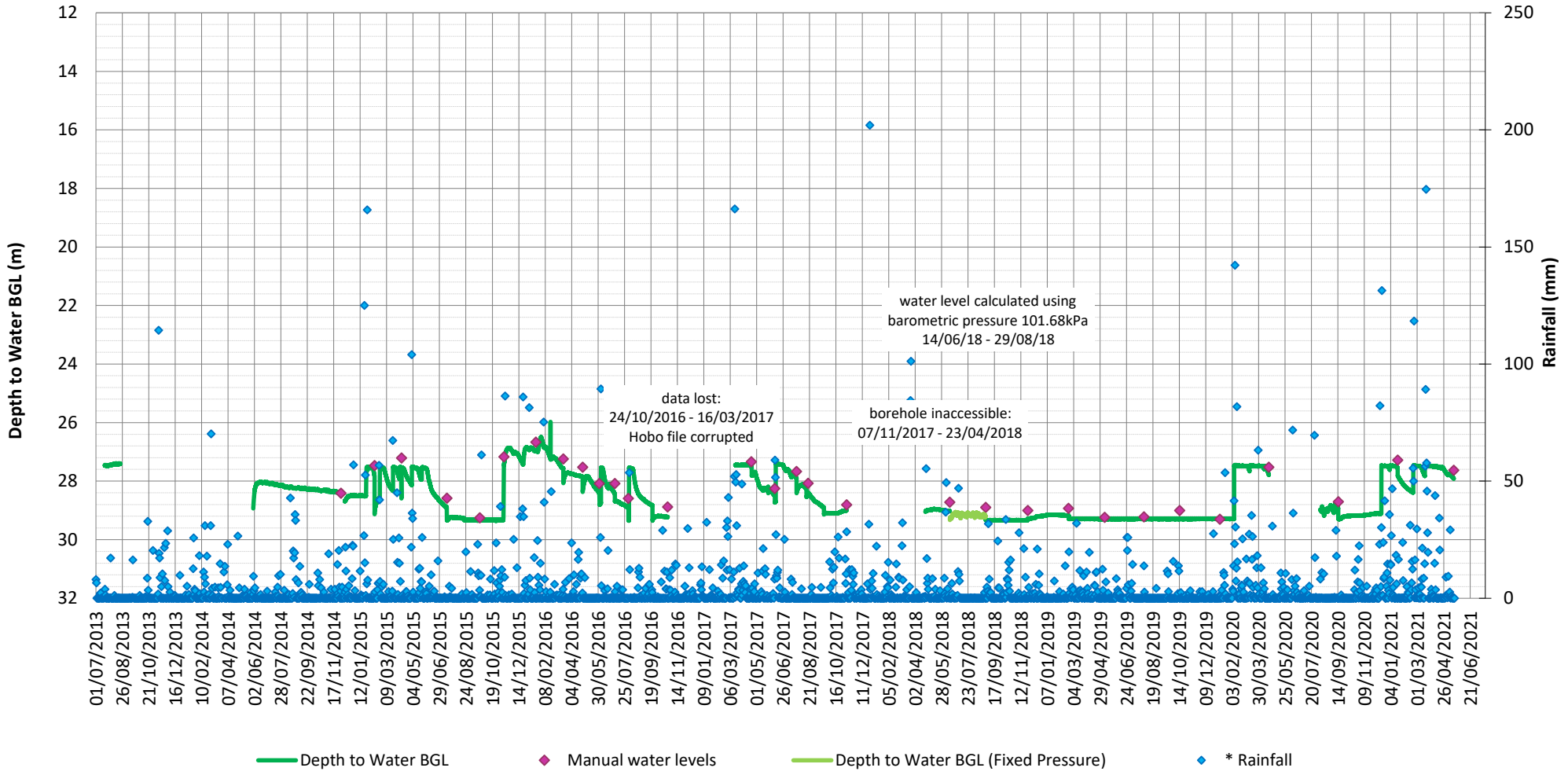
Drawn	**NS**	Transport for NSW Roads & Maritime Services	Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262194	
			BH ID	**D-BH3106**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-16**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW27 (D-BH3102) Water Level BGL



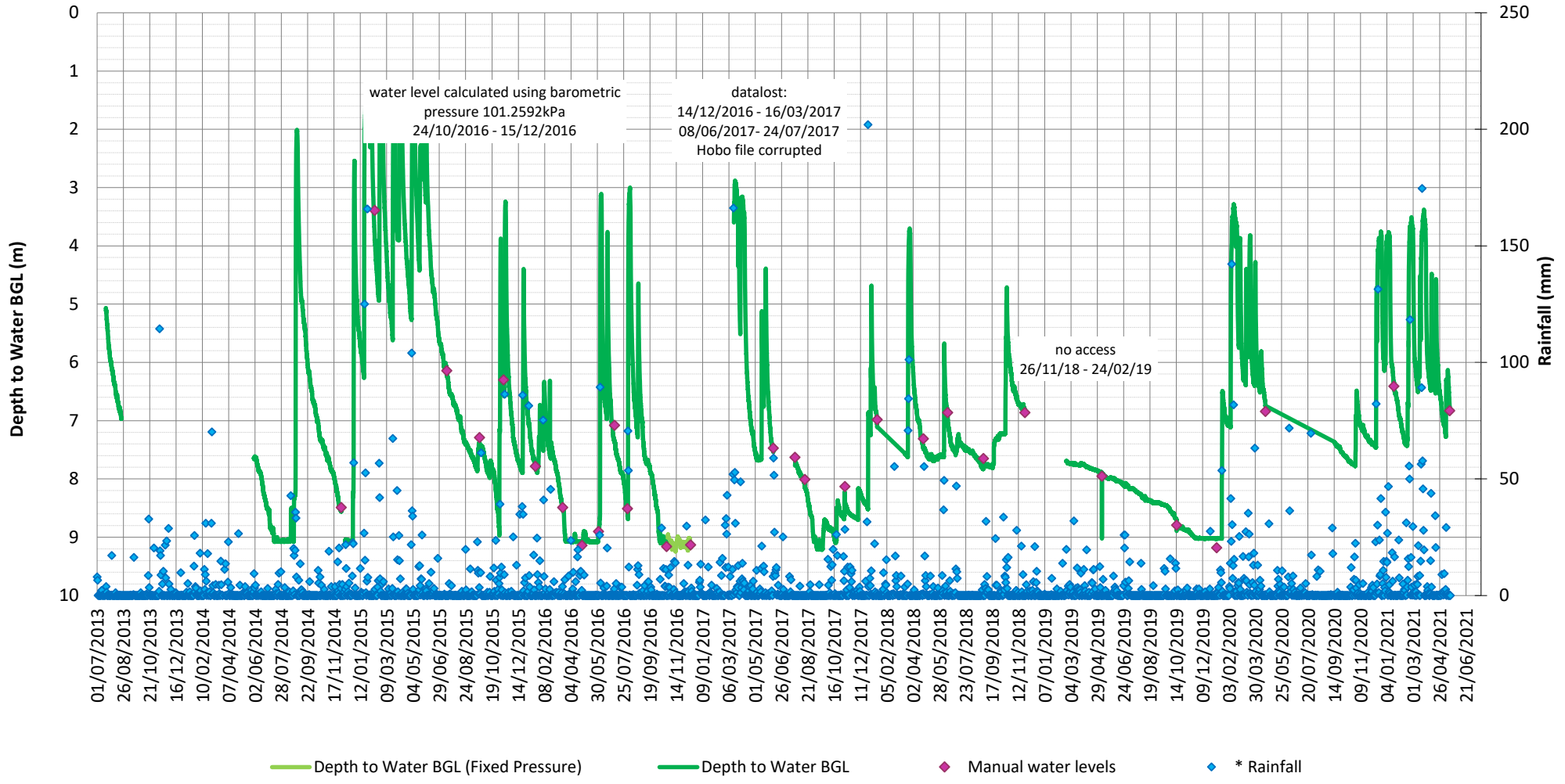
Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262200	
			BH ID	**D-BH3102**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-17**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW29 (D-BH3104) Water Level BGL



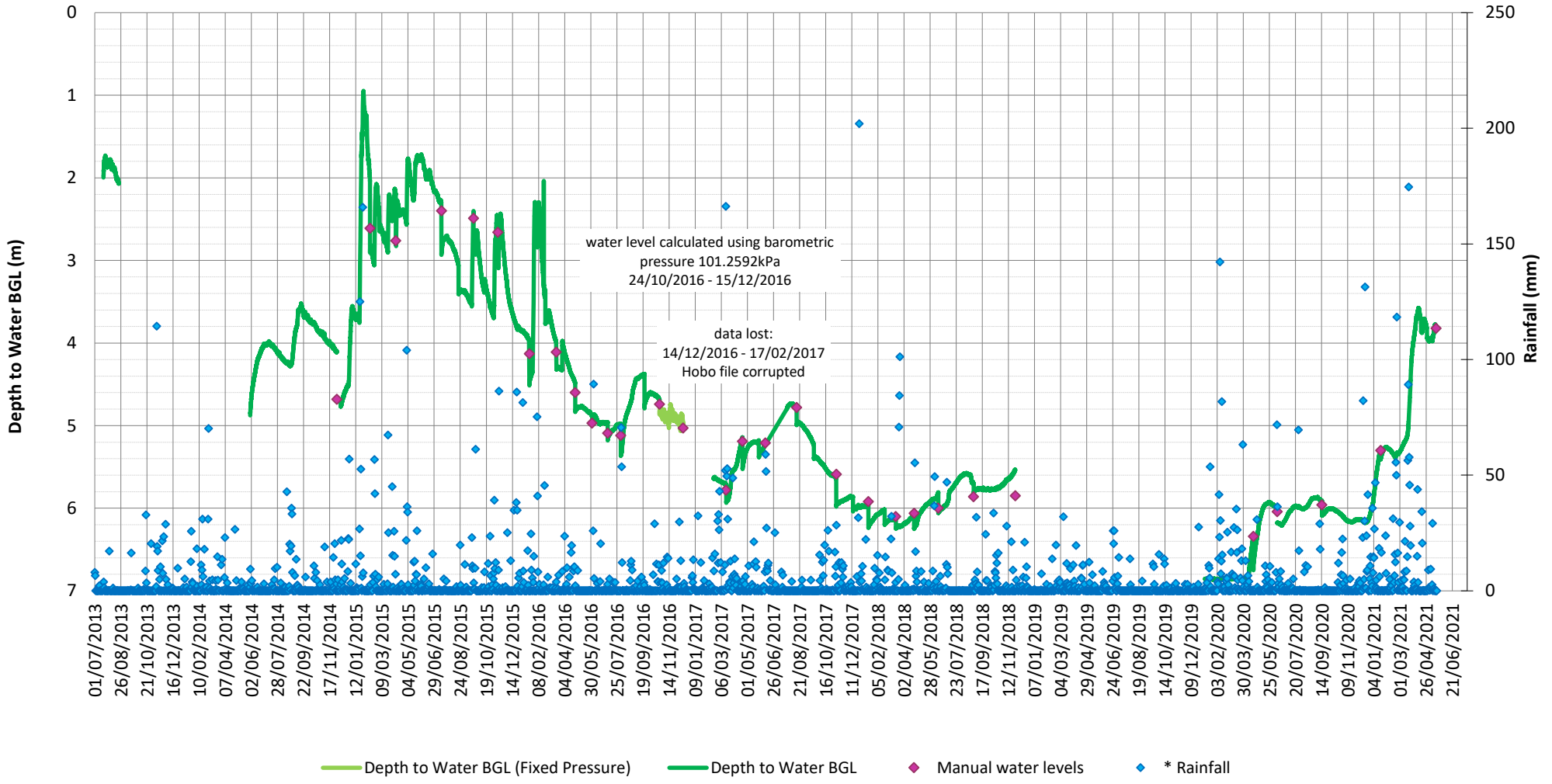
Drawn	**NS**		Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262201	
			BH ID	**D-BH3104**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-19**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2019)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW30 (D-BH3105) Water Level BGL



Drawn	**NS**		Client	**TfNSW**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262193	
			BH ID	**D-BH3105**	
Date	**20/05/2021**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-20**

Groundwater sample taken at time of manual water levels BGL = below ground level (existing)

* Rainfall data sourced from Bureau of Meteorology (BoM) Port Macquarie Airport AWS (Stn 060139, BoM, 2018)

Appendix E – Cumulative construction groundwater results

Table 1 Cumulative construction groundwater quality monitoring results by borehole

Parameter	Unit	LOR	GW01 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	2.51	0.1						54.6	<0.01	<0.01	4.93	<0.01	<0.01
Dissolved Arsenic	mg/L	0.001	0.008	0.002						0.016	<0.001	<0.001	0.004	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001						0.0288	0.0034	0.0031	0.0042	0.0032	0.0038
Dissolved Chromium	mg/L	0.001	<0.001	<0.001						0.068	<0.001	<0.001	0.017	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.037	0.009						0.379	0.003	0.001	0.031	0.026	0.016
Total Iron	mg/L	0.05	2.27	1.8						75.2	16.7	16	7.59	1.91	2.46
Dissolved Lead	mg/L	0.001	0.026	0.002						0.047	<0.001	<0.001	0.006	<0.001	<0.001
Total Manganese	mg/L	0.001	0.247	0.052						1.81	1.02	1.33	1.16	1.3	1.19
Mercury	mg/L	0.0001	<0.00001	0.00001											<0.0001
Dissolved Nickel	mg/L	0.001	0.025	0.005						0.036	0.02	0.008	0.01	0.033	0.013
Dissolved Silver	mg/L	0.001	<0.001	<0.001						<0.001	<0.001	0.002	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.347	0.118						0.398	0.045	0.041	0.114	0.227	0.123
EC laboratory	uS/cm		4400	2170						8050	7650	8500	7690	7860	7820
Total Nitrogen	mg/L		0.38	0.5											1
Total Phosphorus	mg/L		0.05	0.07											0.05
Ammonia	mg/L		0.02	<0.02											0.08
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		7	13											125
Chloride	mg/L		1307	489											1990
Nitrate			0.08	0.25						0.24	0.32	0.27	0.97	0.06	0.52
Sulphate	mg/L		159	274											76
Calcium	mg/L		4.41	1.28											6
Magnesium	mg/L		87.4	21.7											231
Potassium	mg/L		5.78	3.2											1120
Sodium	mg/L		692	370											11

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW01 groundwater monitoring bore destroyed by construction prior to April 2015 sampling event. Re-installation prior to August 2016 monitoring event.

Table 2 Cumulative construction groundwater quality monitoring results by borehole

Parameter	Unit	LOR	GW01 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	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
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	0.0027	0.0023	0.0026	0.0019	0.0023	0.0024	0.0024	0.0043	0.0034	0.0031	0.0022	0.0027	0.0024
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.025	0.011	0.054	0.037	0.023	0.002	0.007	0.025	0.019	0.016	0.011	0.023	0.040
Total Iron	mg/L	0.05	2.73	3.79	5.25	2.32	4.84	4.66	3.70	2.49	4.90	4.46	0.80	3.44	4.00
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	1.04	0.958	1.09	1.14	0.876	0.927	0.991	0.747	1.05	0.982	1.16	0.636	0.853
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.007	0.007	0.007	0.006	0.007	0.006	0.008	0.008	0.008	0.012	0.006	0.015	0.010
Dissolved Silver	mg/L	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.313	0.110	0.087	0.134	0.057	0.076	0.131	0.067	0.090	0.235	0.142	0.151	0.144
EC laboratory	uS/cm		7990	7340	7120	7080	7640	7550	7340	7880	7470	7730	7640	7520	7750
Total Nitrogen	mg/L		0.4	0.4	0.5	0.8	2.6	0.4	0.9	0.6	0.8	1.4	0.7	0.9	1.1
Total Phosphorus	mg/L		0.05	0.05	0.10	0.03	0.06	0.08	0.10	0.08	0.09	0.07	0.07	0.03	0.10
Ammonia	mg/L		0.10	0.09	0.06	0.15	0.22	0.03	0.06	0.12	0.21	0.84	0.32	0.18	0.22
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						103								
Chloride	mg/L						2420					2400			
Nitrate			0.12	0.04	0.04	0.60	2.13	0.10	0.04	0.09	0.15	0.10	0.06	0.10	0.60
Sulphate	mg/L						117					96			
Calcium	mg/L						6					9			
Magnesium	mg/L						217					250			
Potassium	mg/L						12					12			
Sodium	mg/L						1050					1200			

Table 3 Cumulative construction groundwater quality monitoring results by borehole

Parameter	Unit	LOR	GW01 May 21	Results											
Dissolved Aluminium	mg/L	0.01	<0.01												
Dissolved Arsenic	mg/L	0.001	0.001												
Dissolved Cadmium	mg/L	0.0001	0.0038												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.003												
Total Iron	mg/L	0.05	29.7												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	1.60												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.008												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.089												
EC laboratory	uS/cm		7640												
Total Nitrogen	mg/L		2.2												
Total Phosphorus	mg/L		0.44												
Ammonia	mg/L		0.46												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		123												
Chloride	mg/L		2490												
Nitrate			0.06												
Sulphate	mg/L		91												
Calcium	mg/L		6												
Magnesium	mg/L		239												
Potassium	mg/L		13												
Sodium	mg/L		1200												

Table 4 Cumulative construction groundwater quality monitoring results by borehole

Parameter	Unit	LOR	GW02 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	<0.01	0.03	0.01	17.2	18.6				0.01	<0.01	1.2		
Dissolved Arsenic	mg/L	0.001	0.003	<0.001	<0.001	0.007	0.007				<0.001	<0.001	<0.001		
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0032	0.0003				0.0001	<0.0001	<0.0001		
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	0.011	0.014				<0.001	<0.001	0.005		
Dissolved Copper	mg/L	0.001	0.001	0.004	0.003	0.069	0.071				0.004	0.002	0.01		
Total Iron	mg/L	0.05	15.9	8.65	31.9	15.7	21.4				4.1	1.3	1.81		
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.009	0.099				<0.001	<0.001	<0.001		
Total Manganese	mg/L	0.001	0.477	0.088	0.073	0.216	0.312				0.543	0.077	0.077		
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001										
Dissolved Nickel	mg/L	0.001	0.003	0.004	0.003	0.009	0.012				0.013	0.002	0.003		
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001	<0.001	<0.001		
Dissolved Zinc	mg/L	0.005	0.007	0.026	0.012	0.050	0.081				0.062	0.017	0.041		
EC laboratory	uS/cm		345	178	231	852	914				969	550	627		
Total Nitrogen	mg/L		2.7	1.0	0.48										
Total Phosphorus	mg/L		0.37	0.23	0.35										
Ammonia	mg/L		1.54	0.12	0.02										
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		123	34	23										
Chloride	mg/L		27	24	52										
Nitrate			0.11	0.04	0.07	0.26	3.96				5.88	0.33	0.16		
Sulphate	mg/L		7.7	8.4											
Calcium	mg/L		14.8	6.07	8.57										
Magnesium	mg/L		9.62	4.01	5.82										
Potassium	mg/L		4.09	1.89	7.53										
Sodium	mg/L		36.5	21.5	32.9										

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW02 groundwater monitoring bore destroyed by construction prior to January 2016 sampling event. The monitoring bore was reinstated in September 2016, but later destroyed prior to November 2017 sampling event.

Table 5 Cumulative construction groundwater quality monitoring results by borehole

Parameter	Unit	LOR	GW03 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	<0.01	0.02	<0.01	0.24	1.44	<0.01	0.35	1.72	<0.01	<0.01	0.64	0.18	0.07
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	0.006	0.002	<0.001	<0.001	0.007	<0.001	<0.001	0.008	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0002	<0.0001	0.0001	0.0023	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.005	0.005	0.005	0.010	0.022	0.001	0.027	0.011	0.004	0.003	0.015	0.011	0.012
Total Iron	mg/L	0.05	35.7	11.3	3.73	17.4	4.92	7.97	1.88	29.7	21.7	5.82	26.6	7.88	3.35
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.085	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	1.13	0.947	0.141	1.34	0.311	1.22	0.647	1.76	1.47	0.462	0.936	0.127	0.191
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001	0.012	0.013	0.007	0.017	0.013	0.017	0.022	0.026	0.045	0.012	0.024	0.012	0.014
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.01	0.019	0.015	0.028	0.028	0.013	0.085	0.044	0.04	0.006	0.041	0.041	0.061
EC laboratory	uS/cm		1290	939	519	1040	725	1080	1420	1460	1700	1300	1580	742	666
Total Nitrogen	mg/L		0.7	0.6	0.59			0.5							1.8
Total Phosphorus	mg/L		0.37	0.11	0.14			0.07							0.11
Ammonia	mg/L		0.17	0.10	0.02			0.02							0.08
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		147	118	120			96							83
Chloride	mg/L		254	163	74			226							76
Nitrate			0.02	0.02	<0.01	0.22	0.03	0.10	0.03	0.12	0.03	0.12	0.04	0.09	0.65
Sulphate	mg/L		102	80				85							108
Calcium	mg/L		30.8	27.4	42.1			36							44
Magnesium	mg/L		39.9	24.5	15.4			38							18
Potassium	mg/L		3.49	2.93	2.47			1							47
Sodium	mg/L		164	105	38.6			127							3

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Table 6 Cumulative construction groundwater quality monitoring results by borehole

Parameter	Unit	LOR	GW03 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20				
Dissolved Aluminium	mg/L	0.01	<0.01												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.001												
Total Iron	mg/L	0.05	9.05												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.234												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.009												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.029												
EC laboratory	uS/cm		852												
Total Nitrogen	mg/L		1.5												
Total Phosphorus	mg/L		0.11												
Ammonia	mg/L		0.10												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L														
Nitrate			0.28												
Sulphate	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Potassium	mg/L														
Sodium	mg/L														

Note – GW03 groundwater monitoring bore destroyed by construction prior to June 2018 sampling event.

Table 7 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW04 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 15	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	<0.01	0.01	<0.01					86.7					
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	0.001					0.059					
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001					0.0004					
Dissolved Chromium	mg/L	0.001	0.001	0.002	0.002					0.17					
Dissolved Copper	mg/L	0.001	0.005	0.002	0.003					0.152					
Total Iron	mg/L	0.05	106	28.6	24.4					173					
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001					0.07					
Total Manganese	mg/L	0.001	0.632	0.409	0.486					1.58					
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001										
Dissolved Nickel	mg/L	0.001	0.002	0.004	0.007					0.129					
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001					<0.001					
Dissolved Zinc	mg/L	0.005	<0.005	0.017	0.016					1.73					
EC laboratory	uS/cm		4190	3050	3170					1130					
Total Nitrogen	mg/L		1.5	0.9	0.88										
Total Phosphorus	mg/L		0.52	0.11	0.12										
Ammonia	mg/L		0.34	0.16	0.13										
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		319	176	206										
Chloride	mg/L		1148	858	900										
Nitrate			0.01	0.01	0.04					0.04					
Sulphate	mg/L		44	29											
Calcium	mg/L		44.2	25.2	29.6										
Magnesium	mg/L		83.7	48.7	62.1										
Potassium	mg/L		21.8	11.2	10.4										
Sodium	mg/L		627	456	506										

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW04 groundwater monitoring bore destroyed by construction prior to July 2015 sampling event. Re-installed prior to August 2016 monitoring event. There was no access to the borehole between September 2017 and April 2018.

