Transport
Roads & Maritime
Services

Oxley Highway to Kempsey Upgrade Project

Construction water quality monitoring report - 22 January 2017 to 21 July 2017

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1 Introduction

1.1 The project

On behalf of the Australian and NSW governments, Roads and Maritime Services (Roads and Maritime) is currently constructing the Oxley Highway to Kempsey Pacific Highway Upgrade (the project). 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 involves 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 will be retained wherever possible for use as a service road or local road connection. Figure 1-1 shows the location of the project.

Roads and Maritime will construct and open the project in stages. The stages of the project are:

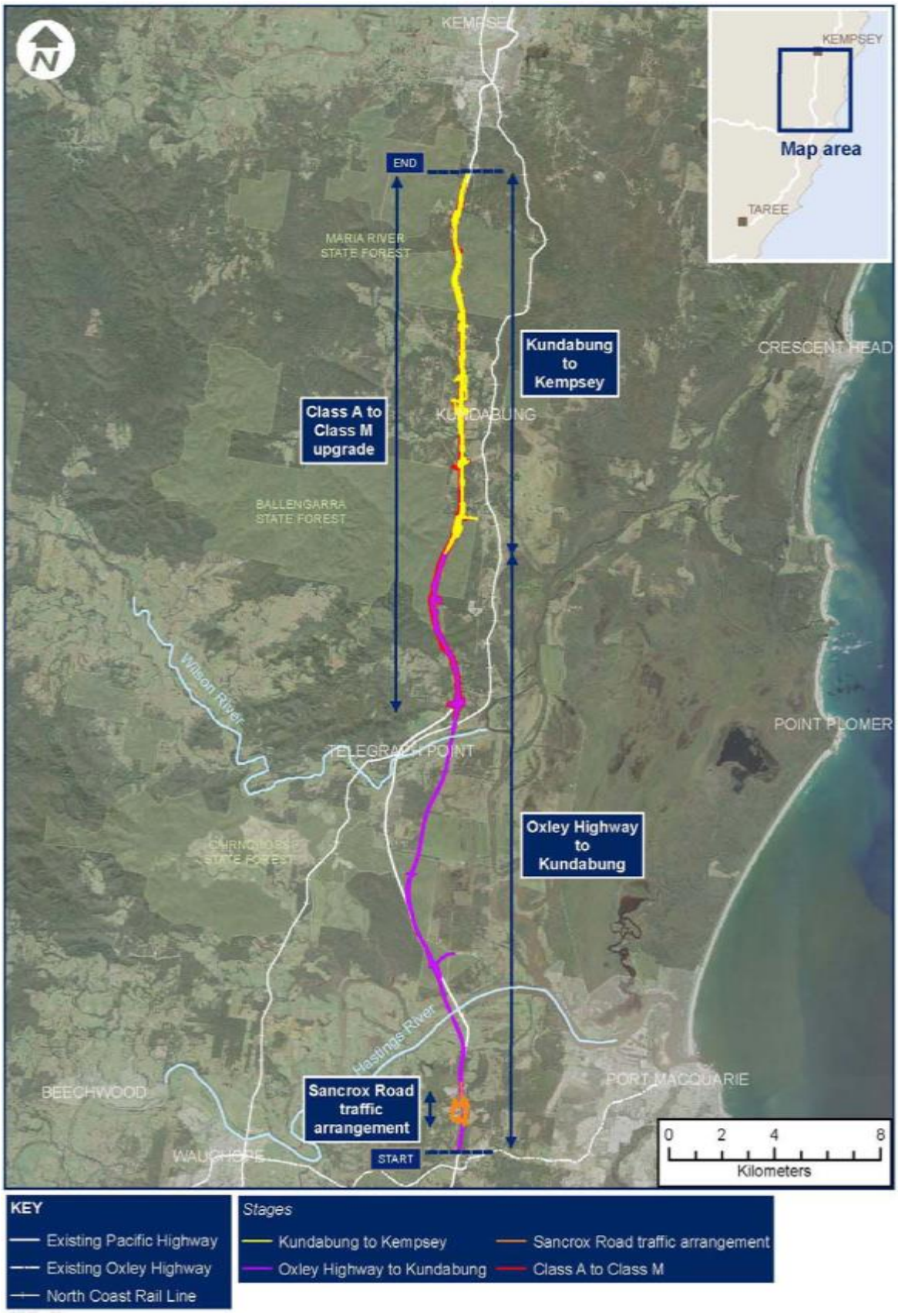
- Stage 1 - The Sancrox Traffic Arrangement works located about two kilometres north of the Oxley Highway / Pacific Highway intersection. This section of the project opened to traffic on 30 November 2015
- Stage 2 - Kundabung to Kempsey Stage consisting of about 14 kilometres of dual carriageway, commencing north of Barrys Creek near Kundabung (chainage 24,000) and connecting to the Kempsey Bypass at Stumpy Creek (Chainage 37,800)
- 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).

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 has since modified the approval on two occasions.

Under MCoA B17, Roads and Maritime 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 sixth construction period between 22 January 2017 and 21 July 2017 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 construction
- 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
- 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
- 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
- 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, 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 is being used for construction purposes. The dam and surrounding land will be restored in-line with the agreement established between the two parties. Monitoring of water levels during construction as outlined in section 4.2 to the WQMP has therefore not been undertaken or proposed.

2.1.2 Groundwater monitoring sites

Further detail is provided in Section 3.7. Of the 13 damaged during previous reporting periods, 11 have been reinstated in the lead up to monitoring in August 2016.

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 have been 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 have been 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

Site no.	Chainage	Reason for site selection
		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
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)	mg/L	Laboratory measurement

		Nickel (Ni) Silver (Ag) Zinc (Zn)		
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

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.

Similarly, 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) have been installed and/or replaced at 27 groundwater monitoring sites to recorded groundwater levels below ground at 30 minute intervals. One barometric air pressure data logger has 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 the construction surface water quality monitoring phase, sampling of all parameters except trace metals, are required for one dry event and as required two wet-weather events per month. Further monitoring of trace metals are required for one dry weather event and as required one wet weather event per month. 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 the construction groundwater quality monitoring phase, sampling of in-field parameters are required on a monthly basis, or every two months where a groundwater level logger is in place. Monitoring of anions, cations, ammonia and phosphate are to be monitored on one occasion in the first quarter and then on an annual basis thereafter. All other laboratory analysed parameters shall be monitored on a monthly basis for the first three months and then on a three 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 monthly basis.

The requirements for ongoing construction and post-construction monitoring are detailed in the WQMP and will be outlined in subsequent construction and post-construction surface water quality monitoring reports.

2.5 Rainfall records

During this construction 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 January 2017 and July 2017.

Site based weather stations have also been established for the project at three locations including:

- Kundabung – Port Macquarie
- Telegraph Point – Port Macquarie

- Sancrox – Port Macquarie.

These stations have been established at various times during pre-construction and construction. These stations have been used during the construction phase of the project to determine the need for wet-weather monitoring and ongoing water quality reporting. Records from these sites for the monitoring period are also attached and Appendix B.

3 Results

3.1 Prevailing climatic conditions

Rainfall during the reporting period 22 January 2017 to 21 July 2017 was mixed with rainfall records at the Port Macquarie Airport Bureau of Meteorology monitoring station characterised as either below average or well above average. January, February, April, May and July were below or well below average with rainfall ranging between two and four times below the historical monthly averages. March was three and a half times above the average. June was almost two times above the historical average. A summary of daily / monthly rainfall for the three Bureau of Meteorology weather stations within the Port Macquarie / Kempsey area and three project weather stations referred to in Section 2.5 are provided at Appendix B.

3.2 Summary of construction activities

Construction activity with the potential to impact on surface and groundwater quality was in progress to a reduced extent across Stage 2 and Stage 3 of project during the monitoring period. Work on each of the stages included (see further detail on groundwater in Section 3.9):

- Stage 1 – Sancrox Traffic Arrangement Works opened to traffic on 30 November 2015. There were no construction works during the reporting period. Landscaping across Stage 1 has established well with the site considered stable and presenting limited potential to influence surface water quality within SW1. The Stage 1 Environment Protection Licence was surrendered on 30 November 2016.
- Stage 2 – Earthworks were in progress, mainly on the northbound carriageway, and largely completed across the majority of the site during the monitoring period. This included achieving final levels for paving on cut and fill embankments. All bridges were completed during the monitoring period with a focus on paving and finishing work on these structures. Mainline paving progressed and was largely completed on both the north and southbound carriageways. Permanent landscaping and rehabilitation work continued with many areas entering a maintenance phase. All waterways, and to a lesser extent groundwater, resources on Stage 2 had the potential to be influenced by construction during the reporting period.
- Stage 3 – Earthworks, including cuts and fill embankments, progressed in a number of areas (mainly north of Haydons Wharf Road) across Stage 3 during the reporting period. All culverts and bridges were substantially completed with efforts focusing on paving and finishing works. Some bridge and culvert work at the northern extent of Stage 3 remained outstanding (ie north of Haydons Wharf Road). A substantial amount of mainline paving was completed between Sancrox traffic arrangement works and north of the Wilson River. Permanent landscaping and rehabilitation work continued with a number of areas now well established. All waterways, and to a lesser extent groundwater resources, on Stage 3 had the potential to be influenced by construction during the reporting period.

Further detail on all construction activities undertaken during the reporting period is provided in the Oxley Highway to Kempsey – Construction Compliance Tracking Report 5 (March 2017).

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, or completely dry, at different times during sampling. Waterways affected included SW1, SW2, SW5, SW7, SW8, SW9, SW12 and SW13. On all occasions this was in response to naturally low flows.
- Access to SW1b was not available due to a private property industrial development from 15 May 2017 onward.
- SW2a and SW2b were dry on four occasions with water levels too low on one further occasion to obtain in-field measurements. On this occasion only laboratory bottled samples were collected.
- SW5b was dry on three occasions.
- SW7a was dry on three occasions. On this basis, comparison between 80th and 20th percentiles at SW7a and downstream location (ie SW7b) do not always adequately represent any potential impacts associated with construction.
- SW8a was dry on 11 occasions during the monitoring period. On only two occasions were all sampling points connected. At all other times SW8b persisted as an isolated pond. On this basis, comparison between 80th and 20th percentiles at SW8a and downstream locations (ie SW8b, SW8c) do not always adequately represent any potential impacts associated with construction.
- 80th and 20th percentile trigger values have generally been established from 24 sampling events up to and including the month subject to analysis (consistent with ANZECC requirements). However, due to the frequency of metal analysis during pre-construction and prevailing dry conditions during subsequent construction monitoring periods, the trigger values have been derived from fewer samples for SW8 for months prior to June 2017.
- 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.

3.4 Summary of surface water results

Table 3-1 to Table 3-27 represent an aggregate summary of water quality results by waterway for upstream and downstream sampling locations. In accordance with the WQMP, 80th and 20th percentiles for upstream sample locations form the trigger values for median

downstream results. Appendix C includes all monitoring results for this construction period. Full laboratory reports for all sampling events are available on request.

Table 3-1 Construction surface water quality results by waterway

Parameter				Results									
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017					March 2017				
				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	4.1	22.3	14.2	24.0	25.0	4.1	22.4	14.7	22.3	22.8
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	244	772	390	818	903	248	772	321	850	807
Dissolved oxygen (DO)	%	0-200	85-110	21	45	23	57	47	19	42	24	66	60
pH		0-14	6.5-8	0.2	6.8	6.4	7.2	7.3	0.2	6.8	6.4	6.9	7.2
Turbidity	NTU	0-600	6-50	58	111	27	19	22	58	105	23	14	43
Total suspended solids (TSS)	mg/L	5	-	16	20	5	5	7	16	20	5	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.52	0.10	0.01	0.01	0.01	0.33	0.13	0.01	0.04	0.04
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.003	0.000	0.001	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.002
Iron (Fe)	mg/L	0.05	ID	5.67	1.62	0.15	0.54	0.05	1.70	1.44	0.15	0.17	0.20
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.317	0.420	0.076	0.999	0.202	0.204	0.321	0.071	0.088	0.109
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.002
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.012	0.011	0.005	0.011	0.007	0.011	0.012	0.005	0.010	0.008
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.6	0.3	0.4	0.3	0.3	0.7	0.3	0.8	0.6
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.02	0.01	0.01	0.04	0.02	0.03	0.01	0.02	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).

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

Parameter				Results									
	Unit	LOR / probe limit	ANZECC default trigger value	April 2017					May 2017				
				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	3.6	22.4	15.2	17.9	19.3	3.1	22.4	16.5	16.5	16.8
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	235	772	366	1026	959	238	772	333	934	904
Dissolved oxygen (DO)	%	0-200	85-110	16	42	21	76	59	14	42	20	58	63
pH		0-14	6.5-8	0.3	6.8	6.4	7.1	7.2	0.3	6.8	6.3	7.2	6.9
Turbidity	NTU	0-600	6-50	59	105	22	9	31	60	105	20	7	22
Total suspended solids (TSS)	mg/L	5	-	16	20	7	5	18	15	23	7	5	12
Aluminium (Al)	mg/L	0.01	0.055”	0.33	0.19	0.01	0.09	0.07	0.33	0.19	0.01	0.05	0.05
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.002	0.000	0.001	0.001	0.001	0.002
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	3.83	1.44	0.17	0.25	0.34	4.65	1.75	0.26	0.20	0.11
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.251	0.321	0.051	0.086	0.139	0.297	0.489	0.051	0.085	0.092
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.011	0.012	0.005	0.006	0.012	0.011	0.012	0.005	0.005	0.010
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.8	0.3	0.2	0.4	0.3	0.8	0.4	0.1	0.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.03	0.01	0.01	0.02	0.02	0.03	0.01	0.01	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).

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

Parameter				Results									
	Unit	LOR / probe limit	ANZECC default trigger value	June 2017					July 2017				
				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	22.4	16.6	DNS	14.2	4.0	22.4	15.8	DNS	11.8
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	233	720	287	DNS	630	233	720	287	DNS	1070
Dissolved oxygen (DO)	%	0-200	85-110	20	43	20	DNS	87	19	43	20	DNS	81
pH		0-14	6.5-8	0.3	6.8	6.3	DNS	7.0	0.3	6.8	6.3	DNS	7.0
Turbidity	NTU	0-600	6-50	61	105	18	DNS	46	60	99	14	DNS	16
Total suspended solids (TSS)	mg/L	5	-	15	21	7	DNS	23	11	20	6	DNS	7
Aluminium (Al)	mg/L	0.01	0.055”	0.36	0.25	0.01	DNS	0.20	0.31	0.19	0.02	DNS	0.01
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	DNS	0.001	0.000	0.001	0.001	DNS	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	DNS	0.0001	0.0000	0.0001	0.0001	DNS	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	DNS	0.001	0.000	0.001	0.001	DNS	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	DNS	0.001	0.000	0.001	0.001	DNS	0.001
Iron (Fe)	mg/L	0.05	ID	4.64	2.35	0.26	DNS	0.29	4.61	3.90	0.32	DNS	0.15
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	DNS	0.001	0.000	0.001	0.001	DNS	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.285	0.420	0.044	DNS	0.123	0.276	0.420	0.071	DNS	0.136
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	DNS	0.0001	0.0000	0.0001	0.0001	DNS	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	DNS	0.001	0.000	0.001	0.001	DNS	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.001	0.000	0.001	0.001	DNS	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.011	0.012	0.005	DNS	0.018	0.011	0.012	0.005	DNS	0.020
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.8	0.4	DNS	0.6	0.2	0.7	0.4	DNS	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.03	0.01	DNS	0.02	0.02	0.02	0.01	DNS	0.11

* 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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017				March 2017				April 2017			
				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	4.3	22.0	13.5	DNS	4.4	22.3	13.5	22.7	4.1	20.7	13.5	18.9
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	246	902	498	DNS	251	902	497	424	241	902	553	466
Dissolved oxygen (DO)	%	0-200	85-110	42	60	10	DNS	42	60	14	64	41	60	17	54
pH		0-14	6.5-8	0.4	7.0	6.4	DNS	0.4	7.0	6.4	5.7	0.4	7.0	6.4	6.5
Turbidity (NTU)	NTU	0-600	6-50	43	53	16	DNS	43	53	15	11	43	53	15	51
Total suspended solids (TSS)	mg/L	5	-	45	65	11	DNS	45	65	11	8	45	56	9	11
Aluminium (Al)	mg/L	0.01	0.055”	0.04	0.02	0.01	DNS	0.05	0.02	0.01	0.18	0.05	0.04	0.01	0.10
Arsenic (As)	mg/L	0.001	0.024	0.001	0.002	0.001	DNS	0.001	0.002	0.001	0.001	0.001	0.002	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	0.0001	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	0.001	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	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	5.95	6.89	0.63	DNS	6.09	9.29	0.63	0.80	6.41	13.32	0.63	2.93
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	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.982	2.010	0.448	DNS	0.933	1.830	0.448	1.330	0.945	2.002	0.462	0.422
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	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.005	0.002	0.001	DNS	0.005	0.002	0.001	0.007	0.005	0.002	0.001	0.003
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	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.002	0.006	0.005	DNS	0.003	0.006	0.005	0.047	0.003	0.006	0.005	0.011
Total Nitrogen (TN)	mg/L	0.1	0.5	1.4	3.2	0.7	DNS	1.4	3.2	0.7	2.2	1.3	3.2	0.7	1.00
Total Phosphorous (TP)	mg/L	0.01	0.05	0.20	0.45	0.10	DNS	0.22	0.46	0.10	0.07	0.26	0.46	0.10	0.09

* 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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	3.9	19.0	13.5	16.7	3.9	18.8	13.2	14.6	4.1	18.8	12.5	11.1
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	248	933	553	470	250	933	553	416	223	933	615	457
Dissolved oxygen (DO)	%	0-200	85-110	38	66	23	50	36	75	26	60	36	81	29	59
pH		0-14	6.5-8	0.6	7.0	6.2	6.3	1.0	6.9	6.0	5.5	1.1	6.9	5.1	5.7
Turbidity (NTU)	NTU	0-600	6-50	42	52	14	59	16	43	10	15	16	43	9	14
Total suspended solids (TSS)	mg/L	5	-	42	34	9	12	43	29	6	7	43	29	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.06	0.08	0.01	0.13	0.10	0.09	0.01	0.18	0.10	0.11	0.01	0.07
Arsenic (As)	mg/L	0.001	0.024	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	6.50	13.32	0.61	3.56	6.57	13.32	0.61	1.23	6.60	13.32	0.61	1.59
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.934	2.002	0.462	0.157	0.889	2.002	0.570	0.489	0.872	2.002	0.650	0.164
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.005	0.002	0.001	0.002	0.005	0.005	0.001	0.004	0.005	0.006	0.001	0.002
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.007	0.005	0.007	0.012	0.011	0.005	0.025	0.013	0.016	0.005	0.021
Total Nitrogen (TN)	mg/L	0.1	0.5	1.3	3.0	0.6	1.1	1.4	3.0	0.5	0.5	1.4	3.0	0.4	0.7
Total Phosphorous (TP)	mg/L	0.01	0.05	0.26	0.37	0.07	0.08	0.27	0.37	0.03	0.03	0.27	0.37	0.02	0.03

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

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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017				March 2017				April 2017			
				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	5.0	27.1	17.3	28.2	4.6	27.1	18.0	25.1	3.6	27.1	21.0	21.0
Electrical conductivity (EC)	uS/cm	0-8000	-	1928	8000	8000	8000	1873	8000	8000	8000	1779	8000	8000	8000
Dissolved oxygen (DO)	%	0-200	80-110	8	97	82	94	9	96	82	78	8	98	83	99
pH		0-14	7.0-8.5	0.2	7.6	7.3	7.5	0.3	7.6	7.3	7.4	0.3	7.5	7.3	7.5
Turbidity (NTU)	NTU	0-600	0.5-10	50	21	6	16	17	21	7	29	16	22	7	24
Total suspended solids (TSS)	mg/L	5		27	11	5	13	9	11	5	11	14	11	5	15
Aluminium (Al)	mg/L	0.01	ID	0.08	0.10	0.01	0.10	0.08	0.10	0.02	0.14	0.08	0.10	0.02	0.05
Arsenic (As)	mg/L	0.001	ID	0.004	0.010	0.001	0.010	0.004	0.010	0.001	0.006	0.004	0.010	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0004	0.0010	0.0001	0.0010	0.0004	0.0010	0.0001	0.0006	0.0004	0.0010	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.004	0.010	0.001	0.010	0.004	0.010	0.001	0.006	0.004	0.010	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.004	0.010	0.001	0.010	0.004	0.010	0.001	0.006	0.004	0.010	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.21	0.50	0.05	0.30	0.20	0.50	0.05	0.25	0.20	0.50	0.05	0.17
Lead (Pb)	mg/L	0.001	0.0044	0.004	0.010	0.001	0.010	0.004	0.010	0.001	0.006	0.004	0.010	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.014	0.030	0.014	0.013	0.022	0.033	0.015	0.049	0.023	0.036	0.015	0.041
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	0.0001	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	0.010	0.004	0.010	0.001	0.006	0.004	0.010	0.001	0.001
Silver (Ag)	mg/L	0.001	0.0014	0.004	0.010	0.001	0.010	0.004	0.010	0.001	0.006	0.004	0.010	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.022	0.050	0.005	0.050	0.021	0.050	0.005	0.028	0.022	0.050	0.005	0.031
Total Nitrogen (TN)	mg/L	0.1	0.3	0.3	0.5	0.4	0.5	0.2	0.5	0.3	0.5	0.2	0.5	0.2	0.3
Total Phosphorous (TP)	mg/L	0.01	0.03	0.03	0.05	0.04	0.05	0.01	0.05	0.05	0.05	0.01	0.05	0.04	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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	3.0	27.1	21.0	20.1	3.8	27.1	20.4	16.9	4.5	27.1	19.1	15.2
Electrical conductivity (EC)	uS/cm	0-8000	-	1779	8000	8000	8000	1779	8000	8000	8000	1779	8000	8000	8000
Dissolved oxygen (DO)	%	0-200	80-110	8	98	84	90	9	99	83	92	9	98	83	93
pH		0-14	7.0-8.5	0.3	7.5	7.3	7.4	0.3	7.5	7.0	7.0	0.3	7.5	7.0	7.5
Turbidity (NTU)	NTU	0-600	0.5-10	30	23	7	11	30	23	7	9	30	23	7	5
Total suspended solids (TSS)	mg/L	5		27	15	5	6	27	12	5	5	27	12	5	5
Aluminium (Al)	mg/L	0.01	ID	0.08	0.10	0.02	0.05	0.08	0.10	0.02	0.09	0.08	0.10	0.01	0.01
Arsenic (As)	mg/L	0.001	ID	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0004	0.0010	0.0001	0.0001	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	0.001	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	0.001	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.20	0.50	0.05	0.05	0.19	0.50	0.05	0.28	0.20	0.50	0.05	0.05
Lead (Pb)	mg/L	0.001	0.0044	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.023	0.036	0.015	0.022	0.023	0.037	0.015	0.044	0.021	0.036	0.015	0.016
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	0.0001	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	0.001	0.004	0.010	0.001	0.002	0.004	0.010	0.001	0.001
Silver (Ag)	mg/L	0.001	0.0014	0.004	0.010	0.001	0.001	0.004	0.010	0.001	0.002	0.004	0.010	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.022	0.050	0.005	0.007	0.021	0.050	0.005	0.010	0.021	0.050	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.3	0.2	0.5	0.2	0.4	0.2	0.5	0.2	0.2	0.2	0.5	0.2	0.8
Total Phosphorous (TP)	mg/L	0.01	0.03	0.01	0.05	0.04	0.05	0.20	0.05	0.04	0.02	0.20	0.05	0.03	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).

Table 3-8 Construction 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 %	February 2017	March 2017	April 2017	May 2017	June 2017	July 2017
Temperature	^{0}C	-2-50	No data	5.4	27.3	19.3	DNS	23.5	22.2	19.1	15.8	13.6
Electrical conductivity (EC)	uS/cm	0-8000	No data	446	1042	490	DNS	1434	428	491	350	418
Dissolved oxygen (DO)	%	0-200	No data	28	115	67	DNS	42	63	47	76	32
pH		0-14	No data	0.8	5.6	4.2	DNS	4.1	6.7	6.8	6.3	6.3
Turbidity (NTU)	NTU	0-600	No data	172	50	6	DNS	16	16	13	8	11
Total suspended solids	mg/L	5	-	313	279	8	DNS	12	5	5	5	5
Aluminium (Al)	mg/L	0.01	0.055”	1.13	1.97	0.42	DNS	2.29	0.09	0.08	0.07	0.04
Arsenic (As)	mg/L	0.001	0.024	0.003	0.004	0.001	DNS	0.005	0.004	0.002	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0004	0.0007	0.0001	DNS	0.0007	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.001	0.001	0.001	DNS	0.005	0.001	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.004	0.002	DNS	0.009	0.001	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	5.55	4.49	0.31	DNS	3.03	1.97	1.67	1.52	1.06
Lead (Pb)	mg/L	0.001	0.0034	0.001	0.001	0.001	DNS	0.001	0.001	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	1.097	3.086	1.652	DNS	3.339	1.152	0.691	0.297	0.336
Mercury (Hg)	mg/L	0.0001	0.0006	0.0001	0.0001	0.0001	DNS	0.0001	0.0001	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.008	0.015	0.005	DNS	0.037	0.002	0.001	0.002	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	DNS	0.001	0.001	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.126	0.269	0.043	DNS	0.599	0.012	0.005	0.017	0.008
Total Nitrogen (TN)	mg/L	0.1	No data	4.4	5.3	0.4	DNS	1.9	1.4	1.0	0.3	1.7
Total Phosphorous (TP)	mg/L	0.01	No data	0.59	0.16	0.02	DNS	0.29	0.10	0.06	0.03	0.33

* 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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017				March 2017				April 2017			
				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	5.5	27.9	17.1	30.1	5.1	27.9	17.8	24.8	4.1	27.9	21.1	20.3
Electrical conductivity (EC)	uS/cm	0-8000	-	3556	8000	485	8000	3414	8000	547	8000	3418	8000	527	584
Dissolved oxygen (DO)	%	0-200	80-110	10	92	75	75	9	91	73	70	10	91	72	78
pH		0-14	7.0-8.5	0.2	7.3	6.9	7.1	0.3	7.2	6.9	7.1	0.2	7.2	6.9	6.9
Turbidity (NTU)	NTU	0-600	0.5-10	24	13	5	6	10	12	5	6	9	17	5	19
Total suspended solids (TSS)	mg/L	5		7	6	5	5	3	6	5	5	3	5	5	5
Aluminium (Al)	mg/L	0.01	ID	0.18	0.23	0.01	0.01	0.18	0.19	0.01	0.14	0.18	0.25	0.01	0.19
Arsenic (As)	mg/L	0.001	ID	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.2	0.4	0.1	0.05	0.2	0.4	0.1	0.33	0.2	0.4	0.1	0.66
Lead (Pb)	mg/L	0.001	0.0044	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.044	0.109	0.033	0.038	0.040	0.112	0.040	0.090	0.038	0.112	0.043	0.059
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.006	0.013	0.005	0.006	0.006	0.013	0.005	0.005	0.006	0.013	0.005	0.009
Total Nitrogen (TN)	mg/L	0.1	0.3	0.2	0.6	0.2	0.5	0.2	0.6	0.2	0.5	0.2	0.7	0.2	0.6
Total Phosphorous (TP)	mg/L	0.01	0.03	0.02	0.05	0.02	0.05	0.01	0.05	0.02	0.03	0.01	0.05	0.02	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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	3.4	27.9	21.2	20.3	4.3	27.9	21.0	16.2	5.0	27.9	19.0	15.0
Electrical conductivity (EC)	uS/cm	0-8000	-	3123	8000	1801	2039	3455	8000	728	516	3542	8000	590	664
Dissolved oxygen (DO)	%	0-200	80-110	9	90	71	73	9	89	71	78	9	89	71	93
pH		0-14	7.0-8.5	0.2	7.2	6.9	7.0	0.2	7.1	6.9	6.6	0.2	7.1	6.8	6.9
Turbidity (NTU)	NTU	0-600	0.5-10	5	12	5	11	5	15	5	14	5	15	5	10
Total suspended solids (TSS)	mg/L	5		2	5	5	6	2	7	5	8	2	7	5	5
Aluminium (Al)	mg/L	0.01	ID	0.18	0.25	0.01	0.15	0.18	0.29	0.01	0.25	0.13	0.20	0.01	0.11
Arsenic (As)	mg/L	0.001	ID	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.4	0.5	0.1	1.39	0.4	0.5	0.1	0.69	0.4	0.6	0.1	0.72
Lead (Pb)	mg/L	0.001	0.0044	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.037	0.109	0.043	0.081	0.038	0.109	0.041	0.069	0.035	0.107	0.040	0.028
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.006	0.013	0.005	0.006	0.006	0.013	0.005	0.012	0.006	0.013	0.005	0.011
Total Nitrogen (TN)	mg/L	0.1	0.3	0.2	0.7	0.2	0.5	0.2	0.6	0.2	0.5	0.2	0.6	0.4	4.0
Total Phosphorous (TP)	mg/L	0.01	0.03	0.01	0.05	0.02	0.01	0.01	0.04	0.02	0.02	0.02	0.05	0.02	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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017				March 2017				April 2017			
				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	5.8	28.0	16.2	30.5	5.4	28.0	17.4	24.9	4.3	28.0	20.8	20.5
Electrical conductivity (EC)	uS/cm	0-8000	-	3571	8000	503	8000	3434	8000	575	8000	3445	8000	442	454
Dissolved oxygen (DO)	%	0-200	80-110	9	93	79	75	10	93	77	74	9	93	77	90
pH		0-14	7.0-8.5	0.2	7.1	6.8	7.2	0.2	7.1	6.8	7.0	0.2	7.1	6.8	7.0
Turbidity (NTU)	NTU	0-600	0.5-10	23	15	5	7	10	13	6	7	5	15	6	16
Total suspended solids (TSS)	mg/L	5		7	6	5	5	1	6	5	5	1	5	5	5
Aluminium (Al)	mg/L	0.01	ID	0.17	0.22	0.01	0.01	0.17	0.22	0.01	0.18	0.17	0.26	0.01	0.13
Arsenic (As)	mg/L	0.001	ID	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0013	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.19	0.38	0.05	0.05	0.18	0.33	0.05	0.43	0.16	0.31	0.05	0.27
Lead (Pb)	mg/L	0.001	0.0044	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.038	0.102	0.022	0.037	0.035	0.102	0.035	0.103	0.035	0.102	0.031	0.025
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.005	0.014	0.005	0.012	0.005	0.012	0.005	0.010	0.005	0.012	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.3	0.2	0.5	0.2	0.5	0.2	0.5	0.2	0.2	0.2	0.5	0.2	0.5
Total Phosphorous (TP)	mg/L	0.01	0.03	0.02	0.05	0.02	0.05	0.01	0.04	0.02	0.02	0.01	0.04	0.02	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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	3.7	28.0	20.8	19.9	4.6	28.0	20.1	15.7	5.3	28.0	18.1	14.6
Electrical conductivity (EC)	uS/cm	0-8000	-	3165	8000	1753	1959	3494	8000	576	474	3583	8000	469	550
Dissolved oxygen (DO)	%	0-200	80-110	9	93	75	82	9	93	75	81	11	94	75	100
pH		0-14	7.0-8.5	0.2	7.1	6.8	7.0	0.2	7.1	6.8	6.9	0.2	7.1	6.8	7.2
Turbidity (NTU)	NTU	0-600	0.5-10	5	11	6	10	5	13	6	14	5	13	6	8
Total suspended solids (TSS)	mg/L	5		1	5	5	5	2	6	5	7	2	6	5	5
Aluminium (Al)	mg/L	0.01	ID	0.17	0.26	0.01	0.11	0.17	0.30	0.01	0.25	0.16	0.26	0.01	0.11
Arsenic (As)	mg/L	0.001	ID	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0055	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.0274	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002
Copper (Cu)	mg/L	0.001	0.0013	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.31	0.39	0.05	1.13	0.31	0.46	0.05	0.53	0.31	0.46	0.05	0.49
Lead (Pb)	mg/L	0.001	0.0044	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	ID	0.033	0.097	0.031	0.068	0.035	0.097	0.029	0.033	0.037	0.097	0.025	0.018
Mercury (Hg)	mg/L	0.0001	0.0004	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.07	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.004
Silver (Ag)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.015	0.005	0.012	0.005	0.006	0.005	0.014	0.005	0.006	0.005	0.014	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.3	0.2	0.5	0.2	0.4	0.1	0.5	0.2	0.4	0.2	0.5	0.3	0.3
Total Phosphorous (TP)	mg/L	0.01	0.03	0.01	0.03	0.02	0.01	0.01	0.03	0.02	0.02	0.01	0.03	0.02	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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017				March 2017				April 2017			
				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	3.6	21.5	14.4	26.2	3.5	21.1	14.4	22.2	3.3	20.8	14.4	19.4
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	41	230	178	588	53	248	167	481	54	248	165	258
Dissolved oxygen (DO)	%	0-200	85-110	25	84	38	103	27	85	33	38	27	87	33	69
pH		0-14	6.5-8	0.3	7.6	7.2	7.1	0.5	7.6	7.0	6.4	0.5	7.5	6.8	6.7
Turbidity (NTU)	NTU	0-600	6-50	14	23	9	21	14	24	9	18	14	24	8	18
Total suspended solids (TSS)	mg/L	5	-	3	8	5	7	3	8	5	5	3	8	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.25	0.26	0.03	0.01	0.25	0.26	0.03	0.09	0.25	0.19	0.03	0.11
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.63	0.85	0.48	0.14	0.64	0.85	0.43	0.33	0.64	0.85	0.40	0.33
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.128	0.136	0.022	0.599	0.130	0.136	0.021	0.134	0.129	0.136	0.024	0.097
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.017	0.007	0.005	0.018	0.018	0.008	0.005	0.023	0.018	0.010	0.005	0.007
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.5	0.1	0.4	0.2	0.6	0.1	0.5	0.2	0.6	0.2	0.4
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	0.01

Trigger values derived from 24 sampling events up to and including the month indicated. However, samples from SW7a were unable to be collected at any time during January and February 2017 due to the absence of water. Therefore, trigger values for February 2017 were derived from 24 sampling events up to and including December 2016.