Table 8 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW04 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	<0.01	0.04	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.001	0.005	0.002	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	0.003	0.003	0.013
Total Iron	mg/L	0.05	54.4	14.9	112	66.3	292	30.4	90.6	78.6	112	33.8	24.0	79.8	19.4
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.623	0.203	0.671	0.377	2.35	1.04	0.897	0.896	1.37	0.560	0.113	0.227	0.388
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.009	0.006	0.008	0.008	0.004	0.009	0.006	0.007	0.001	0.010	0.005	0.005	0.008
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.792	0.425	0.410	0.392	0.105	0.014	0.083	0.037	0.089	0.086	0.076	0.124	0.333
EC laboratory	uS/cm		1800	758	1180	578	3400	8900	2450	2940	4330	1270	562	840	914
Total Nitrogen	mg/L		1.4	2.6	5.3	1.1	15.0	10.5	3.5	5.3	11.8	1.9	2.5	2.8	1.5
Total Phosphorus	mg/L		0.24	0.38	1.36	0.44	3.43	1.37	1.22	1.00	3.32	0.66	0.82	1.47	0.38
Ammonia	mg/L		1.01	0.08	0.80	0.26	1.45	6.16	0.79	1.19	1.19	0.31	0.07	0.79	0.15
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						233								
Chloride	mg/L						1030					246			
Nitrate			0.16	0.08	0.03	0.26	0.97	0.47	0.02	0.02	0.01	0.11	0.11	0.03	0.40
Sulphate	mg/L						102					111			
Calcium	mg/L						48					46			
Magnesium	mg/L						83					30			
Potassium	mg/L						16					4			
Sodium	mg/L						435					158			

Table 9 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW04 May 21	Results											
Dissolved Aluminium	mg/L	0.01	<0.01												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.003												
Total Iron	mg/L	0.05	15.9												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.367												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.006												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.222												
EC laboratory	uS/cm		635												
Total Nitrogen	mg/L		3.3												
Total Phosphorus	mg/L		0.56												
Ammonia	mg/L		0.10												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		101												
Chloride	mg/L		60												
Nitrate			0.02												
Sulphate	mg/L		129												
Calcium	mg/L		37												
Magnesium	mg/L		17												
Potassium	mg/L		2												
Sodium	mg/L		76												

Table 10 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW05 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 15	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.01	0.02	<0.01	6.72	1.28	<0.01		2.72					
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	0.005	0.003	0.001		0.003					
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0008	0.0005	<0.0001		0.0007					
Dissolved Chromium	mg/L	0.001	<0.001	0.001	<0.001	0.010	0.003	<0.001		0.005					
Dissolved Copper	mg/L	0.001	0.01	0.003	0.001	0.047	0.046	<0.001		0.05					
Total Iron	mg/L	0.05	111	66.2	59.4	69.3	46.8	92.7		64.6					
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.005	0.044	<0.001		0.002					
Total Manganese	mg/L	0.001	0.944	1.15	1.02	0.726	0.744	1.43		0.645					
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							
Dissolved Nickel	mg/L	0.001	0.004	0.012	0.008	0.008	0.003	0.017		0.006					
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001					
Dissolved Zinc	mg/L	0.005	0.015	0.020	0.022	0.055	0.039	0.040		0.055					
EC laboratory	uS/cm		7260	6910	6890	7320	7510	6590		7320					
Total Nitrogen	mg/L		3.1	1.8	1.42			2.7							
Total Phosphorus	mg/L		9.43	1.03	1.35			0.97							
Ammonia	mg/L		0.82		0.71			0.49							
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		558	397	460			245							
Chloride	mg/L		2494	1654	1500			1250							
Nitrate			0.10	0.07	0.1	0.26	0.17	0.12		0.62					
Sulphate	mg/L		2032	1305				1200							
Calcium	mg/L		96.6	148	161			179							
Magnesium	mg/L		281	228	268			247							
Potassium	mg/L		21.9	31	34.4			36							
Sodium	mg/L		999	914	1010			907							

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – There was no access to GW05 from November 2017 until after January 2018.

Table 11 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW05 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	<0.01	<0.01				<0.01	<0.01	0.36	0.13			<0.01	
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001				<0.001	<0.001	0.002	0.001			<0.001	
Dissolved Cadmium	mg/L	0.0001	<0.0001	<0.0001				<0.0001	<0.0001	0.0002	0.0003			<0.0001	
Dissolved Chromium	mg/L	0.001	<0.001	<0.001				<0.001	<0.001	<0.001	0.001			<0.001	
Dissolved Copper	mg/L	0.001	<0.001	<0.001				<0.001	<0.001	0.002	<0.001			<0.001	
Total Iron	mg/L	0.05	55.0	70.2				120	100	300	269			97.4	
Dissolved Lead	mg/L	0.001	<0.001	<0.001				<0.001	<0.001	<0.001	<0.001			<0.001	
Total Manganese	mg/L	0.001	0.819	1.01				1.35	1.87	2.97	2.76			2.18	
Mercury	mg/L	0.0001	<0.0001	<0.0001				<0.0001	<0.0001	<0.0001	<0.0001			<0.0001	
Dissolved Nickel	mg/L	0.001	0.006	0.004				0.001	0.007	0.111	0.061			0.009	
Dissolved Silver	mg/L	0.001	<0.001	<0.001				<0.001	<0.001	<0.001	0.002			<0.001	
Dissolved Zinc	mg/L	0.005	0.054	0.010				0.044	0.028	0.240	0.205			0.005	
EC laboratory	uS/cm		5610	7720				3890	14600	20700	20900			17900	
Total Nitrogen	mg/L		5.6	2.1				11.6	1.6	3.1	3.9			18.0	
Total Phosphorus	mg/L		0.61	2.19				2.99	0.33	2.38	1.45			3.08	
Ammonia	mg/L		4.38	0.76				1.28	0.65	2.87	0.49			1.73	
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L														
Nitrate			0.21	0.03				0.15	0.02	0.09	0.04			0.02	
Sulphate	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Potassium	mg/L														
Sodium	mg/L														

Note – There was insufficient water to sample in August and November 2018. There was no access during April and September 2020, and again in January 2021.

Table 12 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW05	Results											
			May 21												
Dissolved Aluminium	mg/L	0.01	0.01												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	<0.001												
Total Iron	mg/L	0.05	270												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	2.38												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.024												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.404												
EC laboratory	uS/cm		15000												
Total Nitrogen	mg/L		4.3												
Total Phosphorus	mg/L		0.81												
Ammonia	mg/L		2.08												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		89												
Chloride	mg/L		4540												
Nitrate			<0.50												
Sulphate	mg/L		1050												
Calcium	mg/L		233												
Magnesium	mg/L		461												
Potassium	mg/L		54												
Sodium	mg/L		2380												

Note – There was insufficient water to sample in August and November 2018.

Table 13 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW06 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 15	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01								39.9	19.3	17	35.2	21.6	20.4
Dissolved Arsenic	mg/L	0.001								0.024	0.018	0.01	0.012	0.013	0.011
Dissolved Cadmium	mg/L	0.0001								0.0002	0.0004	0.0002	0.0002	0.0003	0.0005
Dissolved Chromium	mg/L	0.001								0.013	0.001	<0.001	0.008	<0.001	<0.001
Dissolved Copper	mg/L	0.001								0.028	0.048	0.118	0.036	0.054	0.056
Total Iron	mg/L	0.05								27	24.1	15.7	16	12.9	7.25
Dissolved Lead	mg/L	0.001								0.093	0.032	0.023	0.134	0.1	0.093
Total Manganese	mg/L	0.001								0.861	0.56	0.582	0.56	0.568	0.531
Mercury	mg/L	0.0001													<0.0001
Dissolved Nickel	mg/L	0.001								0.028	0.032	0.027	0.034	0.034	0.027
Dissolved Silver	mg/L	0.001								<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005								0.479	0.488	0.447	0.542	0.563	0.581
EC laboratory	uS/cm									5810	6340	7090	7000	7090	7060
Total Nitrogen	mg/L														0.4
Total Phosphorus	mg/L														0.02
Ammonia	mg/L														0.08
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														<1
Chloride	mg/L														1790
Nitrate										0.03	0.12	0.03	0.02	0.07	0.18
Sulphate	mg/L														9
Calcium	mg/L														7
Magnesium	mg/L														183
Potassium	mg/L														950
Sodium	mg/L														9

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW06 had insufficient water to collect a sample during December 2014 and believed destroyed soon after. Monitoring borehole reinstalled prior to August 2016 monitoring event.

Table 14 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW06 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	17.5	17.9	17.4	20.8	15.4	7.08	12.2	11.6	0.08	<0.01	<0.01	0.01	<0.01
Dissolved Arsenic	mg/L	0.001	0.010	0.010	0.009	0.010	0.009	0.004	0.007	0.007	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0001	0.0003	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.041	0.050	0.065	0.088	0.043	0.027	0.019	0.043	<0.001	<0.001	0.004	0.006	0.002
Total Iron	mg/L	0.05	13.5	2.18	8.81	5.80	14.5	5.47	3.82	7.51	23.6	14.6	0.61	13.7	25.4
Dissolved Lead	mg/L	0.001	0.080	0.089	0.085	0.094	0.093	0.019	0.063	0.058	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.488	0.426	0.450	0.382	0.425	0.200	0.335	0.328	0.214	0.268	0.129	0.013	0.164
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.025	0.026	0.024	0.027	0.025	0.011	0.019	0.019	0.002	0.002	0.002	0.002	0.001
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.561	0.538	0.455	0.517	0.510	0.339	0.418	0.441	0.353	0.244	0.133	0.045	0.208
EC laboratory	uS/cm		7070	6480	6600	6630	6660	4480	5700	5800	1680	1540	1510	798	314
Total Nitrogen	mg/L		0.1	0.4	0.6	0.1	1.6	0.8	0.3	0.7	1.9	3.5	1.4	1.9	2.1
Total Phosphorus	mg/L		0.02	0.05	0.14	0.01	0.12	0.11	0.05	0.08	0.57	0.72	0.40	0.10	0.27
Ammonia	mg/L		0.13	0.04	0.05	0.01	0.09	0.07	0.01	0.07	0.03	0.03	0.02	0.06	0.04
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						<1								
Chloride	mg/L						2150					423			
Nitrate			0.10	0.10	0.07	0.13	1.12	0.23	0.08	0.11	0.01	0.08	0.53	0.10	0.06
Sulphate	mg/L						7					33			
Calcium	mg/L						6					14			
Magnesium	mg/L						166					10			
Potassium	mg/L						9					2			
Sodium	mg/L						891					265			

Table 15 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW06	Results											
			May 21												
Dissolved Aluminium	mg/L	0.01	0.02												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	0.0002												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	<0.001												
Total Iron	mg/L	0.05	34.9												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.274												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.001												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.011												
EC laboratory	uS/cm		323												
Total Nitrogen	mg/L		3.9												
Total Phosphorus	mg/L		0.81												
Ammonia	mg/L		0.04												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		156												
Chloride	mg/L		21												
Nitrate			0.02												
Sulphate	mg/L		7												
Calcium	mg/L		13												
Magnesium	mg/L		4												
Potassium	mg/L		2												
Sodium	mg/L		75												

Table 16 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW07 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01		0.2	0.08		71.7	1.70			0.13	0.76	6.81		0.07
Dissolved Arsenic	mg/L	0.001		<0.001	<0.001		0.012	<0.001			<0.001	<0.001	0.003		<0.001
Dissolved Cadmium	mg/L	0.0001		<0.001	<0.001		0.0004	<0.0001			<0.0001	<0.0001	<0.0001		0.0002
Dissolved Chromium	mg/L	0.001		0.002	<0.001		0.042	0.002			<0.001	<0.001	0.006		0.001
Dissolved Copper	mg/L	0.001		0.001	0.004		7.39	0.020			2	0.026	0.458		17.6
Total Iron	mg/L	0.05		26.7	13.2		31.3	7.07			12.7	4.02	3.88		51.1
Dissolved Lead	mg/L	0.001		<0.001	<0.001		0.154	<0.001			<0.001	<0.001	0.005		<0.001
Total Manganese	mg/L	0.001		0.124	0.125		0.254	0.030			0.072	0.052	0.037		0.218
Mercury	mg/L	0.0001		<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001		0.002	<0.001		0.024	<0.001			0.002	0.001	0.003		0.006
Dissolved Silver	mg/L	0.001		<0.001	<0.001		<0.001	<0.001			<0.001	<0.001	<0.001		<0.001
Dissolved Zinc	mg/L	0.005		0.005	0.011		0.174	0.106			0.029	0.016	0.1		0.14
EC laboratory	uS/cm			212	238		184	169			182	226	225		272
Total Nitrogen	mg/L			0.7	0.45			0.7							7.9
Total Phosphorus	mg/L			0.16	0.22			0.10							1.45
Ammonia	mg/L			<0.02	0.01			<0.01							0.1
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$			36	45			16							15
Chloride	mg/L			35	38			32							59
Nitrate				<0.01	<0.01		<0.01	0.24			<0.01	0.13	0.1		<0.01
Sulphate	mg/L			9.5				8							10
Calcium	mg/L			22.6	10.2			1							2
Magnesium	mg/L			9.09	4.0			1							2
Potassium	mg/L			2.92	1.75			<1							28
Sodium	mg/L			30.8	46.3			32							<1

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW07 had insufficient water to collect a sample during December 2014, July 2015, April 16, August 2016 and November 2017 sampling events.

Table 17 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW07 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	0.12	0.02											0.02
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001											<0.001
Dissolved Cadmium	mg/L	0.0001	<0.0001	0.0002											<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001											<0.001
Dissolved Copper	mg/L	0.001	0.217	15.9											0.042
Total Iron	mg/L	0.05	1.50	15.7											0.86
Dissolved Lead	mg/L	0.001	<0.001	<0.001											<0.001
Total Manganese	mg/L	0.001	0.026	0.125											0.019
Mercury	mg/L	0.0001	<0.0001	<0.0001											<0.0001
Dissolved Nickel	mg/L	0.001	<0.001	0.006											0.001
Dissolved Silver	mg/L	0.001	<0.001	<0.001											<0.001
Dissolved Zinc	mg/L	0.005	0.025	0.206											0.032
EC laboratory	uS/cm		170	249											188
Total Nitrogen	mg/L		0.4	8.5											0.5
Total Phosphorus	mg/L		0.02	1.58											0.02
Ammonia	mg/L		0.06	0.06											0.03
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L														
Nitrate			0.18	<0.01											0.11
Sulphate	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Potassium	mg/L														
Sodium	mg/L														

Note – GW07 had insufficient water to collect samples from August 2018 until January 2021.

Table 18 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW07 May 21	Results											
Dissolved Aluminium	mg/L	0.01	0.02												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.045												
Total Iron	mg/L	0.05	1.94												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.020												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.002												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.095												
EC laboratory	uS/cm		150												
Total Nitrogen	mg/L		0.9												
Total Phosphorus	mg/L		0.06												
Ammonia	mg/L		0.02												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		12												
Chloride	mg/L		39												
Nitrate			0.09												
Sulphate	mg/L		5												
Calcium	mg/L		1												
Magnesium	mg/L		2												
Potassium	mg/L		<1												
Sodium	mg/L		28												

Table 19 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW08 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.02	0.12	1.21	72.9	20.5					1.04	39.4		0.95
Dissolved Arsenic	mg/L	0.001	0.001	<0.001	<0.001	0.028	0.004					0.002	0.01		0.001
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0024	0.0001					<0.0001	0.0001		<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	0.001	0.003	0.082	0.018					0.002	0.039		0.003
Dissolved Copper	mg/L	0.001	<0.001	0.004	0.002	0.114	0.082					0.003	0.059		0.01
Total Iron	mg/L	0.05	139	52.1	78.6	75.4	10.7					26.6	28.2		22.4
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.063	0.108					<0.001	0.024		<0.001
Total Manganese	mg/L	0.001	0.452	0.125	0.089	0.158	0.037					0.094	0.088		0.098
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001										<0.0001
Dissolved Nickel	mg/L	0.001	0.002	0.005	<0.001	0.015	0.003					0.001	0.012		0.003
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001					<0.001	<0.001		<0.001
Dissolved Zinc	mg/L	0.005	<0.005	0.063	0.017	0.291	0.074					0.03	0.374		0.117
EC laboratory	uS/cm			1530	435	528	730					639	786		780
Total Nitrogen	mg/L			1.6	2.90	0.06									6.2
Total Phosphorus	mg/L			0.27	0.55										0.52
Ammonia	mg/L			0.05	0.04										0.18
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$			37	26										31
Chloride	mg/L		264	400	120										202
Nitrate				0.02	0.02	0.06	0.02					0.11	0.03		0.07
Sulphate	mg/L		11	24											25
Calcium	mg/L		108	23.2	18.3										3
Magnesium	mg/L		50	22.8	12.0										4
Potassium	mg/L		17.2	9.61	8.88										141
Sodium	mg/L		229	264	72.3										1

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW08 had insufficient water to collect a sample during January, April, August 2016 and November 2017 sampling events.

Table 20 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW08 Results											
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01		5.15				15.8				1.00			0.57
Dissolved Arsenic	mg/L	0.001		0.002				0.003				0.002			0.001
Dissolved Cadmium	mg/L	0.0001		<0.0001				<0.0001				<0.0001			0.0001
Dissolved Chromium	mg/L	0.001		0.007				0.012				0.003			0.002
Dissolved Copper	mg/L	0.001		0.016				0.013				0.007			0.025
Total Iron	mg/L	0.05		13.2				14.2				9.02			6.77
Dissolved Lead	mg/L	0.001		0.002				0.003				0.001			<0.001
Total Manganese	mg/L	0.001		0.083				0.223				0.085			0.078
Mercury	mg/L	0.0001		<0.0001				<0.0001				<0.0001			<0.0001
Dissolved Nickel	mg/L	0.001		0.008				0.005				0.006			0.005
Dissolved Silver	mg/L	0.001		<0.001				<0.001				<0.001			<0.001
Dissolved Zinc	mg/L	0.005		0.398				0.079				0.065			0.093
EC laboratory	uS/cm			1040				749				920			878
Total Nitrogen	mg/L			6.8				11.1				5.1			8.4
Total Phosphorus	mg/L			0.53				0.99				0.54			0.98
Ammonia	mg/L			0.56				0.36				0.69			6.97
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L											251			
Nitrate				0.13				0.19				0.02			0.30
Sulphate	mg/L											16			
Calcium	mg/L											4			
Magnesium	mg/L											5			
Potassium	mg/L											1			
Sodium	mg/L											166			

Note – GW08 had insufficient water to collect a sample during April, August and November 2018, February, May and July 2019, January, June and September 2020, and May 2021 sampling events.

Table 21 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW08 May 21		Results										
Dissolved Aluminium	mg/L	0.01													
Dissolved Arsenic	mg/L	0.001													
Dissolved Cadmium	mg/L	0.0001													
Dissolved Chromium	mg/L	0.001													
Dissolved Copper	mg/L	0.001													
Total Iron	mg/L	0.05													
Dissolved Lead	mg/L	0.001													
Total Manganese	mg/L	0.001													
Mercury	mg/L	0.0001													
Dissolved Nickel	mg/L	0.001													
Dissolved Silver	mg/L	0.001													
Dissolved Zinc	mg/L	0.005													
EC laboratory	uS/cm														
Total Nitrogen	mg/L														
Total Phosphorus	mg/L														
Ammonia	mg/L														
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L														
Nitrate															
Sulphate	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Potassium	mg/L														
Sodium	mg/L														

Table 22 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW09 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01												0.31	
Dissolved Arsenic	mg/L	0.001												<0.001	
Dissolved Cadmium	mg/L	0.0001												<0.0001	
Dissolved Chromium	mg/L	0.001												<0.001	
Dissolved Copper	mg/L	0.001												0.001	
Total Iron	mg/L	0.05												2.69	
Dissolved Lead	mg/L	0.001												<0.001	
Total Manganese	mg/L	0.001												0.038	
Mercury	mg/L	0.0001													
Dissolved Nickel	mg/L	0.001												<0.001	
Dissolved Silver	mg/L	0.001												<0.001	
Dissolved Zinc	mg/L	0.005												0.029	
EC laboratory	uS/cm													501	
Total Nitrogen	mg/L														
Total Phosphorus	mg/L														
Ammonia	mg/L														
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L														
Nitrate														3.36	
Sulphate	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Potassium	mg/L														
Sodium	mg/L														

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW09 groundwater monitoring bore destroyed by construction following the July 2015 sampling event. Prior to this, the bore contained insufficient water to obtain a sample. Re-installation undertaken prior to August 2016 monitoring event, however the site was not accessible due to construction or dry until November 2017. There was no access to the borehole again in January 2018.

Table 23 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW09 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01		2.15				0.74							0.07
Dissolved Arsenic	mg/L	0.001		0.002				0.001							0.001
Dissolved Cadmium	mg/L	0.0001		<0.0001				<0.0001							<0.0001
Dissolved Chromium	mg/L	0.001		0.002				0.001							<0.001
Dissolved Copper	mg/L	0.001		0.001				0.002							0.008
Total Iron	mg/L	0.05		157				18.3							9.06
Dissolved Lead	mg/L	0.001		<0.001				<0.001							<0.001
Total Manganese	mg/L	0.001		0.547				0.091							0.245
Mercury	mg/L	0.0001		<0.0001				<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001		0.001				0.003							0.002
Dissolved Silver	mg/L	0.001		<0.001				<0.001							<0.001
Dissolved Zinc	mg/L	0.005		0.150				0.185							0.307
EC laboratory	uS/cm			519				351							521
Total Nitrogen	mg/L			16.2				3.3							2.7
Total Phosphorus	mg/L			3.75				0.62							0.25
Ammonia	mg/L			0.24				0.33							0.09
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L														
Nitrate				0.35				0.53							0.10
Sulphate	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Potassium	mg/L														
Sodium	mg/L														

Note – GW09 had insufficient water to collect a sample on a number of occasions since April 2018.

Table 24 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW09	Results											
			May 21												
Dissolved Aluminium	mg/L	0.01	0.14												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.006												
Total Iron	mg/L	0.05	28.6												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.084												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.002												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.407												
EC laboratory	uS/cm		390												
Total Nitrogen	mg/L		4.0												
Total Phosphorus	mg/L		0.83												
Ammonia	mg/L		0.04												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		61												
Chloride	mg/L		72												
Nitrate			0.04												
Sulphate	mg/L		31												
Calcium	mg/L		11												
Magnesium	mg/L		3												
Potassium	mg/L		<1												
Sodium	mg/L		74												

Note – GW09 had insufficient water to collect a sample on a number of occasions since April 2018.