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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	3.3	20.8	14.5	17.1	3.0	20.8	15.0	15.1	3.2	20.8	15.0	12.4
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	49	248	171	208	47	248	180	178	43	248	188	220
Dissolved oxygen (DO)	%	0-200	85-110	26	85	33	68	27	85	33	84	26	83	33	78
pH		0-14	6.5-8	0.4	7.5	6.9	7.0	0.4	7.5	6.8	6.9	0.4	7.5	6.8	7.2
Turbidity (NTU)	NTU	0-600	6-50	13	23	8	12	10	22	8	20	7	19	8	9
Total suspended solids (TSS)	mg/L	5	-	3	8	5	5	3	7	5	7	3	6	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.21	0.14	0.03	0.09	0.24	0.24	0.03	0.43	0.23	0.24	0.03	0.04
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.64	0.85	0.40	0.58	0.65	0.83	0.38	0.47	0.65	0.78	0.37	0.35
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.128	0.136	0.025	0.097	0.131	0.136	0.024	0.022	0.132	0.117	0.024	0.064
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.018	0.010	0.005	0.008	0.018	0.010	0.005	0.007	0.004	0.008	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.5	0.2	0.1	0.2	0.5	0.2	0.3	0.2	0.5	0.2	0.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.03	0.01	0.01	0.02	0.02	0.01	0.02	0.03	0.02	0.01	0.01

Trigger values derived from 24 sampling events up to and including the month indicated. However, samples from SW7a were unable to be collected at any time during January and February 2017 due to the absence of water. Therefore, trigger values for February 2017 were derived from 24 sampling events up to and including December 2016.

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).

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

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017					March 2017					
				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	2.4	20.4	16.3	26.1	23.7	2.5	20.4	16.3	21.1	23.1
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	78	251	119	345	393	77	251	122	454	306
Dissolved oxygen (DO)	%	0-200	85-110	35	98	21	79	40	34	98	21	37	56
pH		0-14	6.5-8	0.5	6.7	5.9	6.5	6.3	0.4	6.7	6.0	5.8	6.1
Turbidity	NTU	0-600	6-50	11	36	18	14	7	12	36	16	14	40
Total suspended solids (TSS)	mg/L	5	-	2	5	5	7	5	2	5	5	5	8
Aluminium (Al)	mg/L	0.01	0.055”	0.45	0.95	0.08	0.04	0.01	0.45	0.93	0.08	0.08	0.08
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.002	0.001	0.000	0.001	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.16	0.38	0.05	1.03	0.80	0.16	0.38	0.05	0.07	0.09
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.025	0.028	0.005	0.527	0.666	0.025	0.026	0.005	0.090	0.018
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.003	0.001	0.000	0.001	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.003	0.007	0.005	0.009	0.009	0.004	0.008	0.005	0.008	0.007
Total Nitrogen (TN)	mg/L	0.1	0.5	0.1	0.4	0.2	0.2	0.1	0.1	0.4	0.2	0.9	0.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01

* Trigger values typically derived from 24 sampling events up to and including the month indicated. However, due to the absence of water at SW8a during pre-construction and the previous reporting periods, a fewer number of events up to and including May 2017 have been used to derive 80th and 20th percentile trigger values for metals. All subsequent months (ie from June 2017 onward) derive 80th and 20th percentiles for all parameters from 24 sampling events.

Note – 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).

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

Parameter				Results									
	Unit	LOR / probe limit	ANZECC default trigger value	April 2017					May 2017				
				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	2.5	20.4	16.3	19.3	19.7	2.4	20.3	16.3	19.1	18.0
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	77	251	122	214	218	79	268	122	223	244
Dissolved oxygen (DO)	%	0-200	85-110	33	98	34	34	53	32	98	40	38	49
pH		0-14	6.5-8	0.4	6.7	6.0	6.6	6.3	0.4	6.7	6.0	6.7	6.3
Turbidity	NTU	0-600	6-50	12	36	14	10	9	12	36	14	14	6
Total suspended solids (TSS)	mg/L	5	-	2	5	5	5	5	2	5	5	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.44	0.91	0.08	0.14	0.16	0.44	0.90	0.09	0.12	0.08
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.16	0.38	0.05	0.20	0.12	0.16	0.37	0.05	0.21	0.08
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.024	0.024	0.005	0.067	0.013	0.024	0.022	0.005	0.085	0.031
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.010	0.005	0.009	0.006	0.004	0.012	0.005	0.010	0.018
Total Nitrogen (TN)	mg/L	0.1	0.5	0.1	0.4	0.2	0.1	0.1	0.1	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	0.01	0.01	0.02	0.01	0.01	0.01

* Trigger values typically derived from 24 sampling events up to and including the month indicated. However, due to the absence of water at SW8a during pre-construction and the previous reporting periods, a fewer number of events up to and including May 2017 have been used to derive 80th and 20th percentile trigger values for metals. All subsequent months (ie from June 2017 onward) derive 80th and 20th percentiles for all parameters from 24 sampling events.

Note – 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).

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

Parameter				Results										
	Unit	LOR / probe limit	ANZECC default trigger value	June 2017					July 2017					
				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	2.3	19.9	15.9	16.3	15.2	2.3	19.9	15.9	16.4	13.5
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	79	272	126	177	171	79	272	126	204	232
Dissolved oxygen (DO)	%	0-200	85-110	32	98	28	63	67	32	98	28	40	58
pH		0-14	6.5-8	0.4	6.7	6.1	6.5	6.6	0.4	6.7	6.1	6.7	6.4
Turbidity	NTU	0-600	6-50	12	36	11	14	14	12	36	11	10	9
Total suspended solids (TSS)	mg/L	5	-	1	5	5	5	6	1	5	5	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.42	0.87	0.10	0.50	0.38	0.42	0.87	0.10	0.10	0.06
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.15	0.36	0.05	0.20	0.17	0.15	0.36	0.05	0.10	0.06
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.023	0.019	0.005	0.007	0.006	0.023	0.019	0.005	0.047	0.006
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.011	0.005	0.007	0.005	0.004	0.011	0.005	0.010	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.4	0.1	0.1	0.1	0.2	0.4	0.1	0.1	0.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01

* Trigger values typically derived from 24 sampling events up to and including the month indicated. However, due to the absence of water at SW8a during pre-construction and the previous reporting periods, a fewer number of events up to and including May 2017 have been used to derive 80th and 20th percentile trigger values for metals. All subsequent months (ie from June 2017 onward) derive 80th and 20th percentiles for all parameters from 24 sampling events.

Note – 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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017				March 2017				April 2017			
				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	5.0	23.9	14.0	23.8	5.0	23.9	14.3	23.7	4.5	23.9	14.7	18.1
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	116	351	174	971	116	365	183	629	108	365	205	192
Dissolved oxygen (DO)	%	0-200	85-110	31	88	25	62	31	86	17	55	30	82	17	81
pH		0-14	6.5-8	0.2	7.1	6.8	6.9	0.4	7.2	6.8	7.2	0.4	7.2	6.8	6.8
Turbidity (NTU)	NTU	0-600	6-50	13	35	11	22	45	43	13	70	45	28	12	13
Total suspended solids (TSS)	mg/L	5	-	2	8	5	9	14	10	5	7	14	10	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.23	0.12	0.02	0.01	0.22	0.12	0.02	0.08	0.22	0.13	0.02	0.20
Arsenic (As)	mg/L	0.001	0.024	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	1.36	1.43	0.41	0.84	1.38	1.43	0.37	0.16	1.44	1.48	0.36	0.36
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.385	0.266	0.011	0.985	0.383	0.266	0.011	0.068	0.397	0.314	0.011	0.018
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.003	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.005	0.014	0.005	0.010	0.005	0.014	0.005	0.080	0.004	0.013	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.3	0.6	0.2	0.4	0.4	0.7	0.2	0.8	0.4	0.7	0.2	0.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.06	0.02	0.01	0.03	0.07	0.01	0.01	0.03	0.06	0.01	0.01

* 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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	3.9	23.9	16.4	16.4	4.0	23.9	16.4	14.4	4.7	23.9	15.1	11.3
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	106	365	215	217	114	365	190	169	115	365	190	216
Dissolved oxygen (DO)	%	0-200	85-110	28	72	17	72	32	81	17	87	33	84	17	95
pH		0-14	6.5-8	0.4	7.2	6.8	7.0	0.4	7.1	6.9	6.9	0.4	7.1	6.9	7.1
Turbidity (NTU)	NTU	0-600	6-50	45	28	9	11	45	28	13	15	45	26	12	10
Total suspended solids (TSS)	mg/L	5	-	14	10	5	5	14	10	5	5	14	10	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.22	0.14	0.03	0.12	0.22	0.27	0.05	0.43	0.18	0.19	0.05	0.09
Arsenic (As)	mg/L	0.001	0.024	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	1.40	1.43	0.34	0.57	1.41	1.31	0.34	0.46	1.41	1.31	0.35	0.38
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.391	0.266	0.011	0.038	0.396	0.217	0.011	0.009	0.396	0.217	0.011	0.014
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.004	0.008	0.005	0.016	0.003	0.008	0.005	0.005	0.003	0.008	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.4	0.7	0.2	0.2	0.4	0.7	0.2	0.2	0.4	0.7	0.2	0.2
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.06	0.01	0.01	0.03	0.06	0.01	0.02	0.03	0.06	0.01	0.01

* 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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017				March 2017				April 2017			
				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	5.2	24.0	14.2	27.0	5.1	24.1	15.1	23.0	4.5	24.1	15.9	18.4
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	164	513	216	512	153	495	248	373	142	495	268	264
Dissolved oxygen (DO)	%	0-200	85-110	23	81	38	42	23	79	33	41	21	71	33	70
pH		0-14	6.5-8	0.3	7.2	6.9	7.1	0.3	7.2	6.9	7.0	0.2	7.2	6.9	6.9
Turbidity (NTU)	NTU	0-600	6-50	50	49	16	10	50	51	16	40	51	46	14	12
Total suspended solids (TSS)	mg/L	5	-	5	12	5	5	5	12	5	10	5	12	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.28	0.18	0.01	0.02	0.27	0.18	0.01	0.16	0.28	0.22	0.01	0.19
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.29	0.72	0.34	0.41	0.23	0.70	0.34	0.59	0.20	0.67	0.34	0.57
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.127	0.294	0.023	0.372	0.133	0.305	0.018	0.141	0.137	0.305	0.017	0.036
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.005	0.008	0.005	0.009	0.005	0.008	0.005	0.008	0.013	0.010	0.005	0.008
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.6	0.3	0.4	0.2	0.6	0.3	1.1	0.2	0.7	0.3	0.6
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.03	0.01	0.01	0.01	0.03	0.01	0.04	0.01	0.02	0.01	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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	24.1	16.8	16.6	4.1	24.1	16.8	13.9	4.9	24.1	14.9	11.2
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	138	495	289	289	147	495	273	254	148	495	273	313
Dissolved oxygen (DO)	%	0-200	85-110	18	59	33	59	21	73	33	81	23	76	33	83
pH		0-14	6.5-8	0.2	7.2	7.0	6.9	0.2	7.2	6.9	6.9	0.2	7.2	6.9	7.1
Turbidity (NTU)	NTU	0-600	6-50	57	51	12	11	57	47	13	15	58	47	12	11
Total suspended solids (TSS)	mg/L	5	-	9	12	5	5	8	11	5	7	8	11	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.27	0.22	0.02	0.12	0.27	0.29	0.02	0.29	0.18	0.23	0.02	0.05
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.21	0.69	0.34	0.82	0.20	0.67	0.35	0.62	0.20	0.64	0.36	0.68
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.132	0.293	0.017	0.081	0.135	0.293	0.016	0.017	0.133	0.293	0.017	0.035
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.013	0.010	0.005	0.010	0.013	0.010	0.005	0.005	0.013	0.010	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.7	0.3	0.4	0.2	0.7	0.4	0.5	0.2	0.7	0.3	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01

* 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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017				March 2017				April 2017			
				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	5.8	24.5	15.3	24.5	5.7	25.7	15.5	22.8	5.1	25.7	17.0	19.2
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	700	1950	448	1479	686	1887	418	468	643	1887	595	1330
Dissolved oxygen (DO)	%	0-200	85-110	27	102	48	70	29	103	48	90	30	105	48	86
pH		0-14	6.5-8	0.5	7.5	6.7	7.3	0.5	7.4	6.8	7.4	0.5	7.4	6.8	6.7
Turbidity (NTU)	NTU	0-600	6-50	11	22	5	8	17	30	5	77	16	16	5	9
Total suspended solids (TSS)	mg/L	5	-	3	6	5	5	3	7	5	10	3	7	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.55	0.20	0.01	0.01	0.46	0.20	0.01	0.24	0.46	0.32	0.01	0.18
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.33	0.38	0.05	0.05	0.23	0.29	0.05	0.18	0.23	0.29	0.05	0.18
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.116	0.186	0.034	0.127	0.111	0.178	0.033	0.056	0.140	0.186	0.031	0.282
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.002	0.002	0.001	0.001	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.003
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.008	0.009	0.005	0.005	0.003	0.008	0.005	0.023	0.003	0.008	0.005	0.016
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.4	0.2	0.3	0.2	0.4	0.2	0.6	0.2	0.4	0.2	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.00	0.01	0.01	0.01

* 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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	4.6	25.7	18.0	16.9	4.9	25.7	17.5	14.7	5.7	25.7	15.5	12.2
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	636	1887	633	765	682	1784	398	393	681	1784	398	953
Dissolved oxygen (DO)	%	0-200	85-110	29	102	48	73	28	105	58	77	30	111	58	83
pH		0-14	6.5-8	0.5	7.4	6.8	7.1	0.5	7.4	6.6	6.6	0.5	7.3	6.6	6.8
Turbidity (NTU)	NTU	0-600	6-50	18	22	5	39	18	30	6	31	18	22	6	15
Total suspended solids (TSS)	mg/L	5	-	4	7	5	8	4	7	5	6	2	6	5	6
Aluminium (Al)	mg/L	0.01	0.055”	0.46	0.32	0.01	0.08	0.46	0.42	0.01	0.40	0.36	0.32	0.01	0.10
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.22	0.29	0.05	0.13	0.23	0.38	0.05	0.30	0.18	0.29	0.05	0.20
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.225	0.197	0.031	0.387	0.226	0.197	0.031	0.036	0.225	0.197	0.041	0.359
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.002
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.003	0.008	0.005	0.008	0.003	0.007	0.005	0.005	0.003	0.007	0.005	0.007
Total Nitrogen (TN)	mg/L	0.1	0.5	0.2	0.4	0.2	0.4	0.2	0.4	0.2	0.3	0.2	0.4	0.2	0.3
Total Phosphorous (TP)	mg/L	0.01	0.05	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01

* 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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	February 2017				March 2017				April 2017			
				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	4.8	23.1	13.9	24.9	5.0	24.2	14.4	23.7	4.4	24.2	15.0	19.2
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	45	246	187	485	57	286	192	305	53	286	201	220
Dissolved oxygen (DO)	%	0-200	85-110	19	43	17	64	19	51	17	60	18	51	18	48
pH		0-14	6.5-8	0.4	7.0	6.4	6.9	0.4	7.0	6.4	6.2	0.4	7.0	6.4	6.0
Turbidity (NTU)	NTU	0-600	6-50	12	30	11	23	27	34	11	80	27	30	11	13
Total suspended solids (TSS)	mg/L	5	-	3	9	5	16	3	9	5	41	3	10	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.30	0.33	0.02	0.01	0.31	0.33	0.02	0.30	0.31	0.43	0.02	0.36
Arsenic (As)	mg/L	0.001	0.024	0.001	0.002	0.001	0.002	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.49	1.29	0.46	1.71	0.50	1.29	0.38	0.35	0.46	1.19	0.46	0.61
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.131	0.279	0.074	0.439	0.131	0.279	0.074	0.204	0.133	0.279	0.073	0.096
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.002
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.002	0.007	0.005	0.007	0.002	0.007	0.005	0.014	0.002	0.008	0.005	0.006
Total Nitrogen (TN)	mg/L	0.1	0.5	0.6	0.8	0.5	1.2	0.6	0.8	0.5	0.8	0.6	0.9	0.5	0.6
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.06	0.01	0.05	0.03	0.05	0.01	0.07	0.03	0.05	0.01	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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	3.8	24.2	16.2	16.2	3.9	24.2	16.2	14.1	4.6	24.2	15.2	11.1
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	53	281	201	225	52	238	187	196	53	255	192	283
Dissolved oxygen (DO)	%	0-200	85-110	19	51	15	31	22	53	15	43	21	43	15	50
pH		0-14	6.5-8	0.4	7.0	6.5	6.3	0.4	7.0	6.4	6.1	0.4	7.0	6.4	6.5
Turbidity (NTU)	NTU	0-600	6-50	32	42	11	41	32	42	13	17	32	42	12	10
Total suspended solids (TSS)	mg/L	5	-	5	13	5	9	5	13	6	11	5	13	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.30	0.43	0.03	0.23	0.31	0.53	0.03	0.58	0.25	0.43	0.03	0.15
Arsenic (As)	mg/L	0.001	0.024	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Iron (Fe)	mg/L	0.05	ID	0.47	1.29	0.55	1.34	0.46	1.29	0.60	0.87	0.47	1.39	0.60	1.28
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.133	0.279	0.073	0.203	0.137	0.253	0.055	0.034	0.135	0.253	0.066	0.094
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.003	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.003	0.008	0.005	0.009	0.003	0.008	0.005	0.005	0.003	0.008	0.005	0.005
Total Nitrogen (TN)	mg/L	0.1	0.5	0.6	0.9	0.6	0.7	0.6	0.9	0.6	0.5	0.6	0.9	0.6	0.4
Total Phosphorous (TP)	mg/L	0.01	0.05	0.03	0.05	0.02	0.03	0.03	0.05	0.03	0.01	0.03	0.05	0.02	0.01

* 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).

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

Parameter	Unit	LOR / probe limit	ANZECC default trigger value	Results											
				February 2017				March 2017				April 2017			
				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	4.2	21.8	13.8	23.8	4.2	22.3	14.2	23.4	3.8	22.2	14.4	18.3
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	65	313	202	490	66	316	213	422	61	313	206	281
Dissolved oxygen (DO)	%	0-200	85-110	13	64	43	43	13	64	42	79	12	64	42	73
pH		0-14	6.5-8	0.4	6.9	6.2	7.3	0.4	6.9	6.3	6.9	0.4	6.9	6.2	6.7
Turbidity (NTU)	NTU	0-600	6-50	15	36	14	8	15	35	16	20	14	34	16	17
Total suspended solids (TSS)	mg/L	5	-	4	8	5	5	4	8	5	5	4	9	5	5
Aluminium (Al)	mg/L	0.01	0.055”	0.40	0.58	0.03	0.02	0.42	0.61	0.03	0.55	0.43	0.74	0.03	0.49
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.002	0.002	0.001	0.001	0.002
Iron (Fe)	mg/L	0.05	ID	0.35	1.18	0.58	0.43	0.30	1.06	0.55	0.51	0.29	0.98	0.55	0.58
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Manganese (Mn)	mg/L	0.001	1.9	0.072	0.145	0.060	0.068	0.068	0.138	0.059	0.056	0.057	0.128	0.057	0.043
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.002
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.002	0.008	0.005	0.005	0.003	0.009	0.005	0.015	0.003	0.010	0.005	0.014
Total Nitrogen (TN)	mg/L	0.1	0.5	1.4	0.8	0.5	0.6	1.4	0.8	0.5	0.9	1.4	0.8	0.5	0.9
Total Phosphorous (TP)	mg/L	0.01	0.05	0.02	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.01	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).

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

Parameter				Results											
	Unit	LOR / probe limit	ANZECC default trigger value	May 2017				June 2017				July 2017			
				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	3.2	22.3	16.1	16.1	3.4	22.3	16.1	13.6	4.1	22.3	14.6	11.2
Electrical conductivity (EC)	uS/cm	0-8000	125-2200	63	321	245	407	68	321	207	211	68	321	207	615
Dissolved oxygen (DO)	%	0-200	85-110	12	56	37	71	13	62	38	77	13	62	38	83
pH		0-14	6.5-8	0.4	6.9	6.4	6.9	0.4	6.9	6.2	6.4	0.4	6.9	6.2	7.0
Turbidity (NTU)	NTU	0-600	6-50	13	32	16	26	13	32	16	19	11	25	16	17
Total suspended solids (TSS)	mg/L	5	-	4	8	5	10	4	9	5	7	4	9	5	6
Aluminium (Al)	mg/L	0.01	0.055”	0.43	0.74	0.03	0.18	0.42	0.74	0.04	0.49	0.36	0.57	0.04	0.23
Arsenic (As)	mg/L	0.001	0.024	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.003
Cadmium (Cd)	mg/L	0.0001	0.0002	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Chromium (Cr)	mg/L	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Copper (Cu)	mg/L	0.001	0.0014	0.002	0.001	0.001	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002
Iron (Fe)	mg/L	0.05	ID	0.30	1.04	0.55	0.59	0.30	1.10	0.56	0.92	0.31	1.12	0.56	0.77
Lead (Pb)	mg/L	0.001	0.0034	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.002
Manganese (Mn)	mg/L	0.001	1.9	0.054	0.128	0.057	0.021	0.037	0.120	0.057	0.052	0.037	0.120	0.057	0.024
Mercury (Hg)	mg/L	0.0001	0.0006	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001	0.0000	0.0001	0.0001	0.0001
Nickel (Ni)	mg/L	0.001	0.011	0.000	0.001	0.001	0.002	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.005
Silver (Ag)	mg/L	0.001		0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001	0.000	0.001	0.001	0.001
Zinc (Zn)	mg/L	0.005	0.008	0.003	0.010	0.005	0.012	0.003	0.010	0.005	0.012	0.003	0.010	0.005	0.128
Total Nitrogen (TN)	mg/L	0.1	0.5	1.4	0.8	0.5	0.8	1.4	0.8	0.5	0.9	1.4	0.8	0.5	15.0
Total Phosphorous (TP)	mg/L	0.01	0.05	0.01	0.02	0.01	0.03	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.88

* 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).

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. While construction work at different times during the reporting period were in close proximity to all waterways, this level of variability remained typical of results experienced during pre-construction monitoring. Observations made during site monitoring suggest some elevated parameter levels (eg turbidity) in some waterways was attributable to construction. At other times, impacts were considered to be unrelated to the project. Therefore, the following general and specific observations can be made:

- The monitoring period can be characterised by rainfall values generally below average across the entire project and broader region. March was an exception with rainfall about four times the historical average. Five of the seven months encompassing the monitoring period (January 2017 to July 2017) were well below average. While most waterways were continuous (ie a connection between upstream and downstream sampling points was maintained) there were exceptions on one or more occasions at a number of waterways. Exceptions occurred at SW1, SW2, SW7, SW8, SW9, SW12 and SW13 that were observed to be either dry or isolated ponds at different times during the monitoring period.
- 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 SW3. 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 SW7, SW8, SW12 and SW13. At all sampling locations the greater differences coincide with no visible flow, sample points persisting as isolated ponds, or in some cases dry upstream conditions at the time of sampling. At SW13a (26 May 2017), the difference coincided with an approved licensed basin release. For all freshwater waterways, the calculated median values were within the default trigger values for low land rivers presented in the ANZECC guidelines.

  Impacts attributable to construction for all waterways are considered negligible to minor.
- 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 with the exception of SW8c and SW11a. SW3b, SW5b, SW6b, SW6d and SW8b were below the 20th percentile trigger values for between one and four months during the monitoring period. While 80th percentile trigger values were exceeded on a number of occasions (on between one and six occasions), particularly at SW1 and SW13. In all instances, 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, SW9 and SW10 were typically consistent between upstream and downstream samples. At SW2 and SW5b, these locations routinely persist as standing water where water level, rather than flow, is very dependent on rainfall. These locations have also been observed to have algae outbreaks that trigger substantial fluctuations in dissolved oxygen levels from month to month. At the remaining waterways, it was noted that these waterways persistent with little to no flow, or on occasions were present as isolated ponds, during periods when upstream and downstream variability was recorded. However, a further exception was noted at SW13a where elevated DO levels coincide with elevated nitrogen

and phosphorous levels, particularly during June and July. This trend is discussed further in response to nitrogen and phosphorous levels below.

Impacts attributable to construction are considered negligible.

- pH – Calculated median values were generally within, or close to, the calculated upstream 80th and 20th percentile trigger values for the majority of waterways throughout the six-month monitoring period. Exceptions in most instances were minor, with differences ranging between pH 0.1 and 0.6. In all but four instance (SW2a – March and June, SW5b – March 2017 and SW8b – March 2017), pH levels were within the default trigger value for low land rivers present in the ANZECC guidelines.

  There were more substantial exceptions at SW5b when comparing pre-construction results. During pre-construction, SW5b exhibited quite acidic conditions, which appear to correlate to low and below average rainfall. During this monitoring period, while rainfall was consistently at or below average, substantial rain events in March (totaling nearly 500mm for the month at Telegraph Point BoM weather station) resulted in a rapid increase in water level and inundation of the area. Water level remained elevated for the remainder of the monitoring period with pH levels consistently higher than the pre-construction period. While pH was elevated above pre-construction levels between April and July, it is noted that the level remained within the default trigger value for low land rivers present in the ANZECC guidelines.

  When comparing all other exceptions, individual sampling events generally show consistent pH levels between upstream and downstream sampling locations.

  It is considered that pH variability within all waterways across the project was unrelated to construction during the monitoring period. Rainfall, or persistent periods without rain, are considered to the predominant factors affecting pH.

- Turbidity – Calculated median values for SW2a, SW3b, SW6b, SW6d, SW8c, SW9a, SW11a, SW12b and SW13a exceeded calculated 80th percentile values on one or more occasions during the monitoring period. A number of these exceedances were also above the ANZECC upper limit default trigger value for the respective waterway type.

  On all occasions where exceedances occurred at SW2b and SW9a, levels during individual sampling events were higher upstream than downstream. For those elevated levels at SW6b and SW6d, on all occasions upstream and downstream levels were similar.

  At SW3b, while there were individual sampling events where turbidity levels were higher downstream than upstream, in all instances the differences were observed to be attributable to localised environmental conditions unrelated to the project. The Hastings River has been observed over extended monitoring for the project to be heavily affected close to shore by tidal current, wind and wave action. Elevated levels on all occasions were considered to be due to one or a combination of these factors. There were no observed impacts attributable to the project.

  For SW8c, two out of the three sampling events were during periods when SW8a was dry, SW8b persistent as an isolated pond and little to no flow was observed at SW8c. While turbidity was higher at SW8c on these occasions, it remained below the upper limit default trigger value for low land rivers present in the ANZECC guidelines. During the third monitoring event, all sampling points were observed to be connected with turbidity levels generally consistent at all sampling points. Measured levels were also well below the upper limit default trigger value for low land rivers present in the ANZECC guidelines.

At SW11a, both the March and June elevated levels were attributable to either a downstream basin overtopping during substantial wet weather events or an approved licensed basin discharge. Where exceedances were recorded during May, upstream and downstream levels were similar.

Where exceedances were recorded at SW12b during March, both were recorded where sampling points persisted as isolated ponds. However, prior to the first sampling event, it was later determined that a valve on a low-flow pipe was left open during a previous approved licensed basin release. The subsequent uncontrolled release resulted in elevated downstream turbidity levels for both of these early March sampling events (note, sampling events took place four days apart). An incident report was raised in response to the event.

At SW13b, levels were generally the same upstream and downstream for all, but one, sampling event in May. The elevated downstream level was recorded during an approved licensed basin discharge.

Observations made during sampling events and the subsequent monitoring results suggested construction activities have had a minor to moderate impact on turbidity levels in some waterways. This is expected to decline substantially in the subsequent reporting period as paving work is completed, and landscaping and restoration across the project establishes.

- Nitrogen and phosphorus – Calculated median values were generally below the calculated upstream 80th percentile trigger values for the majority of waterways throughout the six-month monitoring period. Exceptions in all waterways, other than some in SW5, SW6 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 the two sampling point persisting as isolated ponds.

  Higher levels and increased variability was recorded at SW5, SW6 and SW13. Generally, broader land use practices eg industry, commercial and agriculture, are considered likely to be the major influences on nitrogen and phosphorus in these and other waterways experiencing elevated levels.

  The elevated level recorded at SW6b in July appears to be a one-off. Levels upstream, and prior to and following the monitoring event were within a normal range and consistent with historical trends. The spike is only evident in the analysis due to the limited number of samples taken during July. It is most likely that the sample was contaminated during the collection.

  At SW13a, results for both nitrogen and phosphorous show an initial elevated trend commencing in July 2017. While not part of this monitoring period, it is noted that this trend has continued in subsequent months ie beyond July 2017. As the project site has remained unchanged in this area for a considerable period of time (ie paving and permanent drainage completed, and restoration substantially progressed), it is considered unlikely to be a result of construction. However, changes to land use activities that may contribute to an increased nitrogen and phosphorous load in the waterway have been observed within the SW13a catchment.

  Impacts attributable to construction 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 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. The results were not inconsistent with the variability and levels experienced during the pre-construction and previous construction monitoring periods. None of the elevated or low metal parameters are considered likely to be attributable to construction related activities (eg exposure of acid sulfate material).

3.6 Project response to surface water quality results

Impacts on water quality attributable to the project were generally considered to be negligible during the monitoring period. However, elevated turbidity levels at SW12 downstream monitoring site on two occasions were considered largely attributable to project activities ie low-flow basin left open following approved licensed basin release during rain event. In response, Roads and Maritime and its construction partners reviewed procedures relating to water quality basin management and took steps to improve procedures and training. The project team will continue to review and implement management measures to minimise the likelihood of future reoccurrences.

It is also noted that the risk water quality impacts attributable to the project will progressively decline over the subsequent reporting period. Final paving, finishing work and landscaping is well advanced on all but a small section of the project on Stage 3 (ie about six kilometres). Landscaping and restoration will continue to be a focus of maintenance efforts over the subsequent monitoring period to minimise the potential for poor water quality outcomes attributable to the project.

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.
- 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, GW04, GW05, GW06, GW07, GW09, GW11, GW12, GW13, GW14, GW19, GW20, GW21, GW22, GW23, GW27 and GW29 were not accessible for between one and six monitoring events during this reporting period due to restricted access attributable to construction.
- 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.

- GW08, GW09, GW10, GW16, GW19, GW20, GW24, GW25 and GW28 had insufficient water to sample for between one and five 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 six occasions during the reporting period.
- GW09 has been dry, contained insufficient water to sample, or had no access due to construction during all construction monitoring events. The site was also destroyed in August 2015 and reinstated prior to June 2016 sampling event.
- 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 has been permanently inaccessible due to permanent project boundary fencing.
- GW16, GW17 and GW20 were not sampled during the pre-construction period and, with the exception of GW17, were largely dry during this and previous construction 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.
- Laboratory analysis was conducted for various parameters on either one or two occasions for GW01 to GW03, GW06 to GW08, GW11 to GW13, GW15, GW17 to GW18, GW22, GW24, GW26 to GW30 only. As indicated previously, all other boreholes had insufficient water to take a sample, were dry, or not accessible due to construction staging or permanent fencing.
- All metals analysed for the July 2017 monitoring event were for total metals only. Previous monitoring events (with the exception of July 2015, November 2015, April 2016 and August 2016) analysed dissolved metals with the exception of iron and manganese. Roads and Maritime has previously identified this issue on two separate occasions and had instructed the laboratory to analyse both total and dissolved metals for all future monitoring events. However, a failure to implement continuity of these instructions has resulted in only total metals being analysed for the July 2017 monitoring event. Roads and Maritime has again provided an instruction to the laboratory to analyse all future samples for both total and dissolved metals.

3.8 Summary of groundwater results

Table 3-28 to Table 3-41 present data collected manually during the construction period 22 January 2017 to 21 July 2017 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 January 2017). This report presents data from monitoring undertaken between February 2017 and July 2017). 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 will be developed further over time with the inclusion of subsequent construction and post-construction monitoring data and allow for the identification of any long-term trends.