Table 25 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW10 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.17	0.54	0.80									0.52	
Dissolved Arsenic	mg/L	0.001	0.002	0.004	0.007									<0.001	
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001									<0.0001	
Dissolved Chromium	mg/L	0.001	0.002	0.004	0.005									<0.001	
Dissolved Copper	mg/L	0.001	0.087	0.014	0.112									0.017	
Total Iron	mg/L	0.05	74.1	23.8	75.4									0.54	
Dissolved Lead	mg/L	0.001	<0.001	0.001	0.002									<0.001	
Total Manganese	mg/L	0.001	0.22	0.15	0.271									0.026	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001										
Dissolved Nickel	mg/L	0.001	0.003	0.003	0.003									0.005	
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001									<0.001	
Dissolved Zinc	mg/L	0.005	0.007	0.018	0.028									0.072	
EC laboratory	uS/cm			419	590									1200	
Total Nitrogen	mg/L			0.8	2.11										
Total Phosphorus	mg/L			0.09	0.55										
Ammonia	mg/L			<0.02	0.01										
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		71	15	52										
Chloride	mg/L		70	106	150										
Nitrate				<0.01	<0.01									0.24	
Sulphate	mg/L		5.5	7											
Calcium	mg/L		28.6	9.38	17.5										
Magnesium	mg/L		10.9	7.11	16.4										
Potassium	mg/L		5.64	3.9	9.59										
Sodium	mg/L		66.1	63.4	107										

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW10 groundwater monitoring bore destroyed by construction prior to July 2015 sampling event. Re-installation completed prior to August 2016 monitoring event. However, there has generally been insufficient water to collect samples other than during November 2017.

Table 26 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW10 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01		0.08								0.15	0.26		0.48
Dissolved Arsenic	mg/L	0.001		<0.001								0.001	<0.001		<0.001
Dissolved Cadmium	mg/L	0.0001		<0.0001								<0.0001	<0.0001		<0.0001
Dissolved Chromium	mg/L	0.001		<0.001								0.003	0.001		0.001
Dissolved Copper	mg/L	0.001		0.004								0.002	0.008		0.010
Total Iron	mg/L	0.05		8.01								29.1	0.72		4.67
Dissolved Lead	mg/L	0.001		<0.001								<0.001	<0.001		<0.001
Total Manganese	mg/L	0.001		0.139								0.396	0.036		0.053
Mercury	mg/L	0.0001		<0.0001								<0.0001	<0.0001		<0.0001
Dissolved Nickel	mg/L	0.001		0.004								0.003	<0.001		0.003
Dissolved Silver	mg/L	0.001		<0.001								<0.001	<0.001		<0.001
Dissolved Zinc	mg/L	0.005		0.589								0.230	0.030		0.049
EC laboratory	uS/cm			1560								914	331		410
Total Nitrogen	mg/L			2.9								9.4	0.6		0.9
Total Phosphorus	mg/L			0.39								1.17	0.07		0.04
Ammonia	mg/L			0.06								1.32	0.04		0.07
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L											263			
Nitrate				0.17								0.01	0.03		0.11
Sulphate	mg/L											2			
Calcium	mg/L											13			
Magnesium	mg/L											11			
Potassium	mg/L											1			
Sodium	mg/L											137			

Note – GW10 had insufficient water to collect a sample on a number of occasions since April 2018.

Table 27 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW10 May 21	Results											
Dissolved Aluminium	mg/L	0.01	0.47												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	0.003												
Dissolved Copper	mg/L	0.001	0.014												
Total Iron	mg/L	0.05	6.74												
Dissolved Lead	mg/L	0.001	0.001												
Total Manganese	mg/L	0.001	0.048												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.002												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.079												
EC laboratory	uS/cm		314												
Total Nitrogen	mg/L		1.4												
Total Phosphorus	mg/L		0.16												
Ammonia	mg/L		0.02												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		6												
Chloride	mg/L		91												
Nitrate			<0.01												
Sulphate	mg/L		4												
Calcium	mg/L		2												
Magnesium	mg/L		4												
Potassium	mg/L		<1												
Sodium	mg/L		56												

Note – GW10 had insufficient water to collect a sample on a number of occasions since April 2018.

Table 28 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW11 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.96	0.01	0.01	0.62				2.24	0.04	0.04	1.08	0.29	0.08
Dissolved Arsenic	mg/L	0.001	0.003	<0.001	0.001	0.004				0.009	0.001	<0.001	0.002	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	0.002	<0.001	<0.001	0.0007				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	0.001	<0.001	0.002				0.007	<0.001	<0.001	0.002	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.126	0.039	0.018	0.039				0.018	0.041	0.003	0.023	0.008	0.002
Total Iron	mg/L	0.05	14	14.5	16.0	1.79				7.19	6.96	1.55	2.76	18.3	7.38
Dissolved Lead	mg/L	0.001	0.003	<0.001	<0.001	0.003				0.004	<0.001	<0.001	0.002	<0.001	<0.001
Total Manganese	mg/L	0.001	1.80	0.735	0.069	0.117				0.107	0.097	0.048	0.054	0.138	0.195
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001										<0.0001
Dissolved Nickel	mg/L	0.001	0.157	0.043	0.003	0.012				0.01	0.008	0.005	0.006	0.002	0.003
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.136	0.045	0.021	0.064				0.389	0.3	0.146	0.208	0.702	0.741
EC laboratory	uS/cm		8510	4370	1040	2390				1760	1760	1130	1290	547	474
Total Nitrogen	mg/L		0.7	--	0.56										7.8
Total Phosphorus	mg/L		0.10	0.03	0.075										0.89
Ammonia	mg/L		0.19	0.07	0.02										0.28
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		7	118	273										4
Chloride	mg/L		2076	966	140										89
Nitrate			0.02	0.01	<0.01	0.02				0.22	0.39	0.15	0.33	3.52	1.53
Sulphate	mg/L		1889	928											44
Calcium	mg/L		94.7	62.6	8.50										5
Magnesium	mg/L		272	103	9.14										6
Potassium	mg/L		14.1	12.6	6.05										67
Sodium	mg/L		1240	669	200										2

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW11 groundwater monitoring bore destroyed by construction following July 2015 sampling event. Re-installation completed prior to August 2016 monitoring event.

Table 29 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW11	Results										
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01		0.74	0.41	0.74	0.25	6.47	0.05	0.12	<0.01	0.16	<0.01	<0.01	0.14
Dissolved Arsenic	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.002	0.002	0.002	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001		<0.001	<0.001	0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001		0.007	0.039	0.028	0.002	0.006	0.006	<0.001	<0.001	<0.001	0.005	0.026	0.018
Total Iron	mg/L	0.05		11.2	7.96	10.4	8.39	14.6	4.10	170	775	18.7	11.1	12.4	16.8
Dissolved Lead	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001		0.080	0.050	0.082	0.030	0.042	0.025	0.244	1.47	0.225	0.130	0.063	0.122
Mercury	mg/L	0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001		0.002	0.002	0.003	0.002	0.003	0.003	0.001	0.003	0.003	0.002	0.002	0.004
Dissolved Silver	mg/L	0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005		0.608	0.191	0.573	0.259	0.208	0.134	0.479	0.079	0.013	0.294	0.378	1.11
EC laboratory	uS/cm			426	552	372	497	656	875	985	1430	528	628	628	313
Total Nitrogen	mg/L			2.2	0.8	1.7	2.7	2.3	0.7	15.1	83.9	7.8	2.4	1.5	9.7
Total Phosphorus	mg/L			0.18	0.12	0.06	0.42	0.44	0.09	3.47	19.8	0.69	0.37	0.17	0.49
Ammonia	mg/L			0.03	0.02	0.07	0.07	0.10	<0.01	0.07	0.60	2.83	0.32	0.16	0.08
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						21								
Chloride	mg/L						121					68			
Nitrate				0.75	0.05	0.98	0.26	0.03	0.08	0.07	<0.01	0.05	0.09	0.01	0.04
Sulphate	mg/L						60					1			
Calcium	mg/L						1					3			
Magnesium	mg/L						2					4			
Potassium	mg/L						1					2			
Sodium	mg/L						100					93			

Table 30 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW11		Results										
			May 21												
Dissolved Aluminium	mg/L	0.01	0.12												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.015												
Total Iron	mg/L	0.05	19.8												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.068												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.002												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.523												
EC laboratory	uS/cm		227												
Total Nitrogen	mg/L		2.6												
Total Phosphorus	mg/L		0.25												
Ammonia	mg/L		0.06												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		25												
Chloride	mg/L		37												
Nitrate			0.01												
Sulphate	mg/L		29												
Calcium	mg/L		1												
Magnesium	mg/L		1												
Potassium	mg/L		<1												
Sodium	mg/L		46												

Table 31 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW12 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.01	0.01	<0.01	2.33	2.54	<0.01	0.51		<0.01	0.06	2.48	<0.01	<0.01
Dissolved Arsenic	mg/L	0.001	0.004	0.003	0.002	0.077	0.024	0.004	0.028		0.001	0.01	0.102	0.001	0.007
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0005	0.0003	0.0001	0.0032		<0.0001	0.0002	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	0.006	0.003	<0.001	0.003		<0.001	0.003	0.005	<0.001	<0.001
Dissolved Copper	mg/L	0.001	<0.001	<0.001	<0.001	0.016	0.043	<0.001	0.381		<0.001	0.03	0.034	0.005	0.001
Total Iron	mg/L	0.05	344	191	169	135	74.6	101	49.2		130	69.4	238	197	130
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.003	0.069	<0.001	<0.001		<0.001	<0.001	0.002	<0.001	<0.001
Total Manganese	mg/L	0.001	8.61	4.85		4.97	3.79	4.75	3.74		4.81	6.7	8.41	7.06	6.78
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001	0.004	0.009	0.007	0.005	0.006	0.011	0.012		0.004	0.018	0.004	0.009	0.013
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.02	0.018	0.029	0.040	0.034	0.027	0.118		0.039	0.135	0.091	0.071	0.051
EC laboratory	uS/cm		4020	2860	2470	2600	1740	1510	1440		2140	2660	4680	3360	2490
Total Nitrogen	mg/L		3.8	2.0	1.08			3.0							2.4
Total Phosphorus	mg/L		0.70	0.20	0.15			0.14							0.07
Ammonia	mg/L		1.58	1.48	1.05			0.90							0.6
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		74	83	56			25							33
Chloride	mg/L		354	281	230			159							210
Nitrate			<0.01	<0.10*	<0.01	1.53	1.24	0.05	0.26		0.52	0.18	<0.01	0.16	0.11
Sulphate	mg/L		1865	1342				478							1110
Calcium	mg/L		64.2	68.3	62.3			29							53
Magnesium	mg/L		217	103	104			61							95
Potassium	mg/L		10.6	11.6	11.0			10							243
Sodium	mg/L		488	281	264			168							10

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW12 groundwater monitoring bore not accessible due to construction in August 2016.

Table 32 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW12		Results										
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20				
Dissolved Aluminium	mg/L	0.01	<0.01												
Dissolved Arsenic	mg/L	0.001	0.004												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.001												
Total Iron	mg/L	0.05	87.3												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	3.26												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.005												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.092												
EC laboratory	uS/cm		1640												
Total Nitrogen	mg/L		1.3												
Total Phosphorus	mg/L		0.07												
Ammonia	mg/L		0.48												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L														
Nitrate			0.36												
Sulphate	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Potassium	mg/L														
Sodium	mg/L														

Note – GW12 groundwater monitoring bore was permanently destroyed following April 2018 monitoring event.

Table 33 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW013 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.02	0.01						1.93	0.02	0.02			
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001						0.107	0.006	<0.001			
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001						<0.0001	<0.0001	<0.0001			
Dissolved Chromium	mg/L	0.001	<0.001	0.001						0.004	<0.001	<0.001			
Dissolved Copper	mg/L	0.001	0.004	0.003						0.007	0.004	<0.001			
Total Iron	mg/L	0.05	76.9	13.7						57.4	10.6	8.98			
Dissolved Lead	mg/L	0.001	<0.001	<0.001						0.002	<0.001	<0.001			
Total Manganese	mg/L	0.001	0.358	0.114						0.238	0.165	0.341			
Mercury	mg/L	0.0001	<0.00001	<0.00001											
Dissolved Nickel	mg/L	0.001	<0.001	0.001						0.003	<0.001	<0.001			
Dissolved Silver	mg/L	0.001	<0.001	<0.001						<0.001	<0.001	<0.001			
Dissolved Zinc	mg/L	0.005	0.007	0.014						0.043	0.03	0.058			
EC laboratory	uS/cm		300	247						209	238	299			
Total Nitrogen	mg/L		1.4	0.7											
Total Phosphorus	mg/L		4.21	0.33											
Ammonia	mg/L		0.38	0.23											
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		62	40											
Chloride	mg/L		39	24											
Nitrate			0.01	<0.01						0.09	0.41	0.19			
Sulphate	mg/L		22	34											
Calcium	mg/L		4.48	10.1											
Magnesium	mg/L		7	2.54											
Potassium	mg/L		3.89	2.8											
Sodium	mg/L		40.6	32.3											

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW13 groundwater monitoring bore destroyed by construction following February 2015 sampling event. Re-installation completed prior to August 2016 monitoring event. However, gain destroyed prior to July 2017 sampling event.

Table 34 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW013 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01				0.06	0.04	0.02	<0.01	0.04	0.02	0.02	0.01	<0.01	0.05
Dissolved Arsenic	mg/L	0.001				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001				<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001				0.010	0.002	<0.001	0.002	0.027	<0.001	<0.001	0.002	0.005	0.004
Total Iron	mg/L	0.05				6.34	4.93	4.92	4.96	6.64	7.01	8.98	6.25	6.71	10.6
Dissolved Lead	mg/L	0.001				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001				0.119	0.100	0.108	0.104	0.153	0.137	0.124	0.107	0.088	0.125
Mercury	mg/L	0.0001				<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001				0.002	0.001	0.002	<0.001	0.003	0.001	0.002	0.001	<0.001	0.003
Dissolved Silver	mg/L	0.001				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005				0.052	0.041	0.306	0.016	0.120	0.075	0.006	0.080	0.199	0.068
EC laboratory	uS/cm					235	152	188	217	310	278	269	216	189	231
Total Nitrogen	mg/L					0.9	2.7	12.2	5.5	4.3	13.2	15.1	9.1	4.1	2.0
Total Phosphorus	mg/L					0.19	0.43	1.23	0.64	0.44	0.96	2.11	1.01	0.56	0.50
Ammonia	mg/L					0.50	0.84	3.05	3.27	1.35	1.95	5.46	3.67	0.13	0.83
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						42								
Chloride	mg/L						37					34			
Nitrate						0.22	0.71	0.32	0.16	1.45	0.14	0.40	0.18	1.12	0.15
Sulphate	mg/L						4					1			
Calcium	mg/L						2					3			
Magnesium	mg/L						3					4			
Potassium	mg/L						4					6			
Sodium	mg/L						29					28			

Note – GW13 had insufficient water to collect a sample between April 2018 and August 2018.

Table 35 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW013 May 21	Results											
Dissolved Aluminium	mg/L	0.01	0.02												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	<0.001												
Total Iron	mg/L	0.05	12.0												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.155												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.001												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.011												
EC laboratory	uS/cm		274												
Total Nitrogen	mg/L		12.5												
Total Phosphorus	mg/L		1.88												
Ammonia	mg/L		7.07												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		79												
Chloride	mg/L		37												
Nitrate			0.44												
Sulphate	mg/L		2												
Calcium	mg/L		5												
Magnesium	mg/L		5												
Potassium	mg/L		9												
Sodium	mg/L		28												

Note – GW13 had insufficient water to collect a sample between April 2018 and August 2018.

Table 36 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW14 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.05	0.03						6.62	8.49			7.07	6.67
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001						0.006	0.006			0.003	0.003
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001						0.0014	0.0008			0.0011	0.0013
Dissolved Chromium	mg/L	0.001	<0.001	0.001						0.001	<0.001			<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.024	0.008						0.313	0.188			0.104	0.113
Total Iron	mg/L	0.05	0.79	0.37						41.7	46.9			54.9	55.6
Dissolved Lead	mg/L	0.001	<0.001	<0.001						0.009	0.012			0.007	0.007
Total Manganese	mg/L	0.001	0.279	0.171						5.86	3.96			5.58	4.88
Mercury	mg/L	0.0001	<0.00001	0.00001											<0.0001
Dissolved Nickel	mg/L	0.001	0.003	0.002						0.247	0.292			0.264	0.247
Dissolved Silver	mg/L	0.001	<0.001	<0.001						<0.001	<0.001			<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.018	0.019						1.07	0.806			1.15	1.11
EC laboratory	uS/cm		3690	3230						21000	20800			21400	20900
Total Nitrogen	mg/L		0.7	1.1											1.2
Total Phosphorus	mg/L		0.03	0.06											<0.02
Ammonia	mg/L		0.03	0.04											0.65
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		506	461											<1
Chloride	mg/L		833	700											5900
Nitrate			0.22	0.38						0.48	0.05			0.05	0.05
Sulphate	mg/L		284	286											898
Calcium	mg/L		141	138											381
Magnesium	mg/L		32.9	23.9											620
Potassium	mg/L		2.76	3.32											2730
Sodium	mg/L		610	509											8

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW14 groundwater monitoring bore destroyed by construction following February 2015 sampling event. Re-installation completed prior to August 2016 monitoring event. There was no access due to construction in April and July 2017

Table 37 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW14 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	0.52	2.15	4.20	4.23		3.84	<0.01	<0.01	5.19	0.17	0.14	0.79	2.73
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	0.002	0.001		0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	0.0003	0.0003	0.0009	0.0010		0.0008	0.0003	0.0005	0.0015	0.0002	0.0003	0.0003	0.0006
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.164	2.13	0.172	0.341		0.080	0.012	0.009	0.164	0.018	0.124	0.852	0.351
Total Iron	mg/L	0.05	38.6	16.2	21.5	31.9		42.5	1.57	2.94	54.7	1.59	0.47	14.2	10.0
Dissolved Lead	mg/L	0.001	<0.001	0.007	0.009	0.005		0.003	<0.001	<0.001	0.008	<0.001	<0.001	<0.001	0.002
Total Manganese	mg/L	0.001	1.40	1.64	3.32	3.16		2.48	0.755	0.794	4.48	0.195	0.230	0.412	0.966
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.069	0.087	0.149	0.136		0.137	0.037	0.039	0.213	0.012	0.013	0.021	0.052
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.312	0.477	0.716	0.692		0.741	0.854	0.515	1.66	18.2	18.8	21.2	34.5
EC laboratory	uS/cm		7330	8720	13800	11800		12500	4920	5730	17300	1550	1600	2880	5770
Total Nitrogen	mg/L		1.3	0.9	0.5	0.4		1.0	1.7	2.2	1.3	0.7	0.8	0.7	1.2
Total Phosphorus	mg/L		0.02	0.03	<0.02	<0.01		<0.02	0.03	0.02	0.09	<0.01	0.02	0.03	0.03
Ammonia	mg/L		0.74	0.62	0.35	0.26		0.75	0.18	0.21	0.29	0.09	0.03	0.05	0.29
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L											412			
Nitrate			0.20	<0.01	0.03	0.08		0.08	0.71	1.33	0.23	0.39	0.44	0.06	0.21
Sulphate	mg/L											105			
Calcium	mg/L											16			
Magnesium	mg/L											29			
Potassium	mg/L											4			
Sodium	mg/L											217			

Note – GW14 groundwater monitoring bore was unsafe to access in February 2019

Table 38 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW14				Results								
			May 21												
Dissolved Aluminium	mg/L	0.01	0.07												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.098												
Total Iron	mg/L	0.05	4.24												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.113												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.005												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	36.3												
EC laboratory	uS/cm		915												
Total Nitrogen	mg/L		0.9												
Total Phosphorus	mg/L		0.05												
Ammonia	mg/L		0.03												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		<1												
Chloride	mg/L		266												
Nitrate			0.28												
Sulphate	mg/L		39												
Calcium	mg/L		11												
Magnesium	mg/L		15												
Potassium	mg/L		7												
Sodium	mg/L		117												

Table 39 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW15 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.02	0.02	0.01	0.47	1.01	<0.01	0.75	1.67	0.45	<0.01	0.46	<0.01	0.02
Dissolved Arsenic	mg/L	0.001	0.01	0.008	0.005	0.026	0.014	0.008	0.021	0.025	0.024	0.004	0.012	0.004	0.003
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	<0.0001	0.0001	<0.0001	0.0002	0.0002	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.008	0.002	0.002	0.012	0.03	<0.001	0.056	0.05	0.038	0.002	0.036	0.003	0.009
Total Iron	mg/L	0.05	7.28	6.61	5.02	3.98	3.38	5.40	3.84	4.39	4.95	2.36	2.36	3.77	2.3
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.002	0.169	<0.001	0.002	0.006	0.003	<0.001	0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	2.55	2.21	2.00	1.94	2.06	3.58	2.59	2.6	1.84	1.98	2.08	2.11	1.98
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							
Dissolved Nickel	mg/L	0.001	0.003	0.003	0.003	0.003	0.006	0.004	0.006	0.006	0.005	0.003	0.004	0.004	0.003
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.021	0.016	0.020	0.022	0.026	0.015	0.065	0.033	0.028	0.007	0.03	0.031	0.023
EC laboratory	uS/cm		3760	3740	3660	3760	3850	3690	3280	3640	3540	3740	3540	3660	3570
Total Nitrogen	mg/L		0.26	--	0.28			0.6							0.7
Total Phosphorus	mg/L		0.09	0.05	0.08			0.10							0.05
Ammonia	mg/L		0.05	--	0.07			0.05							0.1
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		260	239	244			268							270
Chloride	mg/L		981	1086	1000			888							848
Nitrate			<0.01	<0.01	<0.01	<0.01	0.02	0.05	0.77	0.03	0.03	0.04	0.01	0.08	0.11
Sulphate	mg/L		149	164				141							130
Calcium	mg/L		30.2	47.7	51.7			56							45
Magnesium	mg/L		105	99.3	110			118							98
Potassium	mg/L		5.30	8.87	8.54			10							503
Sodium	mg/L		507	527	549			539							8