Table 3-28 Construction groundwater monitoring results by borehole

Parameter	Unit	LOR	GW01		Results		GW02		Results		GW03		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01	4.24	4.6	<0.01	4.93	<0.01*	<0.01*	<0.01	1.2	0.03	0.03	<0.01	0.64
Dissolved Arsenic	mg/L	0.001	0.007	0.008	<0.001	0.004	0.0034	0.0046	<0.001	<0.001	0.003	0.003	<0.001	0.008
Dissolved Cadmium	mg/L	0.0001	0.001	0.001	0.0031	0.0042	<0.01*	<0.01*	<0.0001	<0.0001	<0.001*	<0.001*	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	0.001	0.001	<0.001	0.017	<0.01*	<0.01*	<0.001	0.005	0.012	0.012	<0.001	<0.001
Dissolved Copper	mg/L	0.001	0.043	0.063	0.001	0.031	<0.01*	<0.01*	0.002	0.01	0.007	0.007	0.003	0.015
Total Iron	mg/L	0.05	7.01	10.84	16	7.59	42.54	59.28	1.3	1.81	53.7	149.8	5.82	26.6
Dissolved Lead	mg/L	0.001	0.021	0.03	<0.001	0.006	<0.01*	<0.01*	<0.001	<0.001	<0.001*	<0.001*	<0.001	<0.001
Total Manganese	mg/L	0.001	0.472	0.487	1.33	1.16	0.458	0.482	0.077	0.077	0.252	0.483	0.462	0.936
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001	0.033	0.035	0.008	0.01	0.0032	0.0038	0.002	0.003	0.0048	0.0132	0.012	0.024
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*	0.002	<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	0.041	0.114	0.0074	0.0086	0.017	0.041	0.013	0.013	0.006	0.041
EC laboratory	uS/cm		5166	5982	8500	7690	384	469	550	627	967	1292	1300	1580
Total Nitrogen	mg/L		0.35	1.00			1.08	2.04			1.2	1.9		
Total Phosphorus	mg/L		0.04	0.12			0.196	0.424			0.30	0.62		
Ammonia	mg/L		0.03	0.03			0.272	0.506			0.07	0.17		
Phosphate	mg/L													
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L		1427	1919			27	37.2			194	325		
Nitrate	mg/L				0.27	0.97			0.33	0.16			0.12	0.04
Sulphate	mg/L		105	258			14.4	29.4			99	149		
Calcium	mg/L		7.86	10.23			14.28	18.66			33.1	58.0		
Magnesium	mg/L		109.3	136.2			12.18	16.92			37	76		
Potassium	mg/L		6.17	7.23			4.85	6.044			6.17	13.84		
Sodium	mg/L		741	874			38.48	54.38			97	337		

* No variation established between sampling events.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

DNS – Did Not Sample

Table 3-29 Construction groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW04		Results		GW05		Results		GW07^		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01	<0.01*	<0.01*	DNS	DNS	<0.01*	<0.01*	DNS	DNS			0.76	6.81
Dissolved Arsenic	mg/L	0.001	0.0034	0.0046			0.006	0.010					<0.001	0.003
Dissolved Cadmium	mg/L	0.0001	<0.001*	<0.001*			<0.001*	<0.001*					<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	0.002	0.002			<0.001*	<0.001*					<0.001	0.006
Dissolved Copper	mg/L	0.001	<0.001*	<0.001*			<0.001*	<0.001*					0.026	0.458
Total Iron	mg/L	0.05	66.3	93.3			158	510			38.3	38.3	4.02	3.88
Dissolved Lead	mg/L	0.001	<0.001*	<0.001*			<0.001*	<0.001*					<0.001	0.005
Total Manganese	mg/L	0.001	0.410	0.540			0.799	0.980					0.052	0.037
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001	0.0018	0.0042			0.004	0.01					0.001	0.003
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*			<0.001*	<0.001*					<0.001	<0.001
Dissolved Zinc	mg/L	0.005	0.010	0.014			0.019	0.019					0.016	0.1
EC laboratory	uS/cm		3212	4922			6598	7294			168	168	226	225
Total Nitrogen	mg/L		1.4	2.7			2.6	5.5			1.4	1.4		
Total Phosphorus	mg/L		0.38	1.40			1.60	3.18			0.2	0.2		
Ammonia	mg/L		0.18	0.98			0.80	0.89			0.07	0.07		
Phosphate	mg/L													
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L		1089	1309			1468	1564			38	38		
Nitrate													0.13	0.1
Sulphate	mg/L		40	65			1055	1171			4.7	4.7		
Calcium	mg/L		34.7	54.9			170	232			37.6	37.6		
Magnesium	mg/L		68	107			273	367			16.9	16.9		
Potassium	mg/L		14.2	24.7			35.4	56.34			5.25	5.25		
Sodium	mg/L		511	701			973	1045			26.2	26.2		

* No variation established between sampling events.

^ Based on one record only.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

DNS – Did Not Sample

Table 3-30 Construction groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW08		Results		GW09		Results		GW010		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01			1.04	39.4	0.23^	0.23^	DNS	DNS	1^	1^	DNS	DNS
Dissolved Arsenic	mg/L	0.001			0.002	0.01	<0.001^	<0.001^			0.001^	0.001^		
Dissolved Cadmium	mg/L	0.0001			<0.0001	0.0001	0.002^	0.002^			<0.001^	<0.001^		
Dissolved Chromium	mg/L	0.001			0.002	0.039	0.001^	0.001^			0.003^	0.003^		
Dissolved Copper	mg/L	0.001			0.003	0.059	0.218^	0.218^			0.02^	0.02^		
Total Iron	mg/L	0.05			26.6	28.2	8.47	9.49			115.1	194.5		
Dissolved Lead	mg/L	0.001			<0.001	0.024	<0.001^	<0.001^			0.001^	0.001^		
Total Manganese	mg/L	0.001			0.094	0.088	0.85^	0.85^			0.013^	0.013^		
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001			0.001	0.012	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			0.03	0.374	0.063^	0.063^			0.007^	0.007^		
EC laboratory	uS/cm				639	786					270^	270^		
Total Nitrogen	mg/L										1.1^	1.1^		
Total Phosphorus	mg/L										0.11^	0.11^		
Ammonia	mg/L										<0.02^	<0.02^		
Phosphate	mg/L													
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L										52^	52^		
Nitrate					0.11	0.03								
Sulphate	mg/L										9.4^	9.4^		
Calcium	mg/L						20.45	59.86			46.1	127.0		
Magnesium	mg/L						54.8	108.9			22.1	48.6		
Potassium	mg/L						5.57	11.59			9.42	16.01		
Sodium	mg/L						478	698			69.0	120.8		

* No variation established between sampling events.

^ Based on one record only.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

DNS – Did Not Sample

Table 3-31 Construction groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW11		Results		GW12		Results		GW013		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01	0.26	0.56	0.04	1.08	0.02	0.02	0.06	2.48	0.02	0.03	0.02	DNS
Dissolved Arsenic	mg/L	0.001	<0.001*	<0.001*	<0.001	0.002	0.029	0.030	0.01	0.102	0.002	0.004	<0.001	
Dissolved Cadmium	mg/L	0.0001	0.0022	0.0028	<0.0001	<0.0001	<0.001*	<0.001*	0.0002	<0.0001	<0.001*	<0.001*	<0.0001	
Dissolved Chromium	mg/L	0.001	0.001	0.001	<0.001	0.002	<0.001*	<0.001*	0.003	0.005	0.001	0.001	<0.001	
Dissolved Copper	mg/L	0.001	0.1818	0.2292	0.003	0.023	<0.001*	<0.001*	0.03	0.034	<0.001*	<0.001*	<0.001	
Total Iron	mg/L	0.05	46.8	219.3	1.55	2.76	185	283	69.4	238	41.5	60.4	8.98	
Dissolved Lead	mg/L	0.001	<0.001*	<0.001*	<0.001	0.002	<0.001*	<0.001*	<0.001	0.002	<0.001*	<0.001*	<0.001	
Total Manganese	mg/L	0.001	0.791	1.623	0.048	0.054	5.07	7.14	6.7	8.41	0.217	0.249	0.341	
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001	0.0626	0.0884	0.005	0.006	0.003	0.003	0.018	0.004	0.003	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*	<0.001	
Dissolved Zinc	mg/L	0.005	0.0788	0.0992	0.146	0.208	0.028	0.034	0.135	0.091	0.014	0.023	0.058	
EC laboratory	uS/cm		2904	7650	1130	1290	3314	6962	2660	4680	207	305	299	
Total Nitrogen	mg/L		0.56	1			1.3	1.7			1.6	1.7		
Total Phosphorus	mg/L		0.08	0.70			0.08	0.19			0.41	0.59		
Ammonia	mg/L		0.03	0.13			0.82	0.93			0.32	0.50		
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L		581	1422			394	781			25	36		
Nitrate					0.15	0.33			0.18	<0.01			0.19	
Sulphate	mg/L		448	1263			1284	3267			14	26		
Calcium	mg/L		30.8	120.4			85.9	148.8			3.70	4.36		
Magnesium	mg/L		58.1	189.4			137	233			8.23	9.23		
Potassium	mg/L		14.4	20.8			14.2	21.0			6.19	8.58		
Sodium	mg/L		427	1013			313	481			28.8	41.2		

* No variation established between sampling events.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

DNS – Did Not Sample

Table 3-32 Construction groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW14		Results		GW15		Results		GW017		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01	4.07	4.29	DNS	DNS	0.01	0.01	<0.01	0.46			<0.01	0.73
Dissolved Arsenic	mg/L	0.001	0.001	0.001			0.020	0.021	0.004	0.012			<0.001	0.002
Dissolved Cadmium	mg/L	0.0001	<0.001*	<0.001*			<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
Dissolved Copper	mg/L	0.001	0.114	0.200			<0.001*	<0.001*	0.002	0.036			<0.001	0.004
Total Iron	mg/L	0.05	2.05	3.40			8.13	10.30	2.36	2.36			2.33	2.64
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	0.757	0.759			2.85	2.99	1.98	2.08			0.092	0.126
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001	0.028	0.029			0.003	0.003	0.003	0.004			0.001	0.002
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	0.130	0.146			0.007	0.007	0.007	0.03			<0.005	0.051
EC laboratory	uS/cm		7480	8074			3768	3798	3740	3540			3540	3260
Total Nitrogen	mg/L		0.7	0.9			0.43	0.96						
Total Phosphorus	mg/L		0.02	0.03			0.07	0.09						
Ammonia	mg/L		0.08	0.10			0.07	0.10						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L		2386	3480			990	1559						
Nitrate									0.04	0.01			0.04	<0.01
Sulphate	mg/L		166	215			136	206						
Calcium	mg/L		106	127			62.3	71.5						
Magnesium	mg/L		165	195			115	123						
Potassium	mg/L		2.67	3.12			8.80	9.14						
Sodium	mg/L		1048	1216			532	557						

* No variation established between sampling events.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

DNS – Did Not Sample

Table 3-33 Construction groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW018		Results		GW19		Results		GW20		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01	<0.01*	<0.01*	<0.01	1.08	<0.01^	<0.01^	DNS	DNS			DNS	DNS
Dissolved Arsenic	mg/L	0.001	0.007	0.008	0.002	0.006	0.001^	0.001^						
Dissolved Cadmium	mg/L	0.0001	<0.001*	<0.001*	<0.0001	<0.0001	<0.001^	<0.001^						
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	0.01	0.013^	0.013^						
Total Iron	mg/L	0.05	5.76	9.92	1.65	3.16	18.1	48.4						
Dissolved Lead	mg/L	0.001	<0.001*	<0.001*	<0.001	0.007	<0.001^	<0.001^						
Total Manganese	mg/L	0.001	1.64	1.83	1.33	1.32	0.636^	0.636^						
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001	0.003	0.005	0.002	0.004	0.015^	0.015^						
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*	<0.001	<0.001	<0.001^	<0.001^						
Dissolved Zinc	mg/L	0.005	0.011	0.015	<0.005	0.033	0.057^	0.057^						
EC laboratory	uS/cm		1652	1658	1700	1690	746	1371						
Total Nitrogen	mg/L		0.6	0.7			1.6	1.7						
Total Phosphorus	mg/L		0.15	0.15			0.24	0.38						
Ammonia	mg/L		0.20	0.22			0.1	0.28						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L		101	109			90	98						
Nitrate					0.04	0.01								
Sulphate	mg/L		150	154			46	143						
Calcium	mg/L		166	185			34.8	124.9						
Magnesium	mg/L		61.9	62.1			22.7	55.8						
Potassium	mg/L		7.65	8.02			7.74	8.23						
Sodium	mg/L		100.0	108.3			91.1	100.8						

* No variation established between sampling events.

^ Based on one record only.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

DNS – Did Not Sample

Table 3-34 Construction groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW21^		Results		GW022		Results		GW23		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01	0.05	0.05	DNS	DNS	0.05^	0.05^	DNS	DNS	0.05	0.19	0.2	8.3
Dissolved Arsenic	mg/L	0.001	0.002	0.002			<0.01^	<0.01^			0.001	0.001	<0.001	0.003
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001			<0.001^	<0.001^			<0.001*	<0.001*	<0.0001	<0.0001
Dissolved Chromium	mg/L	0.001	<0.001	<0.001			<0.001^	<0.001^			<0.001*	<0.001*	<0.001	0.004
Dissolved Copper	mg/L	0.001	0.048	0.048			0.01^	0.01^			0.009	0.009	0.021	0.086
Total Iron	mg/L	0.05	43.2	43.2			199	217			21.9	35.8	4.85	4.86
Dissolved Lead	mg/L	0.001	<0.001	<0.001			<0.001^	<0.001^			<0.001*	<0.001*	<0.001	0.006
Total Manganese	mg/L	0.001	0.358	0.358			0.011^	0.011^			0.458	0.642	0.178	0.241
Dissolved Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001	0.144	0.144			<0.001^	<0.001^			0.003	0.006	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
Dissolved Zinc	mg/L	0.005	0.122	0.122			0.084^	0.084^			0.069	0.239	0.043	0.095
EC laboratory	uS/cm		1750	1750			872	2056			417	624	291	320
Total Nitrogen	mg/L		2.6	2.6			2.4	2.6			0.5	0.8		
Total Phosphorus	mg/L		0.39	0.39			0.56	0.89			0.43	1.096		
Ammonia	mg/L						0.08	0.08			0.03	0.04		
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L		178	178			201	475			55.4	86		
Nitrate	mg/L												0.04	<0.01
Sulphate	mg/L		326	326			52	154			51	87		
Calcium	mg/L		29.3	29.3			22.5	27.5			28.8	45.6		
Magnesium	mg/L		28.2	28.2			42.3	56.5			17	23		
Potassium	mg/L		10.3	10.3			17.5	18.3			5.56	5.93		
Sodium	mg/L		310	310			154.8	331.9			54.0	87.6		

* No variation established between sampling events.

^ Based on one record only.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

DNS – Did Not Sample

Table 3-35 Construction groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW24		Results		GW025		Results		GW26		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01	0.19^	0.19	0.34	10.2	0.05^	0.05^	1.18	DNS			0.05	7.58
Dissolved Arsenic	mg/L	0.001	0.002^	0.002	<0.001	0.003	0.001^	0.001^	<0.001				<0.001	0.003
Dissolved Cadmium	mg/L	0.0001	<0.001^	<0.001	<0.0001	<0.0001	0.001^	0.001^	0.0001				0.0003	0.0007
Dissolved Chromium	mg/L	0.001	<0.001^	<0.001	<0.001	0.014	<0.001^	<0.001^	<0.001				<0.001	0.006
Dissolved Copper	mg/L	0.001	0.428^	0.428	0.131	0.942	0.066^	0.066^	0.112				1.21	7.02
Total Iron	mg/L	0.05	34.2	98.5	19	13.8	89.0	103.3	5.42		41.3	41.3	7.83	2.91
Dissolved Lead	mg/L	0.001	<0.001^	<0.001	<0.001	0.008	0.001^	0.001^	<0.001				<0.001	0.008
Total Manganese	mg/L	0.001	0.172^	0.172	0.167	0.096	0.902^	0.902^	0.195				0.313	0.145
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001	0.028^	0.028	0.003	0.009	0.016^	0.016^	0.005				0.007	0.018
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	0.13^	0.13	0.029	0.097	0.15^	0.15^	0.06				0.117	0.257
EC laboratory	uS/cm		5530^	5530^	590	571	805^	805^	372		494	494	600	842
Total Nitrogen	mg/L		1.2^	1.2^			0.9^	0.9^			1.4	1.4		
Total Phosphorus	mg/L		4.6^	4.6^			0.12^	0.12^			0.18	0.18		
Ammonia	mg/L		0.04^	0.04^			0.14^	0.14^			0.1	0.1		
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L		1686^	1686^			235^	235^			136	136		
Nitrate					0.04	<0.01			0.08				<0.01	<0.01
Sulphate	mg/L		151^	151^			18^	18^			18	18		
Calcium	mg/L		42.5	160.6			2.55^	2.55^			2.09	2.09		
Magnesium	mg/L		29.35	96.59			14.8^	14.8^			7.07	7.07		
Potassium	mg/L		7.2	12.5			17^	17^			12.8	12.8		
Sodium	mg/L		206.7	593.9			130^	130^			78.9	78.9		

* No variation established between sampling events.