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Table 40 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW15 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	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
Dissolved Arsenic	mg/L	0.001	0.003	0.004	0.004	0.005	0.007	0.009	0.002	0.006	0.004	0.002	0.002	<0.001	0.001
Dissolved Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	0.0001	0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.038	0.010	0.017	0.032	0.001	<0.001	0.003	0.002	0.007	<0.001	0.004	0.009	0.006
Total Iron	mg/L	0.05	2.42	1.64	3.17	4.04	3.25	2.91	2.26	3.26	2.98	3.48	1.29	1.41	1.80
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	1.88	1.79	2.04	2.54	2.19	2.19	2.04	2.53	2.28	1.95	1.60	1.64	1.60
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.004	0.004	0.003	0.004	0.003	0.002	0.002	0.003	0.003	0.004	0.002	0.006	0.006
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.024	0.032	0.117	0.040	0.015	0.016	0.011	0.049	0.052	0.031	0.044	0.080	0.076
EC laboratory	uS/cm		3730	3530	3610	3540	3830	3860	3720	3840	3850	3860	3760	3720	3710
Total Nitrogen	mg/L		0.3	0.4	0.2	0.5	1.5	0.3	0.3	0.6	0.6	0.5	0.4	0.6	0.6
Total Phosphorus	mg/L		0.03	0.03	0.05	0.07	0.11	0.05	0.04	0.06	0.07	<0.01	0.07	0.02	0.05
Ammonia	mg/L		0.09	0.06	0.07	0.06	0.05	0.06	0.03	0.14	0.10	0.23	0.15	0.08	0.07
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						259								
Chloride	mg/L						1010					949			
Nitrate			0.11	0.07	0.03	0.23	0.40	0.10	0.03	0.17	0.05	0.10	0.04	0.14	0.10
Sulphate	mg/L						161					159			
Calcium	mg/L						45					50			
Magnesium	mg/L						102					116			
Potassium	mg/L						8					9			
Sodium	mg/L						503					561			

Table 41 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW15		Results										
			May 21												
Dissolved Aluminium	mg/L	0.01	<0.01												
Dissolved Arsenic	mg/L	0.001	0.003												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	<0.001												
Total Iron	mg/L	0.05	2.55												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	2.48												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.007												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.060												
EC laboratory	uS/cm		3640												
Total Nitrogen	mg/L		1.2												
Total Phosphorus	mg/L		0.09												
Ammonia	mg/L		0.21												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		251												
Chloride	mg/L		946												
Nitrate			0.04												
Sulphate	mg/L		149												
Calcium	mg/L		49												
Magnesium	mg/L		116												
Potassium	mg/L		10												
Sodium	mg/L		556												

Table 42 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW017	Results											
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01			0.01	1.16	2.95	0.01	2.12	0.84	<0.01	<0.01	0.73	<0.01	<0.01
Dissolved Arsenic	mg/L	0.001			<0.001	0.002	0.004	0.001	0.003	0.003	<0.001	<0.001	0.002	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001			<0.001	0.0002	0.0003	<0.0001	0.0005	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001			<0.001	0.002	0.004	<0.001	0.003	0.002	<0.001	<0.001	0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001			0.001	0.006	0.012	<0.001	0.03	0.006	<0.001	<0.001	0.004	<0.001	0.033
Total Iron	mg/L	0.05			19.9	1.73	4.66	8.64	5.18	3.82	8.1	2.33	2.64	5.27	2.33
Dissolved Lead	mg/L	0.001			<0.001	0.003	0.061	<0.001	0.003	0.002	<0.001	<0.001	0.001	<0.001	<0.001
Total Manganese	mg/L	0.001			0.561	0.238	0.245	0.272	0.225	0.202	0.198	0.092	0.126	0.157	0.139
Mercury	mg/L	0.0001			<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001			0.005	0.003	0.004	0.002	0.004	0.003	0.002	0.001	0.002	0.002	0.002
Dissolved Silver	mg/L	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005			0.026	0.046	0.046	0.022	0.057	0.04	0.02	<0.005	0.051	0.026	0.018
EC laboratory	uS/cm				3680	4150	4080	3840	3550	3770	3600	3540	3260	3380	3150
Total Nitrogen	mg/L				0.55			0.6							0.4
Total Phosphorus	mg/L				0.30			0.11							0.03
Ammonia	mg/L				0.02			0.02							0.07
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$				560			382							491
Chloride	mg/L				770			799							564
Nitrate					<0.01	0.10	0.09	0.05	0.2	0.02	0.18	0.04	<0.01	0.02	0.09
Sulphate	mg/L							419							400
Calcium	mg/L				165			163							125
Magnesium	mg/L				171			190							144
Potassium	mg/L				9.85			9							334
Sodium	mg/L				355			370							7

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Table 43 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW017	Results											
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	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
Dissolved Arsenic	mg/L	0.001	<0.001		<0.001	<0.001	0.001	0.001	0.002	0.001	<0.001	<0.001	0.001	0.002	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	<0.001		0.003	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.572	<0.001
Total Iron	mg/L	0.05	3.34		2.89	3.00	2.96	4.92	6.44	8.56	8.57	5.18	3.42	4.15	2.51
Dissolved Lead	mg/L	0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.124		0.120	0.116	0.140	0.167	0.238	0.375	0.535	0.232	0.206	0.193	0.154
Mercury	mg/L	0.0001	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.001		0.002	0.002	0.002	<0.001	<0.001	0.018	0.001	0.002	<0.001	0.003	0.002
Dissolved Silver	mg/L	0.001	<0.001		<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.016		0.046	0.058	0.011	0.022	<0.005	0.052	0.039	0.021	0.019	0.060	0.007
EC laboratory	uS/cm		3210		3100	2900	3130	3160	3050	3170	3100	3040	2910	2840	2780
Total Nitrogen	mg/L		0.3		0.2	0.4	0.9	0.4	0.6	1.5	0.4	0.2	0.2	0.2	0.4
Total Phosphorus	mg/L		0.03		0.03	0.03	0.03	0.03	0.06	0.07	0.06	0.03	0.04	0.02	0.11
Ammonia	mg/L		0.07		0.02	0.06	0.03	0.08	<0.01	0.19	0.05	0.05	0.06	0.03	0.04
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						522								
Chloride	mg/L						606					513			
Nitrate			0.11		<0.01	0.09	0.73	0.05	0.05	0.49	0.04	0.01	0.04	0.01	0.07
Sulphate	mg/L						398					364			
Calcium	mg/L						114					114			
Magnesium	mg/L						137					144			
Potassium	mg/L						7					7			
Sodium	mg/L						323					353			

Table 44 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW017	Results											
			May 21												
Dissolved Aluminium	mg/L	0.01	<0.01												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	<0.001												
Total Iron	mg/L	0.05	6.10												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.194												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	<0.001												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.010												
EC laboratory	uS/cm		2610												
Total Nitrogen	mg/L		0.6												
Total Phosphorus	mg/L		0.13												
Ammonia	mg/L		0.03												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		538												
Chloride	mg/L		441												
Nitrate			<0.01												
Sulphate	mg/L		337												
Calcium	mg/L		96												
Magnesium	mg/L		118												
Potassium	mg/L		7												
Sodium	mg/L		312												

Table 45 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW018 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.02	0.03	<0.01	0.63	2.18	<0.01	1.46	0.94	<0.01	<0.01	1.08	<0.01	<0.01
Dissolved Arsenic	mg/L	0.001	0.006	0.005	0.005	0.011	0.009	0.002	0.009	0.004	0.001	0.002	0.006	0.003	0.002
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0020	0.0003	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.008	0.004	0.003	0.034	0.021	0.001	0.049	0.012	<0.001	<0.001	0.01	<0.001	0.38
Total Iron	mg/L	0.05	5.26	5.57	5.76	2.40	4.34	4.01	5.51	2.12	2.97	1.65	3.16	3.33	2.88
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.012	0.085	<0.001	0.008	0.004	<0.001	<0.001	0.007	<0.001	<0.001
Total Manganese	mg/L	0.001	2.00	1.80	1.80	1.58	1.58	1.60	1.49	1.53	1.2	1.33	1.32	1.32	1.29
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001										<0.0001
Dissolved Nickel	mg/L	0.001	0.002	0.002	0.002	0.002	0.003	0.002	0.004	0.005	0.004	0.002	0.004	0.004	0.003
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.022	0.014	0.022	0.040	0.04	0.007	0.041	0.028	0.007	<0.005	0.033	0.015	0.05
EC laboratory	uS/cm		1690	1690	1660	1700	1730	1720	1550	1780	1670	1700	1690	1760	1720
Total Nitrogen	mg/L		0.46	--	0.37			0.4							0.3
Total Phosphorus	mg/L		0.09	0.06	0.08			0.02							0.03
Ammonia	mg/L		0.14	0.18	0.12			0.08							0.13
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		676	645	684			587							710
Chloride	mg/L		96	95	98			80							86
Nitrate			0.02	<0.01	<0.01	2.02	0.02	0.19	0.02	0.08	0.15	0.04	0.01	0.01	<0.01
Sulphate	mg/L		168	157				170							227
Calcium	mg/L		115	186	199			220							218
Magnesium	mg/L		56.6	49.2	55			62							53
Potassium	mg/L		4.48	6.15	6.56			6							99
Sodium	mg/L		97.7	98.9	101			104							5

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Table 46 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW018 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dissolved Arsenic	mg/L	0.001	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.003	0.003	0.003	0.002	0.004
Dissolved Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	<0.001	<0.001	<0.001	0.006	<0.001	<0.001	<0.001	0.003	0.002	<0.001	<0.001	0.004	<0.001
Total Iron	mg/L	0.05	3.07	3.07	3.10	1.99	2.00	2.12	1.76	1.96	2.67	2.67	1.89	2.16	4.28
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	1.32	1.17	1.28	1.78	1.54	1.35	1.42	1.66	1.33	1.31	1.25	0.978	1.58
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.002	0.002	0.002	0.004	0.003	0.001	0.003	0.008	0.003	0.002	0.002	0.002	0.002
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.008	0.011	0.019	0.051	0.016	0.010	0.008	0.048	0.028	0.025	0.011	0.033	<0.005
EC laboratory	uS/cm		1840	1770	1800	1720	1790	1820	1790	1900	1800	1840	1810	1790	1840
Total Nitrogen	mg/L		0.3	0.3	0.3	0.7	1.4	0.2	0.2	0.7	0.5	0.2	0.4	0.2	0.6
Total Phosphorus	mg/L		0.03	0.03	0.03	0.02	0.03	0.02	0.01	0.02	0.05	0.02	0.03	0.01	0.04
Ammonia	mg/L		0.11	0.10	0.09	0.09	0.08	0.06	0.06	0.14	0.07	0.08	0.10	0.07	0.27
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						685								
Chloride	mg/L						90					81			
Nitrate			0.01	0.06	0.06	0.11	1.16	0.12	0.02	0.23	0.02	0.11	0.05	0.02	0.05
Sulphate	mg/L						283					250			
Calcium	mg/L						225					237			
Magnesium	mg/L						54					58			
Potassium	mg/L						5					5			
Sodium	mg/L						100					112			

Table 47 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW018 May 21	Results											
Dissolved Aluminium	mg/L	0.01	<0.01												
Dissolved Arsenic	mg/L	0.001	0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	<0.001												
Total Iron	mg/L	0.05	5.19												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	1.57												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.006												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.023												
EC laboratory	uS/cm		1280												
Total Nitrogen	mg/L		0.8												
Total Phosphorus	mg/L		0.05												
Ammonia	mg/L		0.09												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		452												
Chloride	mg/L		30												
Nitrate			0.01												
Sulphate	mg/L		276												
Calcium	mg/L		154												
Magnesium	mg/L		40												
Potassium	mg/L		5												
Sodium	mg/L		81												

Table 48 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW19 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.02	0.14	0.04										
Dissolved Arsenic	mg/L	0.001	0.002	<0.001	0.001										
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001										
Dissolved Chromium	mg/L	0.001	<0.001	0.001	0.001										
Dissolved Copper	mg/L	0.001	0.043	0.01	0.013										
Total Iron	mg/L	0.05	24.7	83.6	22.0										
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001										
Total Manganese	mg/L	0.001	0.865	0.319	0.162										
Mercury	mg/L	0.0001	<0.00001	0.00002	<0.00001										
Dissolved Nickel	mg/L	0.001	0.016	0.006	0.007										
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001										
Dissolved Zinc	mg/L	0.005	0.056	0.016	0.024										
EC laboratory	uS/cm		634	435	734										
Total Nitrogen	mg/L		0.5	1.1	0.64										
Total Phosphorus	mg/L		0.14	0.64	0.40										
Ammonia	mg/L		0.03	<0.02	0.01										
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		96	40	201										
Chloride	mg/L		126	64	73										
Nitrate			<0.01	<0.01	<0.01										
Sulphate	mg/L		22	57											
Calcium	mg/L		3.36	3.37	4.08										
Magnesium	mg/L		10.2	9.21	5.9										
Potassium	mg/L		6.15	10.6	6.69										
Sodium	mg/L		114	79.3	157										

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW19 groundwater monitoring bore destroyed by construction following April 2015 sampling event. Re-installation completed prior to August 2016 monitoring event. However, access in August 2016 not available at the time of sampling due to construction. Since then, there has been insufficient water to collect a sample.

Table 49 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW20		Results										
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01			0.01										
Dissolved Arsenic	mg/L	0.001			<0.001										
Dissolved Cadmium	mg/L	0.0001			<0.001										
Dissolved Chromium	mg/L	0.001			<0.001										
Dissolved Copper	mg/L	0.001			0.003										
Total Iron	mg/L	0.05			17.5										
Dissolved Lead	mg/L	0.001			<0.001										
Total Manganese	mg/L	0.001			1.10										
Mercury	mg/L	0.0001			<0.00001										
Dissolved Nickel	mg/L	0.001			0.065										
Dissolved Silver	mg/L	0.001			<0.001										
Dissolved Zinc	mg/L	0.005			0.696										
EC laboratory	uS/cm														
Total Nitrogen	mg/L														
Total Phosphorus	mg/L														
Ammonia	mg/L														
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$				167										
Chloride	mg/L				150										
Nitrate															
Sulphate	mg/L														
Calcium	mg/L				82.0										
Magnesium	mg/L				94.4										
Potassium	mg/L				17.0										
Sodium	mg/L				137										

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW20 had insufficient water to collect a sample during all but the April 2015 sampling event. Site not accessible during April and August 2016 sampling events due to restrictions in place from construction work. Since then, there has been insufficient water to collect a sample.

Table 50 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW21 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.36	0.03	0.02	12.2	6.33	0.17	4.76	2.78	0.06				0.11
Dissolved Arsenic	mg/L	0.001	0.008	0.002	0.002	0.011	0.004	0.008	0.009	0.011	0.004				0.004
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0010	0.0001	<0.0001	0.0003	0.0001	<0.0001				<0.0001
Dissolved Chromium	mg/L	0.001	0.004	<0.001	<0.001	0.011	0.003	0.001	0.005	0.006	0.002				0.002
Dissolved Copper	mg/L	0.001	0.021	<0.001	0.026	0.126	0.169	0.003	0.251	0.062	0.069				0.034
Total Iron	mg/L	0.05	159	86.6	19.3	35.8	7.31	22.0	7.02	9.67	16.8				5.14
Dissolved Lead	mg/L	0.001	0.01	<0.001	<0.001	0.049	0.066	0.001	0.008	0.006	<0.001				0.002
Total Manganese	mg/L	0.001	1.00	0.979	0.557	0.577	0.481	0.652	0.323	0.322	0.406				0.356
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001	0.009	0.003	0.003	0.018	0.005	0.004	0.014	0.006	0.003				0.006
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001				<0.001
Dissolved Zinc	mg/L	0.005	0.022	0.009	0.056	1.16	0.08	0.059	0.146	0.073	0.037				0.036
EC laboratory	uS/cm		1050	714	748	730	562	828	912	811	1090				603
Total Nitrogen	mg/L		3.1	2.2	1.22			1.1							0.7
Total Phosphorus	mg/L		0.55	0.42	0.19			0.19							0.11
Ammonia	mg/L		<0.02	<0.02	0.13			<0.01							0.1
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		376	292	346			333							253
Chloride	mg/L		101	54	58			41							52
Nitrate	mg/L		0.01	<0.01	<0.01	0.14	0.12	0.03	0.03	0.13	0.29				0.02
Sulphate	mg/L		54	1.8				<1							<10
Calcium	mg/L		39.9	38.8	43.8			35							22
Magnesium	mg/L		50.3	26.9	14.2			18							9
Potassium	mg/L		39.1	18.6	9.83			4							94
Sodium	mg/L		220	147	127			145							2

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table. Also, GW21 has not been accessible due to access constraints since January 2018.

Table 51 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW022 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.16	0.62	2.34	87.2	83.1	1.26	2.11						
Dissolved Arsenic	mg/L	0.001	0.001	0.001	0.001	0.074	0.022	0.001	0.004						
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0005	<0.0001	<0.0001	<0.0001						
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	0.002	0.023	0.023	0.001	0.003						
Dissolved Copper	mg/L	0.001	0.018	0.014	0.019	0.236	0.131	0.012	0.036						
Total Iron	mg/L	0.05	96.9	101	110	66.2	49	24.0	1.37						
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.086	0.109	<0.001	0.002						
Total Manganese	mg/L	0.001	0.232	0.252	0.261	0.632	0.147	0.064	0.038						
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							
Dissolved Nickel	mg/L	0.001	<0.001	<0.001	0.001	0.018	0.009	<0.001	0.008						
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001						
Dissolved Zinc	mg/L	0.005	0.048	0.022	0.050	2.33	1.06	0.139	0.309						
EC laboratory	uS/cm		501	325	296	470	410	348	562						
Total Nitrogen	mg/L		2.3	2.5	1.85			1.3							
Total Phosphorus	mg/L		0.37	0.39	0.35			0.15							
Ammonia	mg/L		<0.02	<0.02	0.02			<0.01							
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		18	19	15			10							
Chloride	mg/L		128	72	71			68							
Nitrate	mg/L		0.01	<0.01	<0.01	0.05	0.07	0.06	0.24						
Sulphate	mg/L		24	21				21							
Calcium	mg/L		12.7	9.04	11.8			<1							
Magnesium	mg/L		16.1	15.4	23.7			<1							
Potassium	mg/L		11.6	12.5	9.13			<1							
Sodium	mg/L		104	65.2	72.9			72							

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note: Site no longer accessible (from September 2016) due to permanent fencing arrangements. Site not accessible during April and August 2016 sampling events due to restrictions in place from construction work.

Table 52 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW022 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20				
Dissolved Aluminium	mg/L	0.01													
Dissolved Arsenic	mg/L	0.001													
Dissolved Cadmium	mg/L	0.0001													
Dissolved Chromium	mg/L	0.001													
Dissolved Copper	mg/L	0.001													
Total Iron	mg/L	0.05													
Dissolved Lead	mg/L	0.001													
Total Manganese	mg/L	0.001													
Mercury	mg/L	0.0001													
Dissolved Nickel	mg/L	0.001													
Dissolved Silver	mg/L	0.001													
Dissolved Zinc	mg/L	0.005													
EC laboratory	uS/cm														
Total Nitrogen	mg/L														
Total Phosphorus	mg/L														
Ammonia	mg/L														
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L														
Nitrate															
Sulphate	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Potassium	mg/L														
Sodium	mg/L														

Table 53 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW23 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.07	0.18	0.49	0.04	215	0.45	45.7	0.23		0.2	8.3	0.23	0.19
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.04	<0.001	0.008	0.001		<0.001	0.003	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	<0.0001	0.0007	<0.0001	0.0002	<0.0001		<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	0.001	<0.001	0.002	<0.001	0.063	0.001	0.014	0.001		<0.001	0.004	0.001	<0.001
Dissolved Copper	mg/L	0.001	0.021	0.003	0.019	0.001	0.071	0.010	0.051	0.013		0.021	0.086	0.028	0.122
Total Iron	mg/L	0.05	77.2	55.5	53.2	0.21	83.2	33.0	15.6	14.2		4.85	4.86	6.84	4.51
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.22	<0.001	0.031	<0.001		<0.001	0.006	<0.001	<0.001
Total Manganese	mg/L	0.001	1.75	0.863	0.713	0.076	1.69	0.592	0.391	0.402		0.178	0.241	0.389	0.218
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001	0.007	0.001	<0.001	<0.001	0.021	0.002	0.007	0.002		0.001	0.003	0.003	0.002
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.123	0.037	0.035	0.050	0.531	0.206	0.168	0.064		0.043	0.095	0.068	0.053
EC laboratory	uS/cm		542	205	177	230	245	246	286	293		291	320	382	312
Total Nitrogen	mg/L		0.6	1.1	1.41			1.2							0.9
Total Phosphorus	mg/L		0.45	0.49	0.90			0.62							0.1
Ammonia	mg/L		<0.02	<0.02	0.02			0.01							0.08
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		32	11	9			10							28
Chloride	mg/L		62	45	44			40							58
Nitrate	mg/L		<0.01	0.01	<0.01	0.06	1.14	0.04	0.05	0.04		0.04	<0.01	0.37	0.09
Sulphate	mg/L		137	12				28							26
Calcium	mg/L		88.1	41.5	35.6			2							4
Magnesium	mg/L		35	18.9	17.7			3							4
Potassium	mg/L		9.65	8.94	6.70			1							45
Sodium	mg/L		77.6	35.9	34.5			42							1

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Table 54 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW23 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	0.63	0.33	0.29	0.14	0.13	0.33	0.07	0.04	0.03	0.20		0.12	0.12
Dissolved Arsenic	mg/L	0.001	0.001	<0.001	0.002	0.001	0.002	0.001	0.002	0.002	<0.001	<0.001		0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	<0.001		0.001	<0.001
Dissolved Copper	mg/L	0.001	0.043	0.021	0.018	0.041	0.018	0.009	0.007	0.001	0.004	0.016		0.065	0.068
Total Iron	mg/L	0.05	3.05	3.66	4.73	5.11	5.85	8.20	6.99	8.51	12.9	4.39		7.05	2.88
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001
Total Manganese	mg/L	0.001	0.149	0.220	0.280	0.385	0.467	0.494	0.577	0.521	0.622	0.159		0.277	0.137
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.003	0.002	0.002	0.004	0.003	0.004	0.004	0.004	0.003	0.002		0.004	0.003
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.072	0.069	0.051	0.099	0.054	0.090	0.053	0.030	0.038	0.057		0.078	0.063
EC laboratory	uS/cm		262	316	394	467	443	497	626	769	679	345		490	372
Total Nitrogen	mg/L		1.7	0.6	0.7	1.2	2.4	0.5	0.4	0.9	0.3	1.9		1.0	1.0
Total Phosphorus	mg/L		0.14	0.05	0.09	0.05	0.08	0.13	0.09	0.13	0.13	0.24		0.08	0.09
Ammonia	mg/L		0.10	0.02	0.02	0.06	0.05	0.06	<0.01	0.06	0.06	0.03		0.02	0.02
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						45								
Chloride	mg/L						62					66			
Nitrate	mg/L		0.16	0.08	0.12	0.29	1.75	0.03	0.02	0.34	0.02	0.02		0.02	0.22
Sulphate	mg/L						71					14			
Calcium	mg/L						8					4			
Magnesium	mg/L						9					4			
Potassium	mg/L						1					1			
Sodium	mg/L						69					52			

Table 55 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW23			Results										
			May 21													
Dissolved Aluminium	mg/L	0.01	0.18													
Dissolved Arsenic	mg/L	0.001	<0.001													
Dissolved Cadmium	mg/L	0.0001	<0.0001													
Dissolved Chromium	mg/L	0.001	<0.001													
Dissolved Copper	mg/L	0.001	0.128													
Total Iron	mg/L	0.05	3.15													
Dissolved Lead	mg/L	0.001	<0.001													
Total Manganese	mg/L	0.001	0.195													
Mercury	mg/L	0.0001	<0.0001													
Dissolved Nickel	mg/L	0.001	0.002													
Dissolved Silver	mg/L	0.001	<0.001													
Dissolved Zinc	mg/L	0.005	0.063													
EC laboratory	uS/cm		343													
Total Nitrogen	mg/L		0.5													
Total Phosphorus	mg/L		0.06													
Ammonia	mg/L		0.02													
Phosphate	mg/L															
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		21													
Chloride	mg/L		81													
Nitrate	mg/L		<0.01													
Sulphate	mg/L		24													
Calcium	mg/L		6													
Magnesium	mg/L		6													
Potassium	mg/L		1													
Sodium	mg/L		54													

Table 56 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW24	Results											
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.07	0.27	0.26	24.6	11.2	0.29	63.2	21.2	0.15	0.34	10.2		1.44
Dissolved Arsenic	mg/L	0.001	0.003	<0.001	<0.001	0.010	0.004	0.001	0.012	0.007	<0.001	<0.001	0.003		0.001
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0010	<0.0001	0.0002	0.0008	0.0004	<0.0001	<0.0001	<0.0001		<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	0.001	0.043	0.016	0.001	0.06	0.024	<0.001	<0.001	0.014		0.002
Dissolved Copper	mg/L	0.001	0.087	1.52	0.353	5.09	0.862	2.87	1.51	3.12	0.202	0.131	0.942		0.552
Total Iron	mg/L	0.05	92.5	23.8	34.2	35.6	10.6	22.4	115	42.9	69.2	19	13.8		6.02
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.021	0.062	<0.001	0.052	0.018	<0.001	<0.001	0.008		<0.001
Total Manganese	mg/L	0.001	0.366	0.132	0.145	0.180	0.062	0.090	0.5	0.318	0.332	0.167	0.096		0.05
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001	0.007	0.011	0.008	0.025	0.011	0.008	0.027	0.023	0.003	0.003	0.009		0.004
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001		<0.001
Dissolved Zinc	mg/L	0.005	0.06	0.074	0.063	0.235	0.061	0.072	1.18	0.444	0.069	0.029	0.097		0.025
EC laboratory	uS/cm			595	558	840	410	622	763	690	453	590	571		361
Total Nitrogen	mg/L			1.3	1.10			2.3							1.5
Total Phosphorus	mg/L			0.3	0.365										0.18
Ammonia	mg/L			0.09	0.02			<0.01							0.06
Phosphate	mg/L							0.63							
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		32	<5	<5			6							36
Chloride	mg/L		136	154	150			164							70
Nitrate				<0.01	<0.01	<0.50	<0.01	<0.01	0.04	0.02	0.32	0.04	<0.01		<0.01
Sulphate	mg/L		37	26				31							20
Calcium	mg/L		7.57	1.69	1.75			2							2
Magnesium	mg/L		12.6	6.71	7.63			6							2
Potassium	mg/L		10.1	5.48	5.97			1							63
Sodium	mg/L		100	94.4	99.5			107							<1

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table. There was insufficient water to collect a sample during November 2017.