^ Based on one record only.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

DNS – Did Not Sample

Table 3-36 Construction groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW27		Results		GW028		Results		GW29		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01	<0.01^	<0.01^	0.04	4.27			0.32	39.3	3.21^	3.21^	0.69	33.1
Dissolved Arsenic	mg/L	0.001	0.001^	0.001^	<0.001	0.002			<0.001	0.011	0.014^	0.014^	<0.001	0.004
Dissolved Cadmium	mg/L	0.0001	<0.001^	<0.001^	<0.0001	<0.0001			<0.0001	<0.0001	0.001^	0.001^	<0.0001	0.0002
Dissolved Chromium	mg/L	0.001	<0.001^	<0.001^	<0.001	0.012			<0.001	0.061	0.006^	0.006^	<0.001	0.019
Dissolved Copper	mg/L	0.001	0.002^	0.002^	0.026	0.64			3.8	15.9	0.017^	0.017^	0.003	0.146
Total Iron	mg/L	0.05	6.61	10.20	1.34	6.45	65.3	65.3	15	35	109	110	10.4	13.8
Dissolved Lead	mg/L	0.001	<0.001^	<0.001^	<0.001	0.01			<0.001	0.04	0.009^	0.009^	<0.001	0.031
Total Manganese	mg/L	0.001	0.492^	0.492^	0.095	0.389			0.104	0.196	0.571^	0.571^	0.217	0.26
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001	0.006^	0.006^	0.003	0.008			0.006	0.026	0.031^	0.031^	0.008	0.038
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^	0.02	0.052			0.053	0.279	5.25^	5.25^	0.074	0.573
EC laboratory	uS/cm		567	746	334	393	2140	2140	294	234	291	539	240	227
Total Nitrogen	mg/L		0.3	0.7			2.6	2.6			2.6	4.8		
Total Phosphorus	mg/L		0.14	0.22			0.92	0.92			0.63	1.07		
Ammonia	mg/L		0.04	0.06			0.06	0.06			0.05	0.06		
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L		80	81			34	34			45	63		
Nitrate					0.44	0.51			<0.01	<0.01			0.02	0.08
Sulphate	mg/L		41	64			5.9	5.9			35.9	123.7		
Calcium	mg/L		18.3	25.6			5.75	5.75			7.2	13.9		
Magnesium	mg/L		8.3	9.6			6.83	6.83			23.1	34.0		
Potassium	mg/L		4.34	6.24			10.5	10.5			13.9	20.3		
Sodium	mg/L		60.2	60.3			33.1	33.1			133	231		

* No variation established between sampling events.

^ Based on one record only.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

DNS – Did Not Sample

Table 3-37 Construction groundwater monitoring results by borehole (cont.)

Parameter	Unit	LOR	GW30		Results		GW06		Results		GW		Results	
			20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17	20th per#	80th per#	Apr 17	Jul 17
Dissolved Aluminium	mg/L	0.01	2.34	2.60	0.58	7.19			17	35.2				
Dissolved Arsenic	mg/L	0.001	0.002	0.003	<0.001	0.003			0.01	0.012				
Dissolved Cadmium	mg/L	0.0001	0.001	0.001	0.0002	<0.0001			0.0002	0.0002				
Dissolved Chromium	mg/L	0.001	<0.001*	<0.001*	<0.001	0.006			<0.001	0.008				
Dissolved Copper	mg/L	0.001	2.09	2.23	1.19	0.757			0.118	0.036				
Total Iron	mg/L	0.05	36.9	115.6	7.33	5.11			15.7	16				
Dissolved Lead	mg/L	0.001	<0.001*	<0.001*	<0.001	0.004			0.023	0.134				
Total Manganese	mg/L	0.001	3.21	3.58	1.44	0.774			0.582	0.56				
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001	0.161	0.172	0.069	0.051			0.027	0.034				
Dissolved Silver	mg/L	0.001	<0.001*	<0.001*	<0.001	<0.001			<0.001	<0.001				
Dissolved Zinc	mg/L	0.005	0.813	0.859	0.35	0.247			0.447	0.542				
EC laboratory	uS/cm		4436	4934	2600	2260			7090	7000				
Total Nitrogen	mg/L		1.8	2.0										
Total Phosphorus	mg/L		0.52	0.55										
Ammonia	mg/L		0.04	0.05										
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$													
Chloride	mg/L		1219	1390										
Nitrate					0.02	0.06			0.03	0.02				
Sulphate	mg/L		158	167										
Calcium	mg/L		11.5	12.3										
Magnesium	mg/L		79.9	90.3										
Potassium	mg/L		13.2	14.2										
Sodium	mg/L		687	760										

* No variation established between sampling events.

Note: Analysis of all metals for July 2017 event is for “total” metals despite otherwise indicated in table.

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

Note: Aluminium levels are the same for both dissolved and total at GW06 for July 2017. Likely error with reporting of dissolved levels.

Table 3-38 Construction groundwater level – manual record

Borehole reference	Top of casting RL (mAHD)	Depth of water level										
		Pre-construction		Construction								
		20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW01 (mTOC)	20.11	4.41	4.93	6.20	NA	6.30	NA	6.36	6.26			
GW01 (mAHD)		15.18	15.70									
GW02 (mTOC)	3.57	1.95	2.96	No access	No access	2.82	NA	3.30	3.06			
GW02 (mAHD)		0.61	1.62									
GW03 (mTOC)	2.64	0.81	2.08	1.84	0.16	0.48	NA	0.60	0.50			
GW03 (mAHD)		0.58	1.81									
GW04 (mTOC)	1.69	1.11	2.21	No access	No access	No access	No access	No access	No access			
GW04 (mAHD)		-0.52	0.58									
GW05 (mTOC)	1.24	0.81	1.55	No access	No access	No access	No access	No access	No access			
GW05 (mAHD)		-0.31	0.43									
GW06 (mTOC)	20.1	5.36	5.85	2.31	2.16	1.98	NA	No access	1.96			
GW06 (mAHD)		14.25	14.74									
GW07 (mTOC)	15.98	2.86	5.19	6.42	No access	4.16	NA	No access	4.95			
GW07 (mAHD)		10.79	13.12									
GW08 (mTOC)	19.09	6.94	6.94	Dry	3.12	7.98	NA	Dry	8.26			
GW08 (mAHD)		12.15	12.15									

Borehole reference	Top of casting RL (mAHD)	Depth of water level										
		Pre-construction		Construction								
		20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW09 (mTOC)	17.57	8.05	8.66	Dry	No access	Dry	Dry	No access	Dry			
GW09 (mAHD)		8.91	9.52									
GW10 (mTOC)	15.38	3.34	7.27	Dry	3.88	Dry	Dry	Dry	Dry			
GW10 (mAHD)		8.11	12.04									
GW11 (mTOC)	1.591	1.49	2.45	4.72	No access	4.23	No access	No access	2.34			
GW11 (mAHD)		-0.86	0.10									
GW12 (mTOC)	1.573	0.74	1.68	No access	0.43	0.67	NA	0.85	0.87			
GW12 (mAHD)		-0.20	0.83									
GW13 (mTOC)	2.04	1.44	2.05	1.91	0.42	1.14	NA	1.30	No access			
GW13 (mAHD)		-0.01	0.60									
GW14 (mTOC)	5.656	2.60	3.43	No access	No access	No access	No access	No access	No access			
GW14 (mAHD)		2.23	3.06									
GW15 (mTOC)	13.79	10.01	10.32	10.17	NA	9.87	NA	9.90	9.74			
GW15 (mAHD)		3.47	3.78									
GW16 (mTOC)	14.14	8.13	8.13	Dry	Dry	Dry	Dry	Dry	Dry			
GW16 (mAHD)		6.01	6.01									
GW17 (mTOC)	59.47	Dry	Dry	11.86	11.62	11.26	NA	11.41	11.33			

Borehole reference	Top of casting RL (mAHD)	Depth of water level										
		Pre-construction		Construction								
		20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW17 (mAHD)		Dry	Dry									
GW18 (mTOC)	96.71	33.98	34.04	33.47	33.45	33.30	NA	33.46	33.39			
GW18 (mAHD)		62.67	62.73									
GW19 (mTOC)	51.81	7.53	9.46	No access	No access	Dry	Dry	Dry	Dry			
GW19 (mAHD)		42.35	44.28									
GW20 (mTOC)	87.18	Dry	Dry	Dry	No access	Dry	Dry	Dry	Dry			
GW20 (mAHD)		Dry	Dry									
GW21 (mTOC)	51.29	4.65	5.79	4.86	No access	No access	NA	No access	No access			
GW21 (mAHD)		45.50	46.64									
GW22 (mTOC)	17.27	4.64	5.28	No access	No access	No access	No access	No access	No access			
GW22 (mAHD)		11.99	12.63									
GW23 (mTOC)	39.22	15.93	15.99	16.55	No access	16.48	NA	16.35	16.31			
GW23 (mAHD)		23.23	23.29									
GW24 (mTOC)	26.09	6.25	7.78	Dry	5.42	6.77	NA	7.57	7.33			
GW24 (mAHD)		18.31	19.84									
GW25 (mTOC)	61.72	11.53	12.35	Dry	Dry	12.47	NA	12.75	12.77			
GW25 (mAHD)		49.37	50.19									

Borehole reference	Top of casting RL (mAHD)	Depth of water level										
		Pre-construction		Construction								
		20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW26 (mTOC)	54.56	14.17	14.98	14.85	10.54	12.91	NA	14.00	13.90			
GW26 (mAHD)		39.58	40.39									
GW27 (mTOC)	74.33	27.45	27.66	28.80	No access	27.34	NA	28.25	27.67			
GW27 (mAHD)		46.67	46.88									
GW28 (mTOC)	54.65	8.45	9.40	Dry	7.53	9.06	NA	9.07	9.03			
GW28 (mAHD)		45.25	46.20									
GW29 (mTOC)	45.11	2.97	8.82	8.44	No access	6.49	NA	7.06	7.22			
GW29 (mAHD)		36.29	42.14									
GW30 (mTOC)	41.49	3.16	4.59	6.03	6.24	5.65	NA	5.67	4.91			
GW30 (mAHD)		36.90	38.33									

Table 3-39 Construction groundwater monitoring (EC) – manual record

Borehole reference	Electrical conductivity (uS/cm)										
	Pre-construction		Construction								
	20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW01	5062	5502	727.6	47.7	3651	6806	3393	4118			
GW02	293	656	No access	No access	406	545	574	608			
GW03	1009	1283	1254	503	1420	1273	1278	1535			
GW04	3027	5520	No access	No access	No access	No access	No access	No access			
GW05	5970	6728	No access	No access	No access	No access	No access	No access			
GW06	1359	8204	6052	2740	3185	5712	No access	4603			

Borehole reference	Electrical conductivity (uS/cm)										
	Pre-construction		Construction								
	20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW07	172	230	31.5	No access	161.8	218.7	No access	219.9			
GW08	No record	No record	No access	270.3	4.8	218.7	No access	762			
GW09	1981	2536	No access	No access	No access	No access	No access	No access			
GW10	443	780	No access	61.7	No access	No access	No access	No access			
GW11	1296	5880	1756	No access	1166	No access	No access	1211			
GW12	2467	4460	No access	2.8	119.8	1907.0	993	4538			
GW13	186	295	301.5	303.7	310.5	284	319.3	No access			
GW14	6312	7068	No access	No access	No access	No access	No access	No access			
GW15	3600	3740	3370	1596	3511	3075	1015	1567			
GW16	No record	No record	No access	No access	No access	No access	No access	No access			
GW17	No record	No record	3144	1498	3400	2802	1479	3199			
GW18	1588	1648	1527	760	1778	1431	780	1668			
GW19	554	602	No access	No access	No access	No access	No access	No access			
GW20	No record	No record	No access	No access	No access	No access	No access	No access			
GW21	1861	2426	1377	No access	No access	633	No access	No access			
GW22	842	5484	No access	No access	No access	No access	No access	No access			
GW23	415	726	2.7	No access	318.6	253.6	146.2	316.9			
GW24	509	974	No access	128.1	634	581	154.2	4.6			
GW25	476	965	No access	No access	185.1	No access	No access	No access			
GW26	1083	1337	758	84.0	368.3	708.0	379	779			
GW27	535	737	566	No access	343.5	334.7	221.5	397.8			
GW28	181	225	No access	117.1	299.3	170.6	No access	232.3			
GW29	222	299	199.9	No access	261.6	151.4	44	299.2			
GW30	1750	3800	2132	1017	2533	2216	1099	278.0			

Table 3-40 Construction groundwater monitoring (pH) – manual record

Borehole reference	pH										
	Pre-construction		Construction								
	20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW01	4.1	4.5	5.70	5.76	5.78	6.75	6.82	5.54			
GW02	6.2	6.5	No access	No access	7.44	7.14	7.09	6.43			
GW03	6.0	6.5	6.00	6.43	6.37	7.06	7.24	6.40			
GW04	6.0	6.3	No access	No access	No access	No access	No access	No access			
GW05	6.2	6.6	No access	No access	No access	No access	No access	No access			
GW06	3.6	5.0	3.46	3.27	3.26	4.23	No access	2.82			
GW07	5.6	5.9	5.18	No access	5.46	5.65	No access	4.49			
GW08	No record	No record	No access	5.61	5.61	5.65	No access	6.54			
GW09	4.1	5.6	No access	No access	No access	No access	No access	No access			
GW10	5.7	6.3	No access	4.75	No access	No access	No access	No access			
GW11	4.9	5.2	5.08	No access	5.16	No access	No access	4.01			
GW12	5.8	6.0	No access	4.39	3.54	3.72	3.58	4.73			
GW13	5.3	5.8	5.63	5.11	5.15	5.31	5.83	No access			
GW14	4.4	6.1	No access	No access	No access	No access	No access	No access			
GW15	6.2	6.4	6.19	5.82	6.11	6.50	6.03	4.82			
GW16	No record	No record	No access	No access	No access	No access	No access	No access			
GW17	No record	No record	6.02	5.83	6.01	6.65	5.63	5.02			
GW18	6.5	6.7	6.60	6.48	6.91	6.06	6.55	6.39			
GW19	6.1	6.4	No access	No access	No access	No access	No access	No access			
GW20	No record	No record	No access	No access	No access	No access	No access	No access			
GW21	6.2	6.3	6.23	No access	No access	6.23	No access	No access			
GW22	6.0	6.3	No access	No access	No access	No access	No access	No access			
GW23	5.8	6.2	6.58	No access	7.85	6.54	6.68	6.18			
GW24	4.5	5.3	No access	6.55	5.71	7.19	7.50	7.09			
GW25	4.7	5.0	No access	No access	4.85	No access	No access	No access			
GW26	5.5	5.9	5.60	5.97	5.25	5.83	5.86	5.21			
GW27	6.0	6.2	6.43	No access	6.12	5.98	6.42	5.10			
GW28	5.3	5.7	No access	5.93	5.54	5.97	No access	5.44			
GW29	5.4	5.9	5.85	No access	5.58	6.11	6.63	5.46			

Borehole reference	pH										
	Pre-construction		Construction								
	20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW30	4.3	5.0	4.89	4.44	5.15	4.95	5.54	4.30			

Table 3-41 Construction groundwater monitoring (temperature) – manual record

Borehole reference	Temperature										
	Pre-construction		Construction								
	20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW01	20.1	20.9	23.8	24.3	21.4	21.4	20.7	20.6			
GW02	19.0	21.2	No access	No access	21.6	20.4	20.5	19.2			
GW03	18.5	21.3	21.5	22.3	20.4	19.3	18.1	16.3			
GW04	18.6	20.3	No access	No access	No access	No access	No access	No access			
GW05	17.4	18.9	No access	No access	No access	No access	No access	No access			
GW06	18.5	19.8	24.7	24.3	22.7	20.8	No access	18.7			
GW07	18.5	19.5	21.8	No access	21.4	20.5	No access	19.9			
GW08	No record	No record	Insufficient	21.0	21.8	19.4	Insufficient	19.6			
GW09	18.3	18.5	Insufficient	No access	Insufficient	Insufficient	No access	Insufficient			
GW10	18.2	19.5	Insufficient	22.6	Insufficient	Insufficient	Insufficient	Insufficient			
GW11	18.2	19.6	21.3	No access	21.2	No access	No access	19.3			
GW12	18.0	20.5	No access	26.0	22.4	20.7	20.1	18.6			
GW13	19.1	20.0	24.2	24.4	20.5	20.5	19.9	No access			
GW14	19.2	20.0	No access	No access	No access	No access	No access	No access			
GW15	19.4	20.2	20.4	20.9	21.4	20.8	20.6	20.1			
GW16	No record	No record	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient			
GW17	No record	No record	20.7	20.0	20.0	19.3	19.1	19.3			
GW18	19.9	20.5	20.8	20.0	19.9	19.1	19.0	19.0			
GW19	19.5	20.2	No access	No access	Insufficient	Insufficient	Insufficient	Insufficient			
GW20	No record	No record	Insufficient	No access	Insufficient	Insufficient	Insufficient	Insufficient			
GW21	18.8	20.3	19.5	No access	No access	19.5	No access	No access			
GW22	17.6	20.2	No access	No access	No access	No access	No access	No access			
GW23	19.0	19.6	24.2	No access	20.2	18.7	19.8	18.7			

Borehole reference	Temperature										
	Pre-construction		Construction								
	20th per	80th per	Feb 2017	Mar 2017	Apr 2017	May 2017	Jun 2017	Jul 2017			
GW24	18.3	19.0	Insufficient	20.3	19.5	19.4	19.1	19.6			
GW25	19.9	20.5	Insufficient	Insufficient	20.4	Insufficient	Insufficient	Insufficient			
GW26	19.1	20.6	21.8	20.0	20.1	19.5	19.4	19.6			
GW27	19.3	20.5	21.1	No access	21.0	19.4	19.3	19.4			
GW28	19.5	22.6	Insufficient	20.5	20.4	20.1	Insufficient	19.7			
GW29	18.4	19.9	20.2	No access	19.8	19.6	19.5	19.4			
GW30	19.4	20.0	21.6	20.1	20.4	19.9	20.1	19.8			

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 progressed 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 earthworks were 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 this monitoring period (ie January 2017 to July 2017) 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. These bulk earthworks are expected to be completed by the end of 2017.

Considering these factors, the following observations can be made:

- Logged data shows that groundwater level has a variable response to rainfall events across monitoring sites. Of the 20 accessible data loggers which provided recent data, nine were responsive to recent minor rainfall events. Five of the loggers had variable response to rainfall events, while six of the loggers were 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 other site specific factors (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 appear to coincided with prevailing dry atmospheric conditions rather than the stage of construction.
- Laboratory analysed parameters continue to show variability for a number of analytes between sampling events eg Aluminium, Iron and Manganese. However, this is generally not considered inconsistent with pre-construction and/or during construction results. Note, comparison between July 2015, November 2015, April 2016 and August 2016 and other results for a number of metal parameters are not in all instances possible due to the nature of analysis ie total metals verses dissolved metals).

  Other laboratory analysed parameters continue to show similar levels across all pre-construction and construction monitoring events.

- Manually recorded pH records show some variability across all sampling locations. pH appears to vary within a range of up to 2 pH and more often is slightly acidic rather than alkaline. The variability is consistent with levels experienced during pre-construction and previous construction periods.
- Manually recorded temperature records are generally consistent with levels recorded during the pre-construction and previous construction reporting periods. Subtle temperature movements either up or down tend to reflect seasonal changes rather than potential impacts from construction.
- Manually recorded electric conductivity show a high level of alignment between pre-construction and levels recorded at nearly all sites during the current reporting period.

3.10 Project response to groundwater quality results

Considering the generally consistent results (in particular for EC, temperature, groundwater depth, and a number of the laboratory analysed parameters) onsite management actions / interventions are not proposed at this time. Recommendations for subsequent monitoring would include:

- Ensuring laboratory analysis is consistent with pre-construction and earlier construction monitoring eg total and dissolved metals to be analysed and reported where necessary. As indicated in Section 3.7, Roads and Maritime had previously identified this issue and had instructed the laboratory to analyse both total and dissolved metals for all future monitoring events (this occurred prior to July 2015, in January 2016, in December 2016 and in again April 2017). However, a failure to implement the instructions again in July 2017 resulted in only total metals being analysed. Roads and Maritime has again provided an instruction to the laboratory to analyse all future samples for both total and dissolved metals. This will be resolved for subsequent monitoring events.

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

Appendix B – Rainfall records

Port Macquarie Airport rainfall records from January 2017 to July 2017

Day of month	January 2017	February 2017	March 2017	April 2017	May 2017	June 2017	July 2017
1	0	0	26.4	1.2	0	0	0
2	5.8	0	43	3.4	0.2	0	0
3	6.6	0	0.2	7.2	0	0.4	0
4	3.6	0	0	13.8	10.8	0.2	0
5	13.4	0.6	12.2	6.2	1.4	2	0
6	1.2	0	0	5	0	0.2	0
7	0.8	0	0.4	2.4	0	0	0.2
8	0.4	3	0	5.4	0	8.2	0
9	0	1.2	8.2	0.2	0	59	0
10	0	0	0.4	0	0.4	51.6	0
11	0	0	0	0	2.8	27.2	0
12	0	0	0	0.2	0.6	9.6	0
13	0	0.6	0	0	1.6	8.6	8.2
14	0	1.6	11.2	0	11.6	11	0
15	32.4	14.2	52	0	21.2	12	1.6
16	0	0	166.2	0	0	0.2	6.8
17	0	0	0.4	0	0.2	0.2	0.2
18	0	8.6	49.6	2	0	0.6	0
19	0.2	0	52.8	3.8	12.6	4.4	0
20	0.4	16	31	0.4	10.2	0.2	0
21	12.2	0	2.4	0	0	0	0
22	0.2	0	0.8	4.2	0.2	0.2	0
23	0	0	1.2	0	1.2	0	0
24	0	0	3.8	0	0	0	0
25	1.4	0	3.4	0	0.2	0	0
26	0.8	30.2	12.8	2.8	0	0	0
27	0.2	12	0.2	6.2	0.2	0	0
28	4.4	33	0	0	0.4	0.6	0
29	0		0	0	0.8	25.2	0
30	0		6.2	0	0	2.6	0
31	0		48.8		0		0
Highest Daily	32.4	33	166.2	13.8	21.2	59	8.2
Monthly Total	84	121	533.6	64.4	76.6	224.2	17

Statistics for all years												
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	155.3	165.5	176	139	114.4	140.6	61.9	66.6	59.3	73.1	154.8	108
Median	135.3	152.8	156.2	111.2	73.1	141	64.8	35.8	41.6	58.9	137.5	97.5

Telegraph Point rainfall records from January 2017 to July 2017

Day of month	January 2017	February 2017	March 2017	April 2017	May 2017	June 2017	July 2017
1	0	0	16	2.1	0	0	0
2	5.3	0	24.4	1.4	0	0	0
3	7.6	0.3	1.2	6.8	0	0	0
4	3	0	0	3.7	5.7	0	0
5	2.4	0.2	16.3	1.9	0.8	1.6	0
6	0.1	0	1.4	3	0	0	0
7	1.6	0	0	3.2	0	0	0
8	0	5.5	0	3.6	0	7.8	0
9	0	7.1	4.3	0	0	40.6	0
10	2.4	0	0	0	0	31.2	0
11	0	0	0	0	0	34.2	0
12	0	0	0	0	0	3.3	0
13	0	0	0	0.5	1	7	1.8
14	0	2.9	0.3	0	10.2	9.3	0
15	33.4	7.8	26.3	0	22.2	4.6	1.3
16	0	0	150.3	0	0.4	0.7	0
17	0.2	0	0.2	0	0	0.6	0
18	0	11.2	56.4	1.2	0.2	1	0
19	0.8	0	92.9	2.5	10.6	0.1	0
20	0.5	13.8	13	0.5	7	0.7	0
21	8.6	0	1.6	0	0.2	0	0
22	0	0	1	3.6	0	0	0
23	0	0	1.8	0	4.5	0	0
24	0	0	2.1	0	0	0	0
25	0	0	4.6	0	0	0	0
26	0.6	18.7	23.8	3.4	0	0	0
27	0.4	3.4	0	5.8	0	0	0
28	3.1	35	0	0	1.2	1.2	0
29	0		0	0	0.8	13.7	0
30	0		19	0	0	5	0
31	0		36.5		0		0
Highest Daily	33.4	35	150.3	6.8	22.2	40.6	1.8
Monthly Total	70	105.9	493.4	43.2	64.8	162.6	3.1

Statistics for all years												
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	138.1	175.1	167.2	127.2	104.4	109.2	66.7	58.5	59.7	83.4	109	113.9
Median	110.7	148.6	148.8	85.6	60.2	73.4	35.8	25.9	42	54.6	89.3	95.2

Kempsey airport rainfall records from January 2017 to July 2017

Day of month	January 2017	February 2017	March 2017	April 2017	May 2017	June 2017	July 2017
1	0	0.4	3.6	0.2	0	0	0
2	3	0.2	0.4	0.4	0	0	0.2
3	8.8	0	0.4	3.8	0	0	0
4	1	0	0	2.8	0	0	0
5	1.2	4.2	34	1.8	0	0	0.2
6	0.4	0	19	0.6	0	0.2	0
7	4	0	0	1.8	0	0.2	0
8	0.2	1.4	0	1.6	0	1.6	0
9	0.2	4.4	0.4	0	0	2.6	0
10	0	0	0	0.2	0	23.2	0.2
11	0	0	0	0	0	20.6	0
12	4	0	0	0	0	4.4	
13	0	0.8	0	0	0.8	7.4	
14	0	0.4	0	0	10	6.2	0
15	10.6	3.2	19.2	0	14.2	0.6	
16	1.6	0	133.8	0	0	0.2	6.4
17	0	0	0	0	0.2	2.2	0.2
18	0	7.8	41.8	0	0	3.6	0.2
19	0.2	0.2	104.6	0.4	4.6	0	0
20	0.2	14.4	15.6	8.6	4.8	0.2	0
21	10.6	0.2	2.6	0.2	0.2	0	0
22	0	0	0.4	2	0.2	0	0
23	0	0	0.4	0	3	0.2	0
24	0	0	0.6	0	0.2	0.2	0
25	0	0	2.6	0	0	0.2	0
26	2.2	2	8.2	0.2	0.2	0	0
27	1	1.6	0	1.2	0	0.2	0
28	0	27.2	0.2	0	0.4	2.4	0
29	0		0	0	1.6	7.6	0
30	0		22.6	0	0.2	3.4	0.2
31	0		44.2		0.2		0
Highest Daily	10.6	27.2	133.8	8.6	14.2	23.2	6.4
Monthly Total	49.2	68.4	454.6	25.8	40.8	87.4	

Statistics for all years												
Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean												
Median												

Sancrox site weather station rainfall records from January 2017 to July 2017

Day of month	January 2017	February 2017	March 2017	April 2017	May 2017	June 2017	July 2017
1		0	3.8	2.4	0	0	0
2		0	1.2	10.8	0	0	0
3		0	0	1.2	10.6	0	0
4		0.4	10.2	2.6	0.8	2.2	0
5		0.2	0.2	2.8	0.2	0	0
6		0	0.2	2	0.2	0	0
7		1	0	7.4	0	9	0
8		5.8	8	0.2	0	33	0
9		0	0	0	0	43	0
10		0	0	0	0.2	33.2	0
11		0	0	0	0	9.4	0
12		0	0	0	2.2	5.2	1.6
13		2	5	0	9.2	13	0.2
14		11	64.6	0	13.2	2.2	0.6
15		0.2	145	0	0	0.2	7
16		0	0.6	0	0	0.2	0
17		8.4	47.4	7.6	0	0.4	0
18		0.2	65.8	4.2	11.6	2.6	0
19		17.8	18.8	1	6.2	1.2	0
20		0.2	1.4	0	0	0.2	0
21		0	0.6	3.4	0.2	0.2	0
22	0	0	1	0	1.6	0	
23	0	0	1.2	0	0	0	
24	0.2	0	5.4	0	0.2	0	
25	0.8	23	11.4	2.4	0	0	
26	0.2	11.6	0	5.6	0.2	0	
27	8.4	29.2	0	0.2	0.8	0.6	
28	0	23	0	0	1	19.8	
29	0		14.2	0	0	2.4	
30	0		36	0.2	0	0.2	
31	0		1.8		0		

Telegraph Point site weather station rainfall records from January 2017 to July 2017

Day of month	January 2017	February 2017	March 2017	April 2017	May 2017	June 2017	July 2017
1		0	16.2	1.2	0.2	0	0
2		0	0.4	7.4	0	0	0.2
3		0	0	4.4	4.2	0	0
4		0	29.2	3.2	0.2	0	0.2
5		0	1	5.2	0	0	0
6		0	0.2	10	0.4	0.2	0
7		4	0	6	0	7.2	0
8		3.6	2.8	0	0	29	0.2
9		1.8	0	0	0	36.8	0
10		0	0	0	0.2	34.2	0
11		0	0	0	0.4	6.4	0.2
12		0	0	0	1.8	7	0.6
13		1	0	0	10.4	16.4	0.2
14		8.4	27.4	0.2	21.8	3.2	0.4
15		0.2	158	0	0	0.6	6.8
16		0	0	0	0	0.2	0
17		9.8	55.6	6.4	0.2	1.8	0
18		0.2	83.6	2	9.2	1.2	0.2
19		13.2	7	0.2	7.6	2.4	0
20		0	1.6	0	0	0.2	0
21		0	0.8	6.4	0.2	0	0
22	0	0	1	0	1.4	0	
23	0	0	1.2	0	0.4	0.2	
24	2.8	0	4.6	0.2	0	0	
25	0	40	16.6	3.4	0.2	0.2	
26	0.4	2	0	23.8	0.2	0.2	
27	4	40.4	0	0	0.2	0.4	
28	0	22.6	0.2	0	0.4	8.6	
29	0		8.6	0	0.2	4.4	
30	0		30.4	0	0	0	
31	0		1.4		0.2		

Kundabung site weather station rainfall records from January 2017 to July 2017

Day of month	January 2017	February 2017	March 2017	April 2017	May 2017	June 2017	July 2017
1		0	16.2	1.2	0.2	0	0
2		0	0.4	7.4	0	0	0.2
3		0	0	4.4	4.2	0	0
4		0	29.2	3.2	0.2	0	0.2
5		0	1	5.2	0	0	0
6		0	0.2	10	0.4	0.2	0
7		4	0	6	0	7.2	0
8		3.6	2.8	0	0	29	0.2
9		1.8	0	0	0	36.8	0
10		0	0	0	0.2	34.2	0
11		0	0	0	0.4	6.4	0.2
12		0	0	0	1.8	7	0.6
13		1	0	0	10.4	16.4	0.2
14		8.4	27.4	0.2	21.8	3.2	0.4
15		0.2	158	0	0	0.6	6.8
16		0	0	0	0	0.2	0
17		9.8	55.6	6.4	0.2	1.8	0
18		0.2	83.6	2	9.2	1.2	0.2
19		13.2	7	0.2	7.6	2.4	0
20		0	1.6	0	0	0.2	0
21		0	0.8	6.4	0.2	0	0
22	0	0	1	0	1.4	0	
23	0	0	1.2	0	0.4	0.2	
24	2.8	0	4.6	0.2	0	0	
25	0	40	16.6	3.4	0.2	0.2	
26	0.4	2	0	23.8	0.2	0.2	
27	4	40.4	0	0	0.2	0.4	
28	0	22.6	0.2	0	0.4	8.6	
29	0		8.6	0	0.2	4.4	
30	0		30.4	0	0	0	
31	0		1.4		0.2	0	

Appendix C – Surface water quality sampling results

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

No.	Parameter	Unit	06/02/17 (D)			10/02/17 (W)			16/02/17 (W)			2/03/17 (W)			6/03/17 (W)			24/03/17 (D)			4/04/17 (W)		
			SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a# (US)	SW1b# (US)	SW1c (DS)	SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a (US)	SW1b (US)	SW1c (DS)
1	Temperature	^{0}C	24	24	25	24	25	26	22	22	23	22	22	23	22	22	23	22	23	23	18	18	19
2	Electrical conductivity (EC)	uS/cm	974	789	1194	905	830	903	454	818	542	248	850	764	326	645	807	206	897	852	592	1058	959
3	Dissolved oxygen (DO)	%	25	35	47	34	60	48	30	57	43	41	66	60	42	55	47	42	77	72	19	66	50
4	pH		6.4	7.1	7.2	6.8	7.2	7.4	6.7	7.2	7.3	6.5	7.3	7.5	6.4	6.9	7.0	6.0	6.9	7.2	7.0	7.1	7.3
5	Turbidity (NTU)	NTU	110	16	8	81	19	22	200	37	229	19	15	43	22	14	70	11	6	7	12	6	47
6	Total suspended solids (TSS)	mg/L	15	<5	<5	9	<5	7	30	<5	51	7	<5	<5	8	19	27	<5	<5	<5	10	<5	18
7	Total Petroleum Hydrocarbons	mg/L																					
8	Aluminium (Al)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.01				0.21	0.05	0.05				0.17	0.02	0.02	0.08	<0.01	<0.01
9	Arsenic (As)	mg/L	<0.001	<0.001	0.003	<0.001	<0.001	0.002				0.002	0.001	0.001				<0.001	<0.001	<0.001	0.002	<0.001	0.002
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	<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	<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				0.002	0.002	0.003				<0.001	<0.001	<0.001	<0.001	<0.001	0.001
13	Iron (Fe)	mg/L	0.33	0.69	<0.05	0.19	0.38	<0.05				0.84	0.17	0.15				1.28	0.17	0.24	19.5	0.07	0.06
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	<0.001	<0.001	<0.001	<0.001	<0.001
15	Manganese (Mn)	mg/L	0.212	1.33	0.287	0.143	0.668	0.117				0.044	0.088	0.117				0.081	0.087	0.101	1.09	0.135	0.096
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	<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	0.002				<0.001	<0.001	<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	<0.001				<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
19	Zinc (Zn)	mg/L	0.01	0.016	0.007	<0.005	0.006	0.006				0.015	0.009	0.01				0.01	0.01	<0.005	0.005	<0.005	0.013
20	Total Nitrogen (TN)	mg/L	0.4	0.3	0.3	0.4	0.4	0.3	0.7	0.5	1.5	0.7	0.5	0.6	0.8	1.1	0.6	0.8	0.8	0.6	1	0.2	0.4
21	Total Phosphorous (TP)	mg/L	0.01	<0.01	0.02	<0.01	<0.01	0.04	0.07	0.02	0.18	0.02	0.02	0.03	0.03	0.03	0.04	0.02	0.02	0.05	0.02	<0.01	0.02