Table 57 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW24 Results											
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	0.84	0.56	0.21	0.20	0.27					0.38	0.20		0.07
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	0.002					<0.001	<0.001		<0.001
Dissolved Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001					<0.0001	0.0001		<0.0001
Dissolved Chromium	mg/L	0.001	0.002	<0.001	0.002	0.001	0.003					0.002	0.001		<0.001
Dissolved Copper	mg/L	0.001	0.336	0.695	1.24	0.524	0.424					0.178	1.00		0.296
Total Iron	mg/L	0.05	3.65	2.61	24.9	6.33	4.72					3.11	6.12		13.7
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001					<0.001	<0.001		<0.001
Total Manganese	mg/L	0.001	0.038	0.052	0.180	0.099	0.102					0.047	0.156		0.113
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001					<0.0001	<0.0001		<0.0001
Dissolved Nickel	mg/L	0.001	0.004	0.004	0.027	0.008	0.008					0.004	0.006		0.005
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001					<0.001	<0.001		<0.001
Dissolved Zinc	mg/L	0.005	0.022	0.033	0.112	0.062	0.039					0.014	0.051		0.036
EC laboratory	uS/cm		476	456	564	590	727					641	583		427
Total Nitrogen	mg/L		0.7	0.6	3.9	2.4	3.7					1.4	1.6		1.3
Total Phosphorus	mg/L		0.09	0.09	0.81	0.28	0.40					0.18	0.18		0.13
Ammonia	mg/L		0.16	0.03	0.20	0.24	0.90					0.15	0.16		0.32
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L											115			
Nitrate			0.08	0.03	<0.01	0.03	0.06					0.02	0.05		0.04
Sulphate	mg/L											31			
Calcium	mg/L											16			
Magnesium	mg/L											5			
Potassium	mg/L											1			
Sodium	mg/L											108			

There was insufficient water to collect a sample at times from May 2019 onward.

Table 58 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW24	Results											
			May 21												
Dissolved Aluminium	mg/L	0.01	0.08												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	1.46												
Total Iron	mg/L	0.05	10.6												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.094												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.003												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.069												
EC laboratory	uS/cm		556												
Total Nitrogen	mg/L		1.0												
Total Phosphorus	mg/L		0.10												
Ammonia	mg/L		0.21												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		36												
Chloride	mg/L		150												
Nitrate			<0.01												
Sulphate	mg/L		17												
Calcium	mg/L		12												
Magnesium	mg/L		4												
Potassium	mg/L		1												
Sodium	mg/L		87												

Table 59 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW025 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.20	0.14	0.05	10.7						1.18			
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	<0.001	0.004						<0.001			
Dissolved Cadmium	mg/L	0.0001	0.001	0.001	<0.001	0.0014						0.0001			
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	0.007						<0.001			
Dissolved Copper	mg/L	0.001	0.156	0.351	0.095	0.129						0.112			
Total Iron	mg/L	0.05	30.5	17.6	17.7	8.38						5.42			
Dissolved Lead	mg/L	0.001	0.006	0.005	<0.001	0.012						<0.001			
Total Manganese	mg/L	0.001	2.23	0.929	0.308	0.298						0.195			
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001										
Dissolved Nickel	mg/L	0.001	0.035	0.018	0.005	0.027						0.005			
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001						<0.001			
Dissolved Zinc	mg/L	0.005	0.388	0.306	0.074	0.144						0.06			
EC laboratory	uS/cm			967	449	467						372			
Total Nitrogen	mg/L			0.8	1.09										
Total Phosphorus	mg/L			0.05	0.11										
Ammonia	mg/L			0.18	0.19										
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		<5	<5	7										
Chloride	mg/L		523	269	120										
Nitrate				0.12	0.03	0.04						0.08			
Sulphate	mg/L		20	25											
Calcium	mg/L		2.98	1.67	1.02										
Magnesium	mg/L		25.7	12.2	4.86										
Potassium	mg/L		10.0	9.9	8.67										
Sodium	mg/L		250	150	79.3										

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW25 had insufficient water to collect a sample during November 2015, January 2016, April 2016 and August 2016 sampling events, and from July 2017 onward on various occasions.

Table 60 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW025 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01		1.01											0.14
Dissolved Arsenic	mg/L	0.001		<0.001											0.001
Dissolved Cadmium	mg/L	0.0001		0.0001											0.0004
Dissolved Chromium	mg/L	0.001		0.001											<0.001
Dissolved Copper	mg/L	0.001		0.084											0.115
Total Iron	mg/L	0.05		7.63											6.56
Dissolved Lead	mg/L	0.001		<0.001											<0.001
Total Manganese	mg/L	0.001		0.241											0.158
Mercury	mg/L	0.0001		<0.0001											<0.0001
Dissolved Nickel	mg/L	0.001		0.009											0.005
Dissolved Silver	mg/L	0.001		<0.001											<0.001
Dissolved Zinc	mg/L	0.005		0.260											0.182
EC laboratory	uS/cm			440											321
Total Nitrogen	mg/L			1.9											2.8
Total Phosphorus	mg/L			0.16											0.22
Ammonia	mg/L			0.18											0.05
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L														
Nitrate				0.17											0.26
Sulphate	mg/L														
Calcium	mg/L														
Magnesium	mg/L														
Potassium	mg/L														
Sodium	mg/L														

Table 61 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW025 May 21	Results											
Dissolved Aluminium	mg/L	0.01	0.13												
Dissolved Arsenic	mg/L	0.001	0.001												
Dissolved Cadmium	mg/L	0.0001	0.0003												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.101												
Total Iron	mg/L	0.05	12.2												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.160												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.004												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.116												
EC laboratory	uS/cm		254												
Total Nitrogen	mg/L		2.1												
Total Phosphorus	mg/L		0.21												
Ammonia	mg/L		0.09												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		12												
Chloride	mg/L		65												
Nitrate			0.04												
Sulphate	mg/L		9												
Calcium	mg/L		<1												
Magnesium	mg/L		2												
Potassium	mg/L		2												
Sodium	mg/L		49												

Table 62 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW26 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	<0.01	0.04	0.21	55.2	7.77	0.19	5.37	21.1	0.02	0.05	7.58	0.07	0.06
Dissolved Arsenic	mg/L	0.001	0.002	<0.001	<0.001	0.013	0.004	<0.001	0.002	0.006	<0.001	<0.001	0.003	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0034	0.001	0.0010	0.0017	0.002	0.0011	0.0003	0.0007	0.0009	0.0007
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	0.001	0.023	0.056	0.001	0.01	0.015	<0.001	<0.001	0.006	<0.001	<0.001
Dissolved Copper	mg/L	0.001		0.23	1.01	38.6	1.8	2.19	4.04	7.45	7.78	1.21	7.02	2.37	1.2
Total Iron	mg/L	0.05	26.2	43.6	11.5	16.5	3.28	6.64	2.3	8.62	13.9	7.83	2.91	40.8	2.17
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.045	0.092	<0.001	0.005	0.026	<0.001	<0.001	0.008	<0.001	<0.001
Total Manganese	mg/L	0.001	0.928	0.972	0.300	0.488	0.141	0.157	0.196	0.289	0.322	0.313	0.145	0.928	0.102
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001	0.021	0.016	0.013	0.056	0.062	0.019	0.026	0.032	0.019	0.007	0.018	0.018	0.011
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.165	0.178	0.179	0.779	0.268	0.382	0.308	0.413	0.28	0.117	0.257	0.568	0.148
EC laboratory	uS/cm			896	750	1190	997	951	1050	776	785	600	842	855	731
Total Nitrogen	mg/L			1	0.57			0.5							0.7
Total Phosphorus	mg/L			0.23	0.135			0.14							0.09
Ammonia	mg/L			0.03	0.01			<0.01							0.05
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$			26	34			27							17
Chloride	mg/L		281	250	220			271							203
Nitrate				0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulphate	mg/L		32	11				12							13
Calcium	mg/L		38.2	18.4	4.70			3							2
Magnesium	mg/L		46.5	57.4	20.5			13							7
Potassium	mg/L		12.6	14.6	6.87			5							119
Sodium	mg/L		229	153	131			169							3

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Table 63 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW26 Results											
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	0.32	0.11	0.02			0.01				0.04	0.01	<0.01	0.01
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	<0.001			<0.001				<0.001	<0.001	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	0.0006	0.0008	0.0008			0.0008				0.0005	0.0008	0.0011	0.0002
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001			<0.001				<0.001	<0.001	<0.001	<0.001
Dissolved Copper	mg/L	0.001	3.68	3.14	10.3			5.22				1.54	9.87	14.9	0.018
Total Iron	mg/L	0.05	2.07	3.42	7.67			2.48				2.46	0.84	10.0	1.36
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001			<0.001				<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	0.130	0.148	0.231			0.204				0.243	0.275	0.251	0.482
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001			<0.0001				<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.011	0.026	0.022			0.029				0.008	0.012	0.014	0.006
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001			<0.001				<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.144	0.176	0.246			0.327				0.124	0.197	0.289	0.084
EC laboratory	uS/cm		742	762	817			833				630	766	771	626
Total Nitrogen	mg/L		0.5	0.7	1.7			1.9				0.6	1.3	2.6	0.9
Total Phosphorus	mg/L		0.06	0.10	0.27			0.19				0.09	0.25	0.35	0.06
Ammonia	mg/L		0.11	0.02	0.06			0.41				0.03	0.02	0.04	0.05
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L											179			
Nitrate			<0.01	<0.01	<0.01			<0.01				<0.01	<0.01	<0.01	0.17
Sulphate	mg/L											7			
Calcium	mg/L											6			
Magnesium	mg/L											5			
Potassium	mg/L											2			
Sodium	mg/L											98			

Note – GW26 had insufficient water to collect a sample during November 2018 and February 2019, and from July 2019 to January 2020.

Table 64 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW26 May 21	Results											
Dissolved Aluminium	mg/L	0.01	0.02												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	0.0003												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.551												
Total Iron	mg/L	0.05	5.77												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.325												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.011												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.145												
EC laboratory	uS/cm		664												
Total Nitrogen	mg/L		1.0												
Total Phosphorus	mg/L		0.11												
Ammonia	mg/L		0.07												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		14												
Chloride	mg/L		205												
Nitrate			0.05												
Sulphate	mg/L		4												
Calcium	mg/L		8												
Magnesium	mg/L		7												
Potassium	mg/L		3												
Sodium	mg/L		109												

Note – GW26 had insufficient water to collect a sample during November 2018 and February 2019, and from July 2019 onward.

Table 65 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW27	Results											
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	<0.01	0.02	0.02	20.3	3.27	0.02	2.9	33.3		0.04	4.27	0.01	0.05
Dissolved Arsenic	mg/L	0.001	0.003	<0.001	<0.001	0.021	0.002	0.001	0.005	0.024		<0.001	0.002	0.004	0.001
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0016	<0.0001	0.0001	0.0001	0.0005		<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	0.063	0.008	<0.001	0.008	0.105		<0.001	0.012	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.012	0.053	0.084	2.70	0.039	0.352	0.89	4.25		0.026	0.64	0.021	0.08
Total Iron	mg/L	0.05	21.2	20.5	6.08	37.3	5.3	14.8	8.41	92.8		1.34	6.45	56	5.45
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.045	0.115	<0.001	0.007	0.084		<0.001	0.01	<0.001	<0.001
Total Manganese	mg/L	0.001	2.66	1.33	0.403	0.950	0.447	0.975	1.5	1.8		0.095	0.389	1.06	0.467
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001	0.008	0.011	0.005	0.039	0.012	0.022	0.027	0.064		0.003	0.008	0.011	0.005
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.020	0.066	0.021	0.420	0.049	0.041	0.069	0.341		0.02	0.052	0.025	0.026
EC laboratory	uS/cm			514	353	438	544	660	736	593		334	393	554	496
Total Nitrogen	mg/L			0.8	0.64			0.6							3.7
Total Phosphorus	mg/L			0.31	0.17			0.36							0.48
Ammonia	mg/L			0.05	0.04			0.04							1.23
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		231	51	50			45							96
Chloride	mg/L		139	76	65			128							73
Nitrate				0.09	0.08	0.26	0.21	0.05	0.01	0.03		0.44	0.51	<0.01	0.1
Sulphate	mg/L		55	73				61							29
Calcium	mg/L		71.1	25.4	10.3			30							20
Magnesium	mg/L		18.5	8.8	4.55			12							9
Potassium	mg/L		7.35	7.48	4.37			5							48
Sodium	mg/L		90.5	52.6	55.1			78							4

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Table 66 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW27 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	0.10	0.06	0.02		<0.01					0.04		<0.01	0.03
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001	<0.001		<0.001					<0.001		<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001		<0.0001					0.0001		0.0002	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001		<0.001					<0.001		<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.857	0.895	0.438		0.032					0.151		0.784	0.450
Total Iron	mg/L	0.05	10.1	3.67	13.2		2.94					6.20		16.7	2.31
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001		<0.001					<0.001		<0.001	<0.001
Total Manganese	mg/L	0.001	0.318	0.476	0.534		0.526					0.500		0.776	0.133
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001		<0.0001					<0.0001		<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.006	0.008	0.008		0.007					0.007		0.012	0.005
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001		<0.001					<0.001		<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.049	0.062	0.047		0.014					0.057		0.071	0.031
EC laboratory	uS/cm		422	429	487		666					340		477	304
Total Nitrogen	mg/L		1.5	0.7	2.0		7.2					1.5		3.1	0.9
Total Phosphorus	mg/L		0.30	0.12	0.47		0.96					0.41		0.48	0.11
Ammonia	mg/L		0.20	0.22	0.30		3.00					0.23		0.39	0.06
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						164								
Chloride	mg/L						76					54			
Nitrate			0.02	<0.01	<0.01		1.26					0.11		0.01	0.12
Sulphate	mg/L						68					25			
Calcium	mg/L						43					12			
Magnesium	mg/L						13					5			
Potassium	mg/L						6					3			
Sodium	mg/L						71					41			

Note – GW27 had insufficient water to collect a sample during November 2018 and from May 2019 onward on various occasions.

Table 67 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW27 May 21	Results											
Dissolved Aluminium	mg/L	0.01	0.01												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	1.07												
Total Iron	mg/L	0.05	4.30												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.279												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.003												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.048												
EC laboratory	uS/cm		355												
Total Nitrogen	mg/L		1.7												
Total Phosphorus	mg/L		0.19												
Ammonia	mg/L		0.21												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		48												
Chloride	mg/L		71												
Nitrate			0.98												
Sulphate	mg/L		20												
Calcium	mg/L		17												
Magnesium	mg/L		7												
Potassium	mg/L		3												
Sodium	mg/L		45												

Note – GW27 had insufficient water to collect a sample during November 2018 and from May 2019 onward.

Table 68 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW028	Results										
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.11		0.09	47.7	22.7	2.09				0.32	39.3		
Dissolved Arsenic	mg/L	0.001	0.002		<0.001	0.023	0.007	<0.001				<0.001	0.011		
Dissolved Cadmium	mg/L	0.0001	<0.001		<0.001	0.0035	0.0005	0.0003				<0.0001	<0.0001		
Dissolved Chromium	mg/L	0.001	0.001		<0.001	0.085	0.025	0.002				<0.001	0.061		
Dissolved Copper	mg/L	0.001			0.545	23.0	2.17	2.87				3.8	15.9		
Total Iron	mg/L	0.05	22.6		51.9	53.0	17.1	11.3				15	35		
Dissolved Lead	mg/L	0.001	<0.001		<0.001	0.056	0.157	<0.001				<0.001	0.04		
Total Manganese	mg/L	0.001	0.226		0.202	0.312	0.099	0.098				0.104	0.196		
Mercury	mg/L	0.0001	0.00001		<0.00001			<0.0001							
Dissolved Nickel	mg/L	0.001	0.015		0.003	0.047	0.014	0.004				0.006	0.026		
Dissolved Silver	mg/L	0.001	<0.001		<0.001	<0.001	<0.001	<0.001				<0.001	<0.001		
Dissolved Zinc	mg/L	0.005	0.052		0.019	0.280	0.106	0.313				0.053	0.279		
EC laboratory	uS/cm				199	235	223	235				294	234		
Total Nitrogen	mg/L				0.80			1.5							
Total Phosphorus	mg/L				0.40			0.30							
Ammonia	mg/L				0.02			0.05							
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		31		14			15							
Chloride	mg/L		40		45			41							
Nitrate					<0.01	<0.01	0.02	<0.01				<0.01	<0.01		
Sulphate	mg/L		51					18							
Calcium	mg/L		4.56		3.55			2							
Magnesium	mg/L		11.1		7.27			3							
Potassium	mg/L		6.63		9.23			2							
Sodium	mg/L		50.2		36.2			44							

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Note – GW28 had insufficient water to collect a sample during April, August and December 2016 sampling events, and again in November 2017 and January 2018.

Table 69 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW028	Results											
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	1.55			0.38						0.73		<0.01	0.08
Dissolved Arsenic	mg/L	0.001	<0.001			<0.001						0.001		<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	0.0001			0.0001						0.0004		0.0006	<0.0001
Dissolved Chromium	mg/L	0.001	0.001			<0.001						0.002		<0.001	<0.001
Dissolved Copper	mg/L	0.001	4.80			6.17						6.78		10.3	0.929
Total Iron	mg/L	0.05	9.22			3.22						5.22		3.67	6.11
Dissolved Lead	mg/L	0.001	<0.001			<0.001						<0.001		<0.001	<0.001
Total Manganese	mg/L	0.001	0.086			0.087						0.085		0.063	0.055
Mercury	mg/L	0.0001	<0.0001			<0.0001						<0.0001		<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.010			0.006						0.012		0.006	0.003
Dissolved Silver	mg/L	0.001	<0.001			<0.001						<0.001		<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.209			0.094						0.170		0.144	0.030
EC laboratory	uS/cm		321			366						291		328	209
Total Nitrogen	mg/L		4.2			0.6						2.8		1.6	1.6
Total Phosphorus	mg/L		0.26			0.05						0.31		0.08	0.22
Ammonia	mg/L		0.12			0.05						0.13		0.02	0.03
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$														
Chloride	mg/L											53			
Nitrate			<0.01			<0.01						<0.01		<0.01	<0.01
Sulphate	mg/L											11			
Calcium	mg/L											3			
Magnesium	mg/L											3			
Potassium	mg/L											2			
Sodium	mg/L											48			

Note – GW28 had insufficient water to collect a sample during June and August 2018 and from February 2019 onward on various occasions.

Table 70 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW028 May 21	Results											
Dissolved Aluminium	mg/L	0.01	0.02												
Dissolved Arsenic	mg/L	0.001	<0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.025												
Total Iron	mg/L	0.05	3.55												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.032												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	<0.001												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.038												
EC laboratory	uS/cm		166												
Total Nitrogen	mg/L		0.6												
Total Phosphorus	mg/L		0.07												
Ammonia	mg/L		0.02												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		9												
Chloride	mg/L		43												
Nitrate			0.01												
Sulphate	mg/L		4												
Calcium	mg/L		<1												
Magnesium	mg/L		2												
Potassium	mg/L		1												
Sodium	mg/L		30												

Note – GW28 had insufficient water to collect a sample during June and August 2018 and from February 2019 onward.

Table 71 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW29 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	0.16	0.72	0.78	29.4	35.8	1.06	301	64.4	0.47	0.69	33.1	1.8	0.98
Dissolved Arsenic	mg/L	0.001	0.004	0.002	0.002	0.017	0.009	<0.001	0.092	0.026	0.001	<0.001	0.004	<0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0010	0.0006	0.0001	0.0054	0.0016	<0.0001	<0.0001	0.0002	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	0.002	0.003	0.021	0.022	0.001	0.158	0.038	<0.001	<0.001	0.019	0.001	<0.001
Dissolved Copper	mg/L	0.001	0.014	0.022	0.017	0.154	0.116	0.015	1.23	0.433	0.039	0.003	0.146	0.008	0.023
Total Iron	mg/L	0.05	187	5.29	3.98	18.8	19.5	19.4	139	39.8	124	10.4	13.8	57.5	15.2
Dissolved Lead	mg/L	0.001	<0.001	0.001	<0.001	0.047	0.079	<0.001	0.352	0.099	<0.001	<0.001	0.031	<0.001	<0.001
Total Manganese	mg/L	0.001	3.29	0.089	0.099	0.289	0.26	0.306	2.36	0.937	1.73	0.217	0.26	1.1	0.376
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001	0.007	0.007	0.010	0.037	0.044	0.007	0.254	0.082	0.002	0.008	0.038	0.005	0.009
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.069	0.103	0.087	1.47	0.788	0.310	16.2	3.37	0.044	0.074	0.573	0.073	0.063
EC laboratory	uS/cm		274	145	158	195	211	205	253	201	240	240	227	315	225
Total Nitrogen	mg/L		5.5[%]	0.7	0.68			1.9							3.9
Total Phosphorus	mg/L		1.23[%]	0.1	0.085			0.40							0.56
Ammonia	mg/L		0.03	<0.02	0.09			0.02							0.05
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		46	17	23			16							29
Chloride	mg/L		46	27	29			33							38
Nitrate			0.01	0.01	0.1	0.64	0.03	0.04	0.15	0.33	1.09	0.02	0.08	<0.10	0.04
Sulphate	mg/L		28	6.4				22							22
Calcium	mg/L		36.3	0.74	0.77			<1							<1
Magnesium	mg/L		85.1	1.77	2.05			2							2
Potassium	mg/L		39.9	2.08	1.95			2							34
Sodium	mg/L		67.4	24.3	29.2			39							1

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Table 72 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW29 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	1.14	3.16	0.51	1.02	0.34	17.5	0.08	0.10	0.39	0.13		0.16	0.11
Dissolved Arsenic	mg/L	0.001	<0.001	0.002	0.002	0.001	0.003	0.004	0.002	0.001	<0.010	<0.001		0.001	0.001
Dissolved Cadmium	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0010	<0.0001		<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	0.002	<0.001	0.001	<0.001	0.010	<0.001	<0.001	<0.010	<0.001		<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.091	0.022	0.041	0.087	0.024	0.026	0.003	0.006	<0.010	0.038		0.143	0.030
Total Iron	mg/L	0.05	12.7	9.55	10.2	10.8	5.99	20.0	22.8	23.2	219	9.92		6.74	5.43
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	<0.010	<0.001		<0.001	<0.001
Total Manganese	mg/L	0.001	0.209	0.173	0.210	0.220	0.137	0.374	0.430	0.422	4.57	0.260		0.157	0.123
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.013	0.012	0.012	0.018	0.014	0.013	0.009	0.007	<0.010	0.026		0.018	0.009
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001		<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.165	0.141	0.162	0.114	0.216	0.274	0.072	0.237	0.477	0.184		0.118	0.071
EC laboratory	uS/cm		258	267	256	306	200	205	266	284	333	344		402	227
Total Nitrogen	mg/L		1.6	1.1	1.4	0.3	1.8	4.9	2.3	4.2	58.6	0.4		1.4	1.1
Total Phosphorus	mg/L		0.21	0.19	0.25	0.17	0.33	0.76	0.53	0.70	11.0	0.12		0.06	0.09
Ammonia	mg/L		0.06	0.03	0.06	0.02	0.06	0.06	0.13	0.21	0.44	0.03		<0.01	0.06
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						52								
Chloride	mg/L						41					51			
Nitrate			0.70	0.08	0.07	0.04	0.23	1.14	0.02	0.13	0.04	0.10		<0.01	0.04
Sulphate	mg/L						9					15			
Calcium	mg/L						1					5			
Magnesium	mg/L						3					6			
Potassium	mg/L						2					2			
Sodium	mg/L						44					51			

Note – GW29 had no access in June 2020.

Table 73 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW29 May 21	Results											
Dissolved Aluminium	mg/L	0.01	0.11												
Dissolved Arsenic	mg/L	0.001	0.001												
Dissolved Cadmium	mg/L	0.0001	<0.0001												
Dissolved Chromium	mg/L	0.001	<0.001												
Dissolved Copper	mg/L	0.001	0.025												
Total Iron	mg/L	0.05	5.87												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.095												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.009												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.104												
EC laboratory	uS/cm		218												
Total Nitrogen	mg/L		1.1												
Total Phosphorus	mg/L		0.16												
Ammonia	mg/L		0.03												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		38												
Chloride	mg/L		39												
Nitrate			0.01												
Sulphate	mg/L		14												
Calcium	mg/L		4												
Magnesium	mg/L		3												
Potassium	mg/L		1												
Sodium	mg/L		39												

Table 74 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW30 Results												
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	Nov 17	Jan 18
Dissolved Aluminium	mg/L	0.01	1.36	0.06	0.05	6.79	7.49	0.17	17.2	31.4	0.6	0.58	7.19	0.93	0.76
Dissolved Arsenic	mg/L	0.001	0.001	0.002	0.002	0.022	0.008	<0.001	0.007	0.01	0.001	<0.001	0.003	0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0010	<0.0001	0.0001	0.0002	0.0001	0.0002	0.0002	<0.0001	0.0004	0.0004
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	0.001	0.007	0.006	<0.001	0.008	0.021	<0.001	<0.001	0.006	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.175	0.009	0.01	0.127	1.69	0.650	0.801	1.29	1.41	1.19	0.757	4	5.49
Total Iron	mg/L	0.05	16.8	6.37	17.3	9.16	6.32	19.3	16	26	32.2	7.33	5.11	25.6	27.2
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.005	0.057	<0.001	0.006	0.017	<0.001	<0.001	0.004	<0.001	<0.001
Total Manganese	mg/L	0.001	1.10	0.162	0.187	0.168	0.305	0.485	0.378	1.01	1.1	1.44	0.774	2.21	2.82
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<0.0001							<0.0001
Dissolved Nickel	mg/L	0.001	0.067	0.004	0.004	0.006	0.016	0.018	0.024	0.059	0.061	0.069	0.051	0.092	0.09
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.310	0.018	0.029	0.068	0.098	0.236	0.173	0.372	0.291	0.35	0.247	0.474	0.495
EC laboratory	uS/cm		2820	435	511	677	1020	1420	1290	1880	2280	2600	2260	2880	2810
Total Nitrogen	mg/L		0.6	0.6	0.88			1.7							18
Total Phosphorus	mg/L		0.11	0.06	0.10			0.32							3.44
Ammonia	mg/L		0.03	<0.02	0.11			<0.01							0.09
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		<5	120	95			9							3
Chloride	mg/L		798	39	76			355							708
Nitrate			0.24	<0.01	0.12	0.03	0.41	0.34	0.02	0.01	0.07	0.02	0.06	<0.01	<0.01
Sulphate	mg/L		232	32				102							123
Calcium	mg/L		3.37	15.6	5.74			2							5
Magnesium	mg/L		31.9	3.58	3.73			11							35
Potassium	mg/L		6.59	1.96	6.33			2							455
Sodium	mg/L			78.2	105			263							3

* Analysis of all metals for July 2015, November 2015, April 2016, August 2016 and July 2017 events are for “total” metals despite otherwise indicated in table.

Table 75 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW30 Results												
			Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21
Dissolved Aluminium	mg/L	0.01	0.72	0.86	0.97	0.82	0.98	0.47	0.38			1.01	0.96	0.09	0.73
Dissolved Arsenic	mg/L	0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.017	0.026			<0.001	0.002	0.001	<0.001
Dissolved Cadmium	mg/L	0.0001	0.0004	0.0004	0.0004	0.0006	0.0005	0.0006	0.0007			0.0012	0.0005	0.0015	0.0008
Dissolved Chromium	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			0.003	0.008	<0.001	0.006
Dissolved Copper	mg/L	0.001	5.55	2.64	2.82	11.2	8.69	1.58	0.654			7.76	0.212	0.578	0.662
Total Iron	mg/L	0.05	61.6	29.6	14.6	19.7	23.3	164	166			52.3	5.52	17.7	4.23
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			<0.001	<0.001	<0.001	<0.001
Total Manganese	mg/L	0.001	2.73	2.37	2.81	3.50	4.10	7.35	9.92			4.49	3.87	4.48	2.50
Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			<0.0001	<0.0001	<0.0001	<0.0001
Dissolved Nickel	mg/L	0.001	0.089	0.095	0.098	0.121	0.135	0.127	0.151			0.289	0.154	0.152	0.169
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			<0.001	<0.001	<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.485	0.493	0.493	0.628	0.700	0.580	0.565			1.02	0.362	0.626	0.594
EC laboratory	uS/cm		2890	2800	3010	3170	3600	3510	3020			3890	3930	4160	3720
Total Nitrogen	mg/L		4.4	1.5	2.2	0.8	12.3	91.6	198			7.0	1.1	1.6	1.2
Total Phosphorus	mg/L		1.00	0.33	0.40	0.19	2.63	16.3	52.3			1.39	0.16	0.19	0.09
Ammonia	mg/L		0.14	0.18	0.07	0.02	0.12	0.41	1.20			0.34	0.22	0.04	0.10
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$						4								
Chloride	mg/L						1090					1050			
Nitrate			<0.01	0.01	<0.10	<0.01	<0.01	<0.01	<0.10			<0.01	0.01	<0.01	0.34
Sulphate	mg/L						128					125			
Calcium	mg/L						8					11			
Magnesium	mg/L						52					66			
Potassium	mg/L						3					4			
Sodium	mg/L						562					659			

Note – GW30 had insufficient water to collect a sample during October 2019 and January 2020.

Table 76 Cumulative construction groundwater quality monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW30 May 21	Results											
Dissolved Aluminium	mg/L	0.01	0.20												
Dissolved Arsenic	mg/L	0.001	0.006												
Dissolved Cadmium	mg/L	0.0001	0.0002												
Dissolved Chromium	mg/L	0.001	0.001												
Dissolved Copper	mg/L	0.001	0.116												
Total Iron	mg/L	0.05	12.7												
Dissolved Lead	mg/L	0.001	<0.001												
Total Manganese	mg/L	0.001	0.472												
Mercury	mg/L	0.0001	<0.0001												
Dissolved Nickel	mg/L	0.001	0.021												
Dissolved Silver	mg/L	0.001	<0.001												
Dissolved Zinc	mg/L	0.005	0.110												
EC laboratory	uS/cm		2390												
Total Nitrogen	mg/L		1.2												
Total Phosphorus	mg/L		0.18												
Ammonia	mg/L		0.04												
Phosphate	mg/L														
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		69												
Chloride	mg/L		605												
Nitrate			0.02												
Sulphate	mg/L		200												
Calcium	mg/L		14												
Magnesium	mg/L		22												
Potassium	mg/L		3												
Sodium	mg/L		452												

Table 77 Cumulative construction groundwater level – manual record

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Dec 14	Feb 15	Apr 2015	July 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jul 2016
GW01 (mTOC)	20.11	5.65	5.02	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	5.85	5.98
GW01 (mAHD)														
GW02 (mTOC)	3.57	3.17	1.77	1.34	1.88	Not taken	1.84	1.47	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW02 (mAHD)														
GW03 (mTOC)	2.64	2.29	0.64	0.2	0.08	Not taken	0.27	0.25	0.32	Not taken	0.6	0.12	0.8	0.37
GW03 (mAHD)														
GW04 (mTOC)	1.69	2.37	0.96	0.43	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	1.47	1.12
GW04 (mAHD)														
GW05 (mTOC)	1.24	1.79	0.55	0.17	0.47	Not taken	0.16	0.25	0.34	Not taken	Not taken	Not taken	0.71	0.50
GW05 (mAHD)														
GW06 (mTOC)	20.1	Dry	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	2.22	2.27
GW06 (mAHD)														
GW07 (mTOC)	15.98	6.79 (dry)	1.81	1.0	Dry	Not taken	5.6	5.36	4.41	Not taken	5.37	6.36	6.65	6.46
GW07 (mAHD)														
GW08 (mTOC)	19.09	8.58	7.97	4.6	13.28	Dry	Dry	7.05	Dry	7.52	8.3	Dry	Dry	8.07
GW08 (mAHD)														

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Dec 14	Feb 15	Apr 2015	July 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jul 2016
GW09 (mTOC)	17.57	Dry	Dry	Dry	8.54	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Dry	Not taken
GW09 (mAHD)														
GW10 (mTOC)	15.38	7.31	2.74	5.69	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Dry	Dry
GW10 (mAHD)														
GW11 (mTOC)	1.591	2.99	Not taken	1.55	1.13	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	4.34	Not taken
GW11 (mAHD)														
GW12 (mTOC)	1.573	1.60	0.38	0.2	0.34	Not taken	0.2	0.23	0.31	Not taken	0.74	0.3	0.9	0.48
GW12 (mAHD)														
GW13 (mTOC)	2.04	2.08	0.98	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	1.74	1.19
GW13 (mAHD)														
GW14 (mTOC)	5.656	3.92	2.60	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	1.95	1.37
GW14 (mAHD)														
GW15 (mTOC)	13.79	10.45	10.63	10.5	10.04	Not taken	9.9	9.74	8.95	Not taken	8.94	9.26	9.36	6.83
GW15 (mAHD)														
GW16 (mTOC)	14.14	Dry	Dry	Dry	Dry	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW16 (mAHD)														

Borehole reference	Top of casing RL (mAHD)	Depth of water level												
		Construction												
		Dec 14	Feb 15	Apr 2015	July 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jul 2016
GW17 (mTOC)	59.47	Dry	Dry	12.72	11.66	Not taken	11.82	11.54	11.5	Not taken	11.46	11.5	11.5	11.19
GW17 (mAHD)														
GW18 (mTOC)	96.71	34.09	33.70	33.76	33.71	Not taken	32.78	33.9	33.86	Not taken	33.78	33.72	33.67	33.66
GW18 (mAHD)														
GW19 (mTOC)	51.81	9.45	6.28	5.59	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Dry	Dry
GW19 (mAHD)														
GW20 (mTOC)	87.18	Dry	32.80 (dry)	32.83	33.08	Dry	33.15	Dry	Dry	Dry	Not taken	Not taken	Not taken	Not taken
GW20 (mAHD)														
GW21 (mTOC)	51.29	4.19	3.34	1.65	4.27	Not taken	4.76	2.23	2.82	Not taken	2.72	3.42	3.99	2.82
GW21 (mAHD)														
GW22 (mTOC)	17.27	3.37	2.34	0.76	3.21	Not taken	2.29	1.42	1.67	Not taken	1.66	0.45	Not taken	Not taken
GW22 (mAHD)														
GW23 (mTOC)	39.22	16.29	15.98	15.91	15.99	Not taken	16.7	17.2	17.14	Not taken	16.87	Not taken	16.85	Not taken
GW23 (mAHD)														
GW24 (mTOC)	26.09	8.05	3.51	6.15	7.45	Dry	Dry	6.5	7.16	Not taken	7.5	7.84	Dry	6.18
GW24 (mAHD)														

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Dec 14	Feb 15	Apr 2015	July 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jul 2016
GW25 (mTOC)	61.72	13.04	12.30	12.32	12.55	Not taken	13.08	Dry	Dry	Dry	Dry	Dry	Dry	Dry
GW25 (mAHD)														
GW26 (mTOC)	54.56	15.00	13.58	13.45	14.5	Not taken	15.1	14.1	13.81	Not taken	14.41	13.88	14.28	13.70
GW26 (mAHD)														
GW27 (mTOC)	74.33	28.41	27.47	27.21	28.58	Dry	29.25	29.17	26.67	Not taken	27.24	27.52	28.08	28.08
GW27 (mAHD)														
GW28 (mTOC)	54.65	9.37	9.02	8.05	9.05	Dry	Dry	8.76	9.1	Not taken	9.44	Dry	Dry	9.02
GW28 (mAHD)														
GW29 (mTOC)	45.11	8.49	3.39	1.33	5.73	Not taken	6.88	5.89	7.37	Not taken	8.08	8.73	8.49	6.87
GW29 (mAHD)														
GW30 (mTOC)	41.49	5.14	2.61	2.76	2.86	Not taken	2.95	3.12	4.59	Not taken	4.57	5.06	5.43	5.55
GW30 (mAHD)														

Table 78 Cumulative construction groundwater level – manual record (cont.)

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
GW01 (mTOC)	20.11	6.1	6.17	6.27	6.31	6.22	6.20	NA	6.30	NA	6.36	6.26	6.50	6.53
GW01 (mAHD)														

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
GW02 (mTOC)	3.57	Destroyed	2.93	3.10	3.46	3.84	No access	No access	2.82	NA	3.30	3.06	3.29	Destroyed
GW02 (mAHD)														
GW03 (mTOC)	2.64	0.62	0.47	0.58	0.80	1.52	1.84	0.16	0.48	NA	0.60	0.50	0.66	1.12
GW03 (mAHD)														
GW04 (mTOC)	1.69	1.34	1.26	1.41	No access	No access	No access	No access	No access	No access	No access	No access	1.40	1.58
GW04 (mAHD)														
GW05 (mTOC)	1.24	0.61	0.45	0.49	No access	No access	No access	No access	No access	No access	No access	No access	0.52	0.75
GW05 (mAHD)														
GW06 (mTOC)	20.1	2.26	2.06	2.23	2.26	2.25	2.31	2.16	1.98	NA	No access	1.96	2.17	2.52
GW06 (mAHD)														
GW07 (mTOC)	15.98	6.67	5.46	No access	5.79	6.02	6.42	No access	4.16	NA	No access	4.95	5.91	6.32
GW07 (mAHD)														
GW08 (mTOC)	19.09	8.07	Dry	Dry	Dry	8.26	Dry	3.12	7.98	NA	Dry	8.26	Dry	Dry
GW08 (mAHD)														
GW09 (mTOC)	17.57	No access	No access	No access	Dry	Dry	Dry	No access	Dry	Dry	No access	Dry	Dry	No access
GW09 (mAHD)														
GW10 (mTOC)	15.38	Dry	Dry	Dry	Dry	Dry	Dry	3.88	Dry	Dry	Dry	Dry	Dry	Dry
GW10														

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
(mAHD)														
GW11 (mTOC)	1.591	4.33	No access	No access	4.42	4.60	4.72	No access	4.23	No access	No access	2.34	2.61	2.98
GW11 (mAHD)														
GW12 (mTOC)	1.573	No access	0.60	0.60	0.90	1.41	No access	0.43	0.67	NA	0.85	0.87	1.05	1.12
GW12 (mAHD)														
GW13 (mTOC)	2.04	1.43	1.49	1.37	1.72	1.82	1.91	0.42	1.14	NA	1.30	No access	Destroyed	Destroyed
GW13 (mAHD)														
GW14 (mTOC)	5.656	1.51	1.39	No access	2.42	2.65	No access	No access	No access	No access	No access	No access	No access	2.11
GW14 (mAHD)														
GW15 (mTOC)	13.79	9.13	9.03	9.41	9.85	10.08	10.17	NA	9.87	NA	9.90	9.74	9.78	9.97
GW15 (mAHD)														
GW16 (mTOC)	14.14	Destroyed	Destroyed	Destroyed	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	No access	Dry
GW16 (mAHD)														
GW17 (mTOC)	59.47	11.32	11.18	11.47	11.52	11.74	11.86	11.62	11.26	NA	11.41	11.33	11.45	11.76
GW17 (mAHD)														
GW18 (mTOC)	96.71	33.63	33.55	33.51	33.49	33.46	33.47	33.45	33.30	NA	33.46	33.39	33.35	33.32
GW18 (mAHD)														
GW19 (mTOC)	51.81	No access	Dry	Dry	Dry	No access	No access	No access	Dry	Dry	Dry	Dry	Dry	Dry

Borehole reference	Top of casing RL (mAHD)	Depth of water level												
		Construction												
		Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
GW19 (mAHD)														
GW20 (mTOC)	87.18	No access	32.83	Dry	Dry	Dry	Dry	No access	Dry	Dry	Dry	Dry	Dry	Dry
GW20 (mAHD)														
GW21 (mTOC)	51.29	3.31	3.19	4.02	4.22	4.56	4.86	No access	No access	NA	No access	No access	No access	No access
GW21 (mAHD)														
GW22 (mTOC)	17.27	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW22 (mAHD)														
GW23 (mTOC)	39.22	16.75	No access	17.62	16.61	16.66	16.55	No access	16.48	NA	16.35	16.31	16.26	16.27
GW23 (mAHD)														
GW24 (mTOC)	26.09	7.47	7.38	7.73	7.72	Dry	Dry	5.42	6.77	NA	7.57	7.33	7.79	7.96
GW24 (mAHD)														
GW25 (mTOC)	61.72	Dry	Dry	Dry	Dry	Dry	Dry	Dry	12.47	NA	12.75	12.77	12.75	Dry
GW25 (mAHD)														
GW26 (mTOC)	54.56	14.30	13.96	14.55	14.51	14.56	14.85	10.54	12.91	NA	14.00	13.90	14.11	14.71
GW26 (mAHD)														
GW27 (mTOC)	74.33	28.59	No access	28.88	No access	No access	28.80	No access	27.34	NA	28.25	27.67	28.07	28.07
GW27 (mAHD)														
GW28	54.65	9.40	9.05	Dry	9.33	Dry	Dry	7.53	9.06	NA	9.07	9.03	Dry	Dry

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
(mTOC)														
GW28 (mAHD)														
GW29 (mTOC)	45.11	8.10	8.46	8.75	8.72	8.32	8.44	No access	6.49	NA	7.06	7.22	7.60	8.71
GW29 (mAHD)														
GW30 (mTOC)	41.49	5.58	4.90	5.20	5.20	5.83	6.03	6.24	5.65	NA	5.67	4.91	5.24	5.65
GW30 (mAHD)														

Table 79 Cumulative construction groundwater level – manual record (cont.)

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
GW01 (mTOC)	20.11	6.50	6.43	6.40	6.35	6.41	6.44	6.45	6.59	6.57	6.56	6.58	6.72	6.76
GW01 (mAHD)														
GW02 (mTOC)	3.57	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW02 (mAHD)														
GW03 (mTOC)	2.64	0.20	0.83	0.44	1.03	0.24	0.75	No access	No access	No access	No access	No access	No access	No access
GW03 (mAHD)														
GW04 (mTOC)	1.69	No access	No access	No access	No access	No access	0.43	1.10	1.56	1.33	2.28	0.73	1.98	1.92
GW04 (mAHD)														
GW05	1.24	No	No	No	No	No	0.68	0.48	No	No	No	2.23	0.56	0.56

Borehole reference	Top of casing RL (mAHD)	Depth of water level												
		Construction												
		Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
(mTOC)		access	access	access	access	access			access	access	access			
GW05 (mAHD)														
GW06 (mTOC)	20.1	2.42	2.30	2.22	2.33	2.25	2.32	2.30	2.54	2.04	2.50	2.39	2.64	2.83
GW06 (mAHD)														
GW07 (mTOC)	15.98	Dry	6.49	6.48	Dry	Dry	5.20	6.40	Dry	Dry	Dry	Dry	Dry	Dry
GW07 (mAHD)														
GW08 (mTOC)	19.09	Dry	8.26	8.17	8.53	Dry	Dry	8.27	Dry	Dry	Dry	8.39	Dry	Dry
GW08 (mAHD)														Dry
GW09 (mTOC)	17.57	3.97	No access	No access	7.11	6.84	Dry	7.02	7.43	7.11	7.05	7.05	Dry	Dry
GW09 (mAHD)														Dry
GW10 (mTOC)	15.38	5.19	Dry	Dry	Dry	Dry	Dry	6.64	Dry	Dry	Dry	Dry	Dry	Dry
GW10 (mAHD)														
GW11 (mTOC)	1.591	1.04	2.28	1.55	2.23	1.79	2.30	1.47	2.60	1.72	2.90	3.04	2.97	3.76
GW11 (mAHD)														
GW12 (mTOC)	1.573	0.59	1.04	1.00	1.38	0.97	1.04	No access	No access	No access	No access	No access	No access	No access
GW12 (mAHD)														
GW13 (mTOC)	2.04	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	3.57	3.91	4.01	3.88	4.04
GW13 (mAHD)														
GW14	5.656	1.88	1.72	1.70	No	1.80	1.77	1.06	1.94	1.72	No	2.95	2.63	2.86

Borehole reference	Top of casing RL (mAHD)	Depth of water level												
		Construction												
		Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
(mTOC)					access						access			
GW14 (mAHD)														
GW15 (mTOC)	13.79	10.08	10.01	9.98	9.96	10.03	9.97	9.96	10.10	10.10	10.32	10.45	10.64	10.76
GW15 (mAHD)														
GW16 (mTOC)	14.14	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
GW16 (mAHD)														
GW17 (mTOC)	59.47	11.76	11.75	11.74	11.77	11.78	11.57	11.68	11.67	11.62	11.91	11.92	11.47	12.10
GW17 (mAHD)														
GW18 (mTOC)	96.71	33.32	33.31	33.33	33.26	33.28	33.27	33.24	33.18	33.18	33.16	33.20	33.3	33.29
GW18 (mAHD)														
GW19 (mTOC)	51.81	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry	Dry
GW19 (mAHD)														
GW20 (mTOC)	87.18	Dry	33.14	No access	33.17	Dry	33.17	Dry	Dry	Dry	Dry	Dry	Dry	Dry
GW20 (mAHD)														
GW21 (mTOC)	51.29	No access	No access	3.20	3.68	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW21 (mAHD)														
GW22 (mTOC)	17.27	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW22 (mAHD)														
GW23	39.22	16.34	16.29	16.27	16.23	16.25	16.24	16.20	16.18	16.20	16.19	16.23	16.37	16.36

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
(mTOC)														
GW23 (mAHD)														
GW24 (mTOC)	26.09	Dry	Dry	6.98	7.70	6.98	7.10	6.95	7.72	7.70	7.98	8.00	7.69	7.76
GW24 (mAHD)														
GW25 (mTOC)	61.72	Dry	Dry	Dry	12.97	Dry	Dry	12.78	Dry	Dry	Dry	Dry	Dry	Dry
GW25 (mAHD)														
GW26 (mTOC)	54.56	14.85	14.32	13.74	14.16	14.26	13.26	14.17	14.71	Dry	Dry	14.96	Dry	Dry
GW26 (mAHD)														
GW27 (mTOC)	74.33	28.81	28.78	28.65	28.71	28.74	28.26	28.72	28.90	Dry	28.93	29.25	29.24	29.24
GW27 (mAHD)														
GW28 (mTOC)	54.65	Dry	Dry	Dry	9.45	Dry	9.08	Dry	Dry	9.09	Dry	Dry	Dry	Dry
GW28 (mAHD)														
GW29 (mTOC)	45.11	7.72	7.32	6.57	7.14	7.00	6.90	6.45	7.24	7.04	7.29	7.54	7.29	8.38
GW29 (mAHD)														
GW30 (mTOC)	41.49	6.05	6.30	6.38	6.48	6.56	6.52	6.46	6.32	6.31	6.50	6.93	7.26	Dry
GW30 (mAHD)														

Table 80 Cumulative construction groundwater level – manual record (cont.)

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW01 (mTOC)	20.11	6.67	6.44	6.55	6.32	6.12	5.76							
GW01 (mAHD)														
GW02 (mTOC)	3.57	No access	No access	No access	No access	No access	No access							
GW02 (mAHD)														
GW03 (mTOC)	2.64	No access	No access	No access	No access	No access	No access							
GW03 (mAHD)														
GW04 (mTOC)	1.69	2.46	1.24	1.04	1.15	1.06	1.02							
GW04 (mAHD)														
GW05 (mTOC)	1.24	1.12	No access	No access	0.44	No access	1.45							
GW05 (mAHD)														
GW06 (mTOC)	20.1	3.00	2.36	2.2	2.20	1.83	1.55							
GW06 (mAHD)														
GW07 (mTOC)	15.98	Dry	Dry	Dry	Dry	3.03	4.75							
GW07 (mAHD)														
GW08 (mTOC)	19.09	Dry	8.28	Dry	Dry	8.28	8.29							
GW08 (mAHD)														

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW09 (mTOC)	17.57	Dry	7.16	Dry	Dry	5.04	5.36							
GW09 (mAHD)														
GW10 (mTOC)	15.38	Dry	6.99	2.46	Dry	1.07	4.38							
GW10 (mAHD)														
GW11 (mTOC)	1.591	4.25	2.55	3.23	2.85	1.32	1.7							
GW11 (mAHD)														
GW12 (mTOC)	1.573	No access	No access	No access	No access	No access	No access							
GW12 (mAHD)														
GW13 (mTOC)	2.04	4.10	3.40	3.55	3.53	3.29	3.28							
GW13 (mAHD)														
GW14 (mTOC)	5.656	3.62	1.76	2.04	1.75	1.55	1.51							
GW14 (mAHD)														
GW15 (mTOC)	13.79	10.90	10.32	10.42	10.27	10.04	9.74							
GW15 (mAHD)														
GW16 (mTOC)	14.14	Dry	Dry	Dry	Dry	Dry	Dry							
GW16 (mAHD)														

Borehole reference	Top of casing RL (mAHD)	Depth of water level Construction												
		Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW17 (mTOC)	59.47	12.23	11.21	11.48	11.57	11.05	10.84							
GW17 (mAHD)														
GW18 (mTOC)	96.71	33.33	33.40	33.39	33.35	33.28	33.08							
GW18 (mAHD)														
GW19 (mTOC)	51.81	Dry	Dry	Dry	Dry	Dry	Dry							
GW19 (mAHD)														
GW20 (mTOC)	87.18	Dry	Dry	Dry	Dry	Dry	Dry							
GW20 (mAHD)														
GW21 (mTOC)	51.29	No access	No access	No access	No access	No access	No access							
GW21 (mAHD)														
GW22 (mTOC)	17.27	No access	No access	No access	No access	No access	No access							
GW22 (mAHD)														
GW23 (mTOC)	39.22	16.36	16.40	Dry	16.40	16.26	16.13							
GW23 (mAHD)														
GW24 (mTOC)	26.09	Dry	7.00	7.37	7.00	6.62	6.8							
GW24 (mAHD)														

Borehole reference	Top of casing RL (mAHD)	Depth of water level												
		Construction												
		Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW25 (mTOC)	61.72	Dry	Dry	12.76	Dry	12.61	12.73							
GW25 (mAHD)														
GW26 (mTOC)	54.56	Dry	13.44	14.36	14.74	12.32	13.56							
GW26 (mAHD)														
GW27 (mTOC)	74.33	29.30	27.52	No access	28.70	27.28	27.63							
GW27 (mAHD)														
GW28 (mTOC)	54.65	Dry	9.06	909	9.08	8.77	7.09							
GW28 (mAHD)														
GW29 (mTOC)	45.11	8.77	6.43	No access	7.00	6.0	6.42							
GW29 (mAHD)														
GW30 (mTOC)	41.49	Dry	6.80	6.5	6.42	5.76	4.28							
GW30 (mAHD)														

Table 81 Cumulative construction groundwater monitoring (EC) – manual record

Borehole reference	Electrical conductivity (uS/cm)												
	Construction												
	Dec 14	Feb 15	Apr 2015	Jul 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jul 2016
GW01	446	202	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	5619	6750
GW02	31600	16400	25700	Not taken	662	589	817	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed

Borehole reference	Electrical conductivity (uS/cm)												
	Construction												
	Dec 14	Feb 15	Apr 2015	Jul 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jul 2016
GW03	118	85000	57400	Not taken	959	729	679	866	1267	1167	1149	1192	1125
GW04	450	294	356	Not taken	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	1035	791
GW05	737	666	768	Not taken	6025	5010	6	4975	6283	Not taken	Not taken	6138	5963
GW06	Dry	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	4732	4629
GW07	Dry	20300	272	Not taken	1578	189	173	138	179	150.6	210	Insufficient	171
GW08	47700	140	47900	Not taken	Dry	Insufficient	656	Insufficient	733	493.4	Insufficient	Insufficient	732
GW09	Dry	Dry	Insufficient	Not taken	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Insufficient	Not taken
GW10	46300	39000	65900	Not taken	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Insufficient	Dry
GW11	845	416	112	Not taken	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	1622	Not taken
GW12	399	271	273	Not taken	1376	1265	1457	1199	1421	1556	1352	1495	1371
GW13	39100	22400	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	173	216
GW14	340	308	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	1897	17820
GW15	371	359	410	Not taken	3333	2957	3275	2782	3394	3194	3180	3093	3306
GW16	Dry	Dry	Insufficient water	Not taken	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW17	Dry	Dry	415	Not taken	3555	3151	3454	2888	3480	3250	8	3355	3246
GW18	162	155	182	Not taken	1513	1469	1518	1337	1543	1510	3	1527	1476
GW19	60000	40900	83700	Not taken	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Insufficient	Insufficient
GW20	Dry	Dry	Insufficient	Not taken	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Not taken	Not taken	Not taken	Not taken
GW21	100400	67100	82200	Not taken	731	833	490	666	9	1038	404	1343	584
GW22	50200	31300	33700	Not taken	478	403	345	273	336	194	637	Not taken	Not taken
GW23	54100	14300	21700	Not taken	230	288	216	192	275	281	Not taken	308	Not taken
GW24	54000	55500	62900	Not taken	Insufficient	Insufficient	358	464	336	235	624	Insufficient	378
GW25	158	90100	49600	Not taken	548	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Dry
GW26	87800	84500	83100	Not taken	1060	Insufficient	871	732	878	420	871	425	500
GW27	87200	47200	39100	Not taken	Insufficient	Insufficient	464	491	536	588	611	625	339
GW28	28400	Dry	22000	Not taken	Insufficient	Insufficient	202	Insufficient	140	Insufficient	Insufficient	Insufficient	213
GW29	26800	14100	17500	Not taken	202	187	191	171	191	212	221	220	218
GW30	257	39400	56900	Not taken	1075	1062	854	1072	438	778	1124	1360	401

Table 82 Cumulative construction groundwater monitoring (EC) – manual record (cont.)

Borehole reference	Electrical conductivity (uS/cm) Construction												
	Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
GW01	~~0.1~~	~~5.701~~	5504	5660	740.1	727.6	47.7	3651	6806	3393	4118	78.3	4229
GW02	~~Destroyed~~	~~0.771~~	1186	486	988	No access	No access	406	545	574	608	698	Destroyed
GW03	~~37.1~~	~~1.297~~	1551	1525	1422	1254	503	1420	1273	1278	1535	1488	1424
GW04	~~49.2~~	~~0.735~~	1829	No access	No access	No access	No access	No access	No access	No access	No access	1215	1326
GW05	~~76.1~~	~~5.896~~	4594	No access	No access	No access	No access	No access	No access	No access	No access	7089	6794
GW06	~~47.1~~	~~5.070~~	5241	4314	6079	6052	2740	3185	5712	No access	4603	6213	6251
GW07	~~Insufficient~~	~~0.141~~	No access	175	242	31.5	No access	161.8	218.7	No access	219.9	318.9	252.8
GW08	~~Insufficient~~	~~Insufficient~~	Insufficient	Insufficient	737	Insufficient	270.3	4.8	218.7	Insufficient	762	Insufficient	Insufficient
GW09	~~No access~~	~~No access~~	No access	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	No access	Insufficient	Insufficient	No access
GW10	~~Insufficient~~	~~Insufficient~~	Insufficient	Insufficient	Insufficient	Insufficient	61.7	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW11	~~0.9~~	~~No access~~	No access	1383	2089	1756	No access	1166	No access	No access	1211	1231	1718
GW12	~~No access~~	~~0.022~~	1713	1609	1971	No access	2.8	119.8	1907.0	993	4538	2362	2017
GW13	~~5.5~~	~~0.218~~	357	234.8	236.8	301.5	303.7	310.5	284	319.3	Destroyed	Destroyed	Destroyed
GW14	~~16807~~	~~17.467~~	No access	8707	19353	No access	No access	No access	No access	No access	No access	No access	17015
GW15	~~3142~~	~~2.160~~	2621	7244	3503	3370	1596	3511	3075	1015	1567	3134	3350
GW16	~~Destroyed~~	~~Destroyed~~	Destroyed	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Destroyed	Insufficient
GW17	~~3218~~	~~3.109~~	2758	2302	3428	3144	1498	3400	2802	1479	3199	2947	3004
GW18	~~1473~~	~~1.415~~	1496	1427	1646	1527	760	1778	1431	780	1668	1578	1590
GW19	~~No access~~	~~Insufficient~~	Insufficient	Insufficient	No access	No access	No access	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW20	~~No access~~	~~0.833~~	Insufficient	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW21	~~668~~	~~0.486~~	777	901	1172	1377	No access	No access	633	No access	No access	No access	No access
GW22	~~No access~~	~~No access~~	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW23	~~244~~	~~No access~~	283	262	332	2.7	No access	318.6	253.6	146.2	316.9	310.9	342.9
GW24	~~52.8~~	~~0.557~~	409.1	264.1	Insufficient	Insufficient	128.1	634	581	154.2	4.6	553	Insufficient
GW25	~~Insufficient~~	~~Insufficient~~	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	185.1	Insufficient	Insufficient	Insufficient	341.6	Insufficient
GW26	~~599~~	~~0.664~~	423.5	632	786	758	84.0	368.3	708.0	379	779	774	832
GW27	~~463.4~~	~~No access~~	539	No access	No access	566	No access	343.5	334.7	221.5	397.8	353.7	380.2
GW28	~~Insufficient~~	~~229.6~~	Insufficient	Insufficient	Insufficient	Insufficient	117.1	299.3	170.6	Insufficient	232.3	Insufficient	Insufficient
GW29	~~184~~	~~412.1~~	258.7	225.3	202.6	199.9	No access	261.6	151.4	44	299.2	237.4	214.8

Borehole reference	Electrical conductivity (uS/cm)												
	Construction												
	Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
GW30	~~1495~~	~~1897~~	1697	1405	2274	2132	1017	2533	2216	1099	278.0	2257	2509

Table 83 Cumulative construction groundwater monitoring (EC) – manual record (cont.)

Borehole reference	Electrical conductivity (uS/cm)												
	Construction												
	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
GW01	6858	7097	7536	7302	7436	6408	6661	7084	3148	3.4	6081	27.4	7116
GW02	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW03	656	526	670	758	533	41.4	No access	No access	No access	No access	No access	No access	No access
GW04	No access	No access	No access	No access	No access	1550	639	1339	205.7	3390	287.4	10.9	2396
GW05	No access	No access	No access	No access	No access	39.9	54.8	No access	No access	No access	1664	13503	17086
GW06	6066	3432	6974	3385	68.6	5886	5837	3328	5941	3046	1850	5002	5465
GW07	Insufficient	Insufficient	278	Insufficient	Insufficient	2.3	235.9	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW08	Insufficient	327.9	759	Insufficient	Insufficient	Insufficient	935	Insufficient	Insufficient	Insufficient	706	Insufficient	Insufficient
GW09	448.7	No access	No access	263.2	462.7	Insufficient	476.5	Insufficient	Insufficient	Insufficient	337	Insufficient	Insufficient
GW10	1082	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	642	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW11	547	495.1	492	527	522	5.6	410.4	556	320.9	274.2	316	820	847
GW12	2980	1079	2493	1404	3353	1457	No access	No access	No access	No access	No access	No access	No access
GW13	No access	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	210.0	126.1	219.6	306.2	219
GW14	17445	11024	19681	No access	17137	22.3	7918	13875	10826	No access	10371.0	4681.0	4906.0
GW15	3123	1676	3597	3.33	3456	3.0	3222	2970	3362	9	3257	3507	3317
GW16	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW17	2854	1620	3207	1505	2952	2554	6.6	3106.0	2768	3055	2756	2898	2697
GW18	1534	816	789	913	1649	19.3	15.2	1820	1629	908	1599	1702	1549
GW19	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW20	Insufficient	Insufficient	No access	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW21	No access	No access	623	375.5	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW22	364.3	207.8	339	344.2	396.6	No access	No access	No access	No access	No access	No access	No access	No access

Borehole reference	Electrical conductivity (uS/cm)												
	Construction												
	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
GW23	No access	No access	No access	No access	No access	10.9	270.6	421.2	421.7	277.8	514	593	589
GW24	Insufficient	Insufficient	383	208.7	383	3.2	400.4	608	552	Insufficient	Insufficient	Insufficient	624
GW25	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	387.7	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW26	768	896	745	462	770	11.5	5.0	812.0	Insufficient	Insufficient	785.0	Insufficient	Insufficient
GW27	302.4	275.2	2.0	253.8	508.0	171.5	384.5	488.2	Insufficient	718.0	Insufficient	Insufficient	Insufficient
GW28	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	164.4	Insufficient	Insufficient	342.0	Insufficient	Insufficient	Insufficient	Insufficient
GW29	295.1	120.7	328	149.6	260.6	6.3	10.2	294.7	277.6	Insufficient	130.6	283	262.1
GW30	2442	2305	2778	1371	2630	5.9	1190	2982	2909	Insufficient	6.9	Malfunction	Insufficient

Table 84 Cumulative construction groundwater monitoring (EC) – manual record (cont.)

Borehole reference	Electrical conductivity (uS/cm)												
	Construction												
	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW01	7098	43.7		3655	6854	7102							
GW02	No access	No access	No access	No access	No access	No access							
GW03	No access	No access	No access	No access	No access	No access							
GW04	4173	1230		902	863	661							
GW05	20277	Bull in paddock		16000	No access	133.4							
GW06	5465	1356		750	326	330.9							
GW07	Insufficient	Insufficient		Insufficient	174.8	144.5							
GW08	Insufficient	860		Insufficient	817	Insufficient							
GW09	Insufficient	Insufficient		Insufficient	491.5	355.9							
GW10	Insufficient	33		Insufficient	407	150.1							
GW11	1397	239		630	243.3	227							
GW12	No access	No access	No access	No access	No access	No access							
GW13	4	254		190	245	144.1							

Borehole reference	Electrical conductivity (uS/cm)												
	Construction												
	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW14	17487.0	651.0		2750	5416	816							
GW15	3784	1675		3607	3417	107.4							
GW16	Insufficient	Insufficient		Dry	Insufficient	Insufficient							
GW17	3041	2805		2752	2757	2383							
GW18	1820	856		1700	1721	1126							
GW19	Insufficient	Insufficient		Insufficient	Insufficient	Insufficient							
GW20	Insufficient	Insufficient		Insufficient	Insufficient	Insufficient							
GW21	No access	No access	No access	No access	No access	No access							
GW22	No access	No access	No access	No access	No access	No access							
GW23	667	186		4995	337.2	313.8							
GW24	Insufficient	398.0		398	419.1	314							
GW25	Insufficient	Insufficient		Insufficient	303.4	245.3							
GW26	Insufficient	573		750	591	613							
GW27	Insufficient	1.3		432	288.9	335.2							
GW28	Insufficient	265		307	203.8	119.4							
GW29	347.6	371		400	203.7	201.7							

Table 85 Cumulative construction groundwater monitoring (pH) – manual record

Borehole reference	pH												
	Construction												
	Dec 14	Feb 15	Apr 2015	Jul 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jul 2016
GW01	4.4	5.4	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	6.8	7.5
GW02	Not recorded	5.7	6.3	6.9	5.9	6.4	7.0	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW03	6.5	6.2	6.8	6.6	6.8	6.3	7.5	6.5	16.16	5.8	6.3	6.8	8.4
GW04	6.5	6.2	6.5	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	6.7	7.5
GW05	6.8	6.5	6.6	7.0	6.7	6.7	7.0	6.2	6.2	Not taken	Not taken	6.9	7.1
GW06	Dry	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	4.2	4.5
GW07	Dry	5.9	6.0	Dry	6.0	5.6	6.8	6.1	5.4	5.6	5.7	Insufficient	7.5

Borehole reference	pH Construction												
	Dec 14	Feb 15	Apr 2015	Jul 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jul 2016
GW08	6.3	5.7	6.0	Insufficient	Insufficient	Insufficient	6.0	Insufficient	5.2	5.4	Insufficient	Insufficient	5.8
GW09	Dry	Dry	Dry	Insufficient	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Insufficient	Not taken
GW10	6.7	5.5	5.6	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Insufficient	Dry
GW11	5.3	6.1	6.6	7.0	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	5.7	Not taken
GW12	6.4	6.0	6.2	6.0	3.8	3.8	6.0	6.0	5.9	5.6	4.9	5.7	4.1
GW13	6.3	6.0	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	6.4	6.7
GW14	7.6	6.9	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	3.7	3
GW15	6.5	6.3	6.4	6.2	6.1	625.0	6.2	5.9	6.1	6	5.9	6.6	5.8
GW16	Dry	Dry	Dry	Dry	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW17	Dry	Dry	6.8	6.5	6.4	6.4	6.5	6.3	6.3	6	5.9	6.4	6.9
GW18	6.7	6.9	6.9	6.8	67.3	6.7	6.8	6.8	6.7	6.5	6.3	7.7	7.5
GW19	6.1	5.6	6.4	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Insufficient	Insufficient
GW20	Dry	Dry	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Not taken	Not taken	Not taken	Not taken
GW21	6.8	6.9	6.9	6.6	6.8	6.3	7.5	6.9	6.6	6.3	6.2	6.4	6.7
GW22	5.7	5.7	5.6	6.9	6.3	5.9	5.5	5.8	5.5	5.7	5.7	Not taken	Not taken
GW23	5.7	5.0	5.4	5.6	6.0	5.4	5.5	6.5	5.3	5.6	Not taken	5.9	Not taken
GW24	5.9	4.8	4.9	5.2	Insufficient	Insufficient	5.7	7.5	5.5	5.8	6.5	Insufficient	7.2
GW25	6.0	4.6	5.1	5.1	4.7	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Dry
GW26	6.3	5.5	5.3	5.3	5.3	Insufficient	5.3	5.4	5.3	5	5	5.7	7.1
GW27	7.1	6.2	6.2	Insufficient	Insufficient	Insufficient	5.8	5.7	6.3	6.3	6.3	6.4	8
GW28	6.2	Dry	5.3	Insufficient	Insufficient	Insufficient	5.2	Insufficient	5.9	Insufficient	Insufficient	Insufficient	6.9
GW29	6.0	5.5	5.7	5.8	5.7	5.8	5.4	5.8	5.8	5.9	6.6	6.6	8.7
GW30	4.6	6.1	Instrument error	5.8	5.0	5.2	5.6	5.2	5.9	5.1	5.4	6	5.6

Table 86 Cumulative construction groundwater monitoring (pH) – manual record (cont.)

Borehole reference	pH Construction												
	Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
GW01	6.6	6.6	5.9	6.0	6.1	5.7	5.8	5.8	6.8	6.8	5.5	7.73	5.58
GW02	Destroyed	7.8	6.5	6.2	6.6	No access	No access	7.4	7.1	7.1	6.4	7.54	Destroyed
GW03	6.1	7.6	5.8	5.7	6.5	6.0	6.4	6.4	7.1	7.2	6.4	8.02	6.17
GW04	7.7	8.3	5.9	No access	No access	No access	No access	No access	No access	No access	No access	6.88	5.98
GW05	7.1	6.5	6.3	No access	No access	No access	No access	No access	No access	No access	No access	6.30	6.60
GW06	4.4	5.1	4.2	3.2	3.8	3.5	3.3	3.3	4.2	No access	2.8	4.35	3.32
GW07	Insufficient	5.9	No access	4.9	5.4	5.2	No access	5.5	5.7	No access	4.5	5.31	5.12
GW08	Insufficient	Insufficient	Insufficient	Insufficient	5.9	Insufficient	5.6	5.6	5.7	Insufficient	6.5	Insufficient	Insufficient
GW09	No access	No access	No access	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	No access	Insufficient	Insufficient	No access
GW10	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	4.8	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW11	6.6	No access	No access	4.8	5.3	5.1	No access	5.2	No access	No access	4.0	4.72	4.83
GW12	No access	4.5	5.4	5.3	5.7	No access	4.4	3.5	3.7	3.6	4.7	3.08	2.99
GW13	7.0	5.7	5.4	4.9	5.8	5.6	5.1	5.2	5.3	5.8	No access	Destroyed	Destroyed
GW14	3.1	3.0	No access	3.2	3.9	No access	No access	No access	No access	No access	No access	No access	2.74
GW15	5.8	5.7	5.9	5.9	5.9	6.2	5.8	6.1	6.5	6.0	4.8	5.37	5.94
GW16	Destroyed	Destroyed	Destroyed	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	No access	Insufficient
GW17	6.5	7.1	5.9	5.7	5.8	6.0	5.8	6.0	6.7	5.6	5.0	4.86	5.85
GW18	7.5	7.9	6.4	6.2	7.4	6.6	6.5	6.9	6.1	6.6	6.4	5.80	6.34
GW19	No access	Insufficient	Insufficient	Insufficient	No access	No access	No access	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW20	No access	8.0	Insufficient	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW21	7.1	7.9	5.9	6.0	6.3	6.2	No access	No access	6.2	No access	No access	No access	No access
GW22	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW23	7.0	No access	5.7	5.9	8.2	6.6	No access	7.9	6.5	6.7	6.2	5.49	5.68
GW24	7.5	8.0	6.6	7.1	Insufficient	Insufficient	6.6	5.7	7.2	7.5	7.1	5.83	Insufficient
GW25	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	4.9	Insufficient	Insufficient	Insufficient	5.07	Insufficient
GW26	6.6	6.2	5.0	4.7	6.8	5.6	6.0	5.3	5.8	5.9	5.2	497	4.96
GW27	7.1	No access	6.3	No access	No access	6.4	No access	6.1	6.0	6.4	5.1	5.60	5.82
GW28	Insufficient	~~662~~	Insufficient	Insufficient	Insufficient	Insufficient	5.9	5.5	6.0	Insufficient	5.4	Insufficient	Insufficient

Borehole reference	pH Construction												
	Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
GW29	7.4	6.5	5.8	5.5	6.4	5.9	No access	5.6	6.1	6.6	5.5	5.48	5.66
GW30	7.5	5.5	4.8	4.4	5.8	4.9	4.4	5.2	5.0	5.5	4.3	4.27	4.42

Table 87 Cumulative construction groundwater monitoring (pH) – manual record (cont.)

Borehole reference	pH Construction												
	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
GW01	7.12	6.82	8.24	7.25	6.63	7.10	5.99	5.51	6.10	6.26	5.66	5.87	6.51
GW02	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW03	7.36	6.23	5.65	6.58	6.70	6.83	No access	No access	No access	No access	No access	No access	No access
GW04	No access	No access	No access	No access	No access	7.15	6.83	5.84	6.37	6.02	6.59	6.12	6.61
GW05	No access	No access	No access	No access	No access	5.32	6.65	No access	No access	No access	6.23	5.76	5.16
GW06	4.03	5.65	3.08	4.97	5.97	4.34	3.50	3.12	4.21	3.40	3.52	3.72	3.74
GW07	Insufficient	Insufficient	4.99	Insufficient	Insufficient	7.00	5.51	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW08	Insufficient	6.46	5.89	Insufficient	Insufficient	Insufficient	5.70	Insufficient	Insufficient	Insufficient	6.12	Insufficient	Insufficient
GW09	5.46	No access	No access	6.46	6.89	Insufficient	6.16	Insufficient	Insufficient	Insufficient	6.11	Insufficient	Insufficient
GW10	4.54	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	5.09	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW11	5.29	5.74	4.76	7.40	7.24	6.73	5.98	5.31	5.66	5.34	5.12	5.40	6.53
GW12	5.67	6.14	5.39	5.45	5.89	5.47	No access	No access	No access	No access	No access	No access	No access
GW13	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	6.14	5.59	5.62	5.94	5.76
GW14	3.57	4.72	3.02	No access	4.44	4.91	3.14	2.56	3.82	No access	3.52	6.13	2.90
GW15	6.24	6.54	6.55	7.06	6.51	6.02	6.11	6.23	6.41	5.96	6.11	6.11	5.83
GW16	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW17	5.87	6.23	7.57	5.94	5.97	5.54	5.63	5.83	6.69	6.30	6.31	6.43	6.74
GW18	6.96	6.92	5.62	7.19	6.53	5.68	7.02	6.31	6.85	6.52	6.54	6.66	6.85
GW19	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW20	Insufficient	Insufficient	No access	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW21	No access	No access	5.84	6.77	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW22	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW23	7.85	7.38	8.74	8.56	7.38	5.64	6.71	6.21	6.41	5.86	5.98	6.25	6.47

Borehole reference	pH Construction												
	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
GW24	Insufficient	Insufficient	5.65	7.08	5.65	6.69	4.57	5.68	6.86	Insufficient	Insufficient	Insufficient	6.5
GW25	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	5.33	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW26	6.80	6.59	7.15	8.05	6.65	5.45	5.48	5.33	Insufficient	Insufficient	5.38	Insufficient	Insufficient
GW27	5.61	6.64	5.66	7.11	6.45	6.70	6.24	6.29	Insufficient	6.76	Insufficient	Insufficient	Insufficient
GW28	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	7.26	Insufficient	Insufficient	6.05	Insufficient	Insufficient	Insufficient	Insufficient
GW29	6.88	6.65	5.97	7.52	7.07	7.08	5.91	5.79	6.52	Insufficient	5.94	5.95	6.68
GW30	5.54	6.14	5.19	7.32	5.78	5.91	4.65	4.32	5.08	Insufficient	4.75	Malfunction	Insufficient

Table 88 Cumulative construction groundwater monitoring (pH) – manual record (cont.)

Borehole reference	pH Construction												
	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW01	5.67	5.85		6.32	6	6.27							
GW02	No access	No access		No access	No access	No access							
GW03	No access	No access		No access	No access	No access							
GW04	6.23	6.10		6.41	6.23	6.5							
GW05	5.30	Bull in paddock		5.88	No access	5.3							
GW06	3.74	5.77		6.77	6.85	6.88							
GW07	Insufficient	Insufficient		Insufficient	5.75	5.38							
GW08	Insufficient	5.67		Insufficient	5.86	Insufficient							
GW09	Insufficient	Insufficient		Insufficient	6.19	5.71							
GW10	Insufficient	5.69		Insufficient	4.61	5.41							
GW11	5.65	5.92		5.56	5.85	5.65							
GW12	No access	No access	No access	No access	No access	No access							
GW13	5.66	5.76		5.92	5.5	6.02							
GW14	3.69	4.67		3.59	3.42	4.36							
GW15	6.30	6.26		6.08	6.28	6.4							
GW16	Insufficient	Insufficient		Insufficient	Insufficient	Insufficient							

Borehole reference	pH Construction												
	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW17	6.46	6.54		6.48	6.57	6.79							
GW18	6.96	6.81		6.94	6.8	7.21							
GW19	Insufficient	Insufficient		Insufficient	Insufficient	Insufficient							
GW20	Insufficient	Insufficient		Insufficient	Insufficient	Insufficient							
GW21	No access	No access		No access	No access	No access							
GW22	No access	No access	No access	No access	No access	No access							
GW23	6.38	6.14		6.33	5.67	7.44							
GW24	Insufficient	6.0		6.0	6.0	5.6							
GW25	Insufficient	Insufficient		Insufficient	5.14	5.56							
GW26	Insufficient	5.4		5.59	5.68	5.59							
GW27	Insufficient	6.65		6.61	6.58	6.14							
GW28	Insufficient	5.68		5.73	5.51	5.08							
GW29	6.49	6.00		6.26	6.12	6.74							
GW30	Insufficient	4.68		4.5	4.82	6.118							

Table 89 Construction groundwater monitoring (temperature) – manual record

Borehole reference	Temperature Construction												
	Dec 14	Feb 15	Apr 2015	Jul 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jun 2016
GW01	18.9	21.1	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	19.4	19. 9
GW02	18.5	21.9	21.4	18.5	18.4	17.6	20.1	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW03	19.0	22.7	20.8	16.8	16.2	16.9	18.9	21.1	23.3	21.1	20.5	18	15.3
GW04	18.7	22.3	21.2	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	20.3	18.3
GW05	17.3	20.1	19.5	16.3	15.8	16.0	17.3	20.1	23	Not taken	Not taken	19.1	17.2
GW06	Dry	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	20.9	19.5
GW07	Dry	21.7	22.1	Insufficient	19.5	19.6	19.9	20.2	20.9	19.7	21.8	Insufficient	19.4
GW08	20.2	21.6	20.0	Insufficient	Insufficient	Insufficient	20.3	Insufficient	20.2	20.8	Insufficient	Insufficient	18.8
GW09	Dry	Dry	Insufficient	Insufficient	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Insufficient	Not taken
GW10	19.0	20.6	20.3	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Insufficient	Dry
GW11	18.3	20.4	22.0	17.5	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	20.2	Not taken

Borehole reference	Temperature Construction												
	Dec 14	Feb 15	Apr 2015	Jul 2015	Aug 2015	Sep 2015	Nov 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	Jun 2016	Jun 2016
GW12	18.1	21.5	21.1	15.6	14.3	15.5	18.4	20.7	21.6	20.3	21.1	17.7	16
GW13	18.2	21.4	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	21	18.9
GW14	18.2	20.6	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	20.5	19.2
GW15	18.8	20.5	20.3	19.8	19.9	20.6	20.7	20.5	20.8	20.8	21	20	20.3
GW16	Dry	Dry	Insufficient	Insufficient	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW17	Dry	Dry	19.7	19.2	19.3	19.4	19.7	19.9	19.9	19.3	22.7	19.4	19.1
GW18	18.5	20.2	19.7	18.8	19.0	19.2	19.8	20.8	19.7	19.7	21.4	18.9	18.7
GW19	18.8	19.6	20.1	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Insufficient	Insufficient
GW20	Dry	Dry	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Not taken	Not taken	Not taken	Not taken
GW21	18.9	19.8	20.8	18.8	18.8	18.5	18.6	19.9	21.3	20.6	20.2	19.4	18.2
GW22	18.3	20.3	21.0	18.3	18.2	17.2	18.3	20.6	21.8	22.2	21.2	Not taken	Not taken
GW23	19.1	19.2	18.9	18.3	18.5	18.7	18.9	19.4	19.4	19.7	Not taken	18.5	Not taken
GW24	21.8	19.7	19.7	18.5	Insufficient	Insufficient	18.7	18.8	19.2	19.4	19.1	Insufficient	18.1
GW25	21.0	21.1	19.6	19.4	18.5	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Dry
GW26	22.7	20.3	19.9	18.8	19.2	Insufficient	20.1	20.2	20	20.2	19.7	14.3	19
GW27	19.6	20.4	19.2	Insufficient	Insufficient	Insufficient	19.7	19.9	20.3	19.7	19.3	28.1	19
GW28	21.6	Dry	19.5	18.6	Insufficient	Insufficient	20	Insufficient	23.4	Insufficient	Insufficient	Insufficient	18.7
GW29	18.3	19.6	20.3	Insufficient	18.5	18.7	18.6	19.2	19.3	19.8	19	18.8	18.8
GW30	18.4	20.2	20.5	19.0	18.6	18.6	19.1	19.9	20.2	20.1	20.2	19.8	18.8

Table 90 Construction groundwater monitoring (temperature) – manual record (cont.)

Borehole reference	Temperature Construction												
	Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
GW01	20.5	19.7	20	23.5	22.2	23.8	24.3	21.4	21.4	20.7	20.6	20.6	19.9
GW02	Destroyed	18.3	18.7	20.8	21.0	No access	No access	21.6	20.4	20.5	19.2	18.7	
GW03	24.4	16.5	16.7	19.4	20.9	21.5	22.3	20.4	19.3	18.1	16.3	16.7	17.4
GW04	19.8	17.7	17.6	No access	No access	No access	No access	No access	No access	No access	No access	17.7	17.4
GW05	18.0	17.5	16.9	No access	No access	No access	No access	No access	No access	No access	No access	16	16.5
GW06	21.2	18.5	18.5	21.9	23.5	24.7	24.3	22.7	20.8	No access	18.7	18.2	19.1

Borehole reference	Temperature Construction												
	Aug 16	Sep 16	Oct 16	Dec 16	Jan 17	Feb 17	Mar 17	Apr 17	May 17	Jun 17	Jul 17	Aug 17	Sep 17
GW07	Insufficient	20.1	No access	20.1	21	21.8	No access	21.4	20.5	No access	19.9	19.6	19.9
GW08	Insufficient	Insufficient	Insufficient	Insufficient	20.3	Insufficient	21.0	21.8	19.4	Insufficient	19.6	Insufficient	Insufficient
GW09	No access	No access	No access	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	No access	Insufficient	Insufficient	No access
GW10	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	22.6	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW11	20.4	No access	No access	20.4	20.4	21.3	No access	21.2	No access	No access	19.3	18.6	19.0
GW12	No access	17.3	18.1	22	23.7	No access	26.0	22.4	20.7	20.1	18.6	17.6	18.7
GW13	18.7	21.1	18.8	21.8	23.5	24.2	24.4	20.5	20.5	19.9	No access	Destroyed	Destroyed
GW14	17.6	18.5	No access	20.6	22.2	No access	No access	No access	No access	No access	No access	No access	19.3
GW15	19.8	20.1	20.2	20.7	21.5	20.4	20.9	21.4	20.8	20.6	20.1	20.4	21.2
GW16	Destroyed	Destroyed	Destroyed	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	No access	Insufficient
GW17	19.6	19.4	19.3	20.4	20.2	20.7	20.0	20.0	19.3	19.1	19.3	19.1	19.7
GW18	19.1	19.2	19.3	20.5	20.1	20.8	20.0	19.9	19.1	19.0	19.0	18.8	19.3
GW19	No access	Insufficient	Insufficient	Insufficient	No access	No access	No access	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW20	No access	19.4	Insufficient	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW21	18.7	18.3	18.3	19.3	20.5	19.5	No access	No access	19.5	No access	No access	No access	No access
GW22	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW23	18.6	No access	18.6	19.5	20.4	24.2	No access	20.2	18.7	19.8	18.7	18.6	19.4
GW24	19.8	19.3	19.4	21.3	Insufficient	Insufficient	20.3	19.5	19.4	19.1	19.6	19.2	Insufficient
GW25	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	20.4	Insufficient	Insufficient	Insufficient	20.1	Insufficient
GW26	18.7	18.9	19.4	20.6	21.0	21.8	20.0	20.1	19.5	19.4	19.6	19.6	20.4
GW27	18.3	No access	19.7	No access	No access	21.1	No access	21.0	19.4	19.3	19.4	19.4	19.8
GW28	Insufficient	19.3	Insufficient	Insufficient	Insufficient	Insufficient	20.5	20.4	20.1	Insufficient	19.7	Insufficient	Insufficient
GW29	17.7	19.0	18.8	19.8	19.8	20.2	No access	19.8	19.6	19.5	19.4	19.3	19.7
GW30	19	19.4	19.1	19.7	20.5	21.6	20.1	20.4	19.9	20.1	19.8	19.7	19.8

Table 91 Construction groundwater monitoring (temperature) – manual record (cont.)

Borehole reference	Temperature Construction												
	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
GW01	21.2	21.7	20.3	21.3	22.7	20.8	20.0	19.9	21.8	21.1	20.8	21.1	20.3
GW02	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed
GW03	19.5	22.1	22	22.5	22.6	21.1	No access	No access	No access	No access	No access	No access	No access
GW04	No access	No access	No access	No access	No access	20.8	18.5	16.9	19.2	20.2	21.1	19.7	18.4
GW05	No access	No access	No access	No access	No access	21.4	17.3	No access	No access	No access	19.7	17.6	18.7
GW06	20.1	22.2	21.6	22.5	24.9	22.2	20.0	17.5	20.0	22.5	20.9	19.2	18.8
GW07	Insufficient	Insufficient	20.5	Insufficient	Insufficient	21.3	19.2	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW08	Insufficient	21.7	19.8	Insufficient	Insufficient	Insufficient	18.3	Insufficient	Insufficient	Insufficient	18.7	Insufficient	Insufficient
GW09	19.5	No access	No access	21.7	22.2	Insufficient	18.7	Insufficient	Insufficient	Insufficient	17.9	Insufficient	Insufficient
GW10	20.7	No access	Insufficient	Insufficient	Insufficient	Insufficient	20.4	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW11	20.9	21.2	23.0	23.2	24.9	22.6	19.8	19.3	21.6	23.6	21.5	19.8	20.4
GW12	21.0	23.4	23.9	24.8	24.9	23.4	No access	No access	No access	No access	No access	No access	No access
GW13	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	Destroyed	20.2	22.3	22.0	21.0	20.5
GW14	20.1	22.3	23.1	No access	25.6	22.9	19.2	17.5	20.8	No access	20.9	19.9	20.4
GW15	20.5	21.6	21.2	21.4	21.8	20.9	20.2	19.8	21.7	21.4	20.8	21.4	21.0
GW16	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW17	19.6	20.8	20.2	20.2	20.7	19.6	15.9	19.1	20.8	20.6	20.0	19.8	20.1
GW18	19.5	19.9	20.5	20.4	20.4	20.3	18.4	18.5	20.7	21.1	19.3	19.6	20.2
GW19	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW20	Insufficient	Insufficient	No access	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW21	No access	No access	20.2	20.2	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW22	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access	No access
GW23	19.1	20.1	20.9	20.7	21.7	20.7	18.2	18.5	21.0	20.9	19.6	20.1	21.0
GW24	Insufficient	Insufficient	20.2	21.1	20.2	21.0	18.9	16.8	21.6	Insufficient	Insufficient	Insufficient	21.1
GW25	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	19.2	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient
GW26	20.2	21.2	20.6	20.9	21.3	21.7	19.2	18.7	Insufficient	Insufficient	20.7	Insufficient	Insufficient
GW27	20.0	21.8	24.8	21.1	22.3	20.1	18.9	14.7	Insufficient	25.1	Insufficient	Insufficient	Insufficient
GW28	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	20.4	Insufficient	Insufficient	22.3	Insufficient	Insufficient	Insufficient	Insufficient

Borehole reference	Temperature Construction												
	Nov 17	Dec 17	Jan 18	Feb 18	Mar 18	Apr 18	Jun 18	Aug 18	Nov 18	Feb 19	May 19	Jul 19	Oct 19
GW29	19.4	20.4	19.7	20.2	20.9	19.9	19.3	19.0	21.2	20.9	19.7	19.9	21.3
GW30	19.9	20.6	20.5	20.7	21	20.1	19.8	19.4	20.4	20.6	21.5	Malfunction	Insufficient

Table 92 Construction groundwater monitoring (temperature) – manual record (cont.)

Borehole reference	Temperature Construction												
	Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW01	21.7	21.5		22.7	25.8	24							
GW02	Destroyed	No access		No access	No access	No access							
GW03	No access	No access		No access	No access	No access							
GW04	20.5	21.2		19.6	21.9	18.9							
GW05	23.3	Bull in paddock		19.1	Unreadable - no access	17.6							
GW06	21.1	21.7		19.0	21.7	19.3							
GW07	Insufficient	Insufficient		Insufficient	21.3	18.7							
GW08	Insufficient	19.9		Insufficient	21.1	Insufficient							
GW09	Insufficient	Insufficient		Insufficient	21.3	19.0							
GW10	Insufficient	21.2		Insufficient	22.8	21.0							
GW11	22.9	22.2		20.3	22.7	19.5							
GW12	No access	No access	No access	No access	No access	No access							
GW13	22.8	22.3		20.6	22.5	21.3							
GW14	24.7	21.5		19.7	22.3	18.3							
GW15	22.2	21.2		21.7	21.3	20.7							
GW16	Insufficient	Insufficient		Dry	Insufficient	Insufficient							
GW17	22.3	19.8		20.5	21.2	19.2							
GW18	21.8	19.7		20.4	20.7	18.1							
GW19	Insufficient	Insufficient		Insufficient	Insufficient	Insufficient							
GW20	Insufficient	Insufficient		Insufficient	Insufficient	Insufficient							

Borehole reference	Temperature Construction Jan 20	Apr 20	Jun 20	Sept 20	Jan 21	May 21							
GW21	No access	No access		No access	No access	No access							
GW22	No access	No access	No access	No access	No access	No access							
GW23	22.6	19.7		20.6	21.7	18.3							
GW24	Insufficient	19.8		19.8	20.5	18.8							
GW25	Insufficient	Insufficient			21.2	19.7							
GW26	Insufficient	20.4		20.7	21.1	19.5							
GW27	Insufficient	21.5		20.6	22	19.2							
GW28	Insufficient	21.0		21.3	20.7	19.7							
GW29	22.6	20.3		20.8	20.7	19.3							
GW30	Insufficient	20.5		20.8	21.2	19.6							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