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

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

No.	Parameter	Unit	27/04/17 (W)			05/05/17 (W)			15/05/17 (W)			26/05/17 (D)			13/06/17 (W)			23/06/17 (D)			30/06/17 (W)		
			SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a (US)	SW1b (US)	SW1c (DS)	SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a (US)	SW1b (US)	SW1c# (DS)
1	Temperature	^{0}C	16	17	18	17	17	17	17	DNS	17	15	DNS	16	17	DNS	17	14	DNS	14	14	DNS	14
2	Electrical conductivity (EC)	uS/cm	542	1026	1078	629	934	904	338		814	426		961	130		214	317		1096	237		630
3	Dissolved oxygen (DO)	%	26	76	59	8	58	63	45		75	21		61	90		104	40		86	71		87
4	pH		6.5	7.1	7.2	6.7	7.2	7.5	6.3		6.8	6.3		6.9	6.5		6.7	6.5		7.0	7.1		7.1
5	Turbidity (NTU)	NTU	28	18	31	23	7	22	20		39	14		16	53		316	15		11	22		46
6	Total suspended solids (TSS)	mg/L	19	11	20	22	<5	12	23		24	6		5	12		134	6		6	10		23
7	Total Petroleum Hydrocarbons	mg/L																					
8	Aluminium (Al)	mg/L				0.08	0.05	0.04				0.09		0.06	0.89		0.35	0.32		0.04			
9	Arsenic (As)	mg/L				<0.001	<0.001	0.002				<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			
11	Chromium (Cr)	mg/L				<0.001	<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		<0.001			
13	Iron (Fe)	mg/L				13.3	0.2	0.09				9.02		0.12	0.69		0.35	3.03		0.23			
14	Lead (Pb)	mg/L				<0.001	<0.001	<0.001				<0.001		<0.001	<0.001		<0.001	<0.001		<0.001			
15	Manganese (Mn)	mg/L				0.954	0.085	0.083				0.642		0.101	0.01		0.017	0.18		0.228			
16	Mercury (Hg)	mg/L				<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			
18	Silver (Ag)	mg/L				<0.001	<0.001	<0.001				<0.001		<0.001	<0.001		<0.001	<0.001		<0.001			
19	Zinc (Zn)	mg/L				0.006	<0.005	0.012				0.017		0.008	0.008		0.022	0.006		0.013			
20	Total Nitrogen (TN)	mg/L	0.6	0.2	0.3	0.4	0.1	0.3	0.3		0.4	0.5		0.4	0.6		0.7	0.4		0.3	0.7		0.6
21	Total Phosphorous (TP)	mg/L	0.02	<0.01	0.01	<0.01	<0.01	0.02	<0.01		<0.01	<0.01		0.05	0.01		0.1	<0.01		0.02	0.02		0.02

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

No.	Parameter	Unit	7/07/17 (D)			17/07/17 (W)																	
			SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a# (US)	SW1b# (US)	SW1c# (DS)	SW1a (US)	SW1b (US)	SW1c (DS)	SW1a (US)	SW1b (US)	SW1c (DS)	SW1a (US)	SW1b (US)	SW1c (DS)	SW1a (US)	SW1b (US)	SW1c (DS)	SW1a (US)	SW1b (US)	SW1c (DS)
1	Temperature	^{0}C	10	DNS	11	12	DNS	12															
2	Electrical conductivity (EC)	uS/cm	408		1132	528		1008															
3	Dissolved oxygen (DO)	%	47		80	40		82															
4	pH		6.8		7.0	6.8		7.1															
5	Turbidity (NTU)	NTU	11		12	17		19															
6	Total suspended solids (TSS)	mg/L	5		5	9		8															
7	Total Petroleum Hydrocarbons	mg/L																					
8	Aluminium (Al)	mg/L	0.06		0.01	0.04		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	4.13		0.21	3.74		0.09															
14	Lead (Pb)	mg/L	<0.001		<0.001	<0.001		<0.001															
15	Manganese (Mn)	mg/L	0.248		0.143	0.332		0.129															
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		0.032	0.006		0.008															
20	Total Nitrogen (TN)	mg/L	0.3		0.2	0.4		0.3															
21	Total Phosphorous (TP)	mg/L	<0.01		0.2	<0.01		0.02															

- 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	06/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	DNS	DNS	DNS	DNS	DNS	DNS	DNS	DNS			22.7	23.3	19.0	20.3	18.9	18.5	16.4	18.0
2	Electrical conductivity (EC)	uS/cm											424	362	444	612	466	716	500	730
3	Dissolved oxygen (DO)	%											64	24	54	19	52	35	71	57
4	pH												5.7	6.1	5.4	6.7	6.5	6.7	6.5	6.5
5	Turbidity (NTU)	NTU											11	17	20	18	51	52	75	41
6	Total suspended solids (TSS)	mg/L									<5	<5	10	21	11	30	<5	8	15	15
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L											0.18	0.26	0.09	0.12	0.1	0.03		
9	Arsenic (As)	mg/L											<0.001	0.001	<0.001	0.006	0.001	0.001		
10	Cadmium (Cd)	mg/L											<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L											<0.001	0.001	<0.001	0.002	<0.001	<0.001		
12	Copper (Cu)	mg/L											<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L											0.8	12	1.07	16	4.78	2.27		
14	Lead (Pb)	mg/L											<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L											1.33	1.71	0.691	2.08	0.152	0.362		
16	Mercury (Hg)	mg/L											<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L											0.007	0.009	0.004	0.003	0.002	0.002		
18	Silver (Ag)	mg/L											<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L											0.047	0.02	0.017	<0.005	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L									3.2	1	1.2	2.9	0.8	3.4	1.3	1.6	1	1.5
21	Total Phosphorous (TP)	mg/L									0.03	0.01	0.11	0.7	0.06	1.11	0.1	0.18	0.09	0.15

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

DNS –Sample not collected due to insufficient water depth.

- Insufficient water depth to collect in-field measurement (ie <75mm). Bottle sample only collected.

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

No.	Parameter	Unit	05/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (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	16.7	16.4	17.7	18.4	14.8	18.6	16.0	16.8	14.6	15.4	12.8	12.6	10.9	11.9	11.2	10.8		
2	Electrical conductivity (EC)	uS/cm	464	828	470	993	500	860	359	628	416	771	430	617	469	868	444	649		
3	Dissolved oxygen (DO)	%	38	30	81	64	50	67	88	81	60	71	48	63	69	75	49	81		
4	pH		6.6	6.6	6.1	4.5	6.3	5.8	5.1	3.8	5.5	3.7	5.5	4.5	5.6	4.1	5.9	5.4		
5	Turbidity (NTU)	NTU	73	32	58	17	59	16	11	6	22	4	15	10	13	7	14	8		
6	Total suspended solids (TSS)	mg/L	16	13	12	28	<5	9	10	<5	7	<5	6	6	<5	<5	<5	<5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.14	0.08			0.11	0.1	0.25	0.39	0.1	0.23			0.07	0.23	0.07	0.1		
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	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	0.0001	0.0002		
11	Chromium (Cr)	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		
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	<0.001	<0.001		
13	Iron (Fe)	mg/L	4.27	0.83			2.84	0.34	0.52	0.83	1.94	0.96			1.12	0.72	2.06	0.65		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.165	1.01			0.149	1.43	0.699	0.907	0.279	1.49			0.209	1.33	0.119	0.686		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	0.002	0.002			<0.001	0.005	0.004	0.008	0.003	0.009			0.002	0.007	0.002	0.004		
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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.007	0.012			0.006	0.016	0.036	0.049	0.013	0.047			0.036	0.035	0.006	0.016		
20	Total Nitrogen (TN)	mg/L	1.3	0.9	1.1	0.5	1.1	0.4	0.5	0.4	0.6	0.2	0.5	0.4	0.5	0.3	0.9	0.5		
21	Total Phosphorous (TP)	mg/L	0.1	0.06	0.06	0.02	0.08	0.03	0.06	<0.01	0.03	<0.01	0.03	0.02	0.01	<0.01	0.04	0.02		

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

Table 6 SW3 – Hastings River north bank (Chainage 6040 to 6080)

No.	Parameter	Unit	6/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	28.3	28.2	30.3	30.0	27.2	27.4	25.1	25.1	25.7	25.7	22.8	22.8	20.7	20.6	21.9	22.0	21.1	21.0
2	Electrical conductivity (EC)	uS/cm	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	1112	1103	2051	2060	8000	8000	8000	8000
3	Dissolved oxygen (DO)	%	78	77	108	105	91	94	77	78	87	88	76	76	100	99	99	101	90	88
4	pH		7.5	7.5	7.4	7.4	7.5	7.5	7.3	7.4	7.3	7.4	6.4	6.7	6.9	7.0	7.5	7.7	7.4	7.5
5	Turbidity (NTU)	NTU	8	8	30	24	11	16	11	10	13	29	54	30	24	28	11	12	73	24
6	Total suspended solids (TSS)	mg/L	<5	<5	12	13	<5	14	8	11	<5	<5	40	22	7	14	<5	15	66	16
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	<0.10	<0.10	<0.10	<0.10			<0.10	<0.10			0.13	0.17	0.1	0.09	<0.01	<0.01		
9	Arsenic (As)	mg/L	<0.010	<0.010	<0.010	<0.010			<0.010	<0.010			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
10	Cadmium (Cd)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010			<0.0010	<0.0010			<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		
11	Chromium (Cr)	mg/L	<0.010	<0.010	<0.010	<0.010			<0.010	<0.010			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L	<0.010	<0.010	<0.010	<0.010			<0.010	<0.010			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L	<0.10	<0.10	<0.50	<0.50			<0.10	<0.10			0.41	0.4	0.29	0.28	<0.05	<0.05		
14	Lead (Pb)	mg/L	<0.010	<0.010	<0.010	<0.010			<0.010	<0.010			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.017	<0.010	0.016	0.015			0.019	0.022			0.111	0.075	0.025	0.026	0.058	0.055		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	<0.010	<0.010	<0.010	<0.010			<0.010	<0.010			0.002	<0.001	<0.001	<0.001	<0.001	<0.001		
18	Silver (Ag)	mg/L	<0.010	<0.010	<0.010	<0.010			<0.010	<0.010			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L	<0.050	<0.050	<0.050	<0.050			<0.050	<0.050			<0.005	0.006	<0.005	0.028	0.006	0.034		
20	Total Nitrogen (TN)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	1.1	0.9	0.7	0.6	0.2	0.3	<0.2	0.2
21	Total Phosphorous (TP)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.04	0.03	0.06	0.05	0.03	0.04	<0.02	<0.02	0.04	0.03

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

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

No.	Parameter	Unit	5/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (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	19.9	20.1	20.0	19.9	20.6	20.5	16.9	16.9	17.8	17.7	15.2	15.3	15.6	15.8	14.6	14.6		
2	Electrical conductivity (EC)	uS/cm	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000		
3	Dissolved oxygen (DO)	%	90	91	90	90	90	89	106	105	93	92	79	81	96	96	90	91		
4	pH		7.6	7.8	7.1	7.3	7.3	7.4	6.7	6.8	6.8	7.0	7.0	7.3	7.0	7.4	7.2	7.6		
5	Turbidity (NTU)	NTU	7	11	147	272	13	10	14	12	10	9	5	7	6	6	4	4		
6	Total suspended solids (TSS)	mg/L	<5	<5	125	232	12	6	<5	<5	7	<5	<5	7	<5	<5	<5	5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.05	0.04			0.05	0.05	0.14	0.13	0.04	0.04			0.02	0.01	<0.01	<0.01		
9	Arsenic (As)	mg/L	<0.001	<0.001			0.002	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	<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			<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	<0.05	<0.05			<0.05	<0.05	0.45	0.45	0.1	0.1			<0.05	<0.05	<0.05	<0.05		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.033	0.027			0.02	0.016	0.057	0.061	0.028	0.027			0.02	0.017	0.016	0.015		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	<0.001	<0.001			<0.001	<0.001	0.002	0.002	<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	0.002	0.002	<0.001	<0.001			<0.001	<0.001	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.007	0.006			0.007	0.007	0.008	0.015	<0.005	0.005			<0.005	<0.005	0.006	<0.005		
20	Total Nitrogen (TN)	mg/L	<0.5	<0.5	0.4	0.4	<0.2	<0.2	0.4	0.5	<0.2	<0.2	<0.2	<0.2	<0.5	<0.5	1.2	1		
21	Total Phosphorous (TP)	mg/L	<0.05	<0.05	0.05	0.09	<0.02	0.02	0.02	0.02	1.05	0.04	<0.02	<0.02	<0.05	<0.05	<0.02	<0.02		

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

Table 8 SW5 – Unnamed tributary of the Wilson River (Chainage 15820)

No.	Parameter	Unit	6/02/17 (D) SW5b (DS)	10/02/17 (W) SW5b (DS)	16/02/17 (W) SW5b (DS)	2/03/17 (W) SW5b (DS)	6/03/17 (W) SW5b (DS)	24/03/17 (D) SW5b (DS)	4/04/17 (W) SW5b (DS)	20/04/17 (D) SW5b (DS)	27/04/17 (W) SW5b (DS)
1	Temperature	^{0}C	DNS	DNS	DNS	22.2	24.8	23.5	22.2	23.8	20.1
2	Electrical conductivity (EC)	uS/cm				1541	1434	173	289	428	463
3	Dissolved oxygen (DO)	%				42	74	29	63	63	72
4	pH					4.1	3.7	6.1	6.5	6.7	6.9
5	Turbidity (NTU)	NTU				10	16	39	8	21	16
6	Total suspended solids (TSS)	mg/L				12	5	14	<5	<5	8
7	Total Petroleum Hydrocarbons	mg/L									
8	Aluminium (Al)	mg/L				4.3		0.28	0.12	0.05	
9	Arsenic (As)	mg/L				0.007		0.002	0.003	0.004	
10	Cadmium (Cd)	mg/L				0.0013		<0.0001	<0.0001	<0.0001	
11	Chromium (Cr)	mg/L				0.008		<0.001	<0.001	<0.001	
12	Copper (Cu)	mg/L				0.016		<0.001	<0.001	<0.001	
13	Iron (Fe)	mg/L				2.58		3.48	3.08	0.86	
14	Lead (Pb)	mg/L				<0.001		<0.001	<0.001	<0.001	
15	Manganese (Mn)	mg/L				5.83		0.847	1.5	0.804	
16	Mercury (Hg)	mg/L				<0.0001		<0.0001	<0.0001	<0.0001	
17	Nickel (Ni)	mg/L				0.072		0.001	0.002	<0.001	
18	Silver (Ag)	mg/L				<0.001		<0.001	<0.001	<0.001	
19	Zinc (Zn)	mg/L				1.19		0.008	0.019	<0.005	
20	Total Nitrogen (TN)	mg/L				3.8	1.3	1.9	1.4	1.6	1.1
21	Total Phosphorous (TP)	mg/L				0.09	0.59	0.29	0.1	0.1	0.08

DNS –Sample not collected due to insufficient water depth.

Table 9 SW5 – Unnamed tributary of the Wilson River (Chainage 15820) cont.

No.	Parameter	Unit	5/05/17 (W) SW5b (DS)	15/05/17 (W) SW5b (DS)	26/05/17 (D) SW5b (DS)	13/06/17 (W) SW5b (DS)	23/06/17 (D) SW5b (DS)	30/06/17 (W) SW5b (DS)	7/07/17 (D) SW5b (DS)	17/07/17 (W) SW5b (DS)	SW5b (DS)
1	Temperature	^{0}C	19.0	19.6	19.1	15.8	18.4	13.8	13.9	13.4	
2	Electrical conductivity (EC)	uS/cm	480	491	552	259	388	350	399	437	
3	Dissolved oxygen (DO)	%	28	74	47	76	93	34	31	33	
4	pH		6.8	6.9	6.4	6.1	6.3	6.5	6.4	6.1	
5	Turbidity (NTU)	NTU	13	9	13	6	10	8	11	11	
6	Total suspended solids (TSS)	mg/L	<5	5	<5	<5	6	<5	<5	<5	
7	Total Petroleum Hydrocarbons	mg/L									
8	Aluminium (Al)	mg/L	0.1		0.06	0.09	0.05		0.04	0.03	
9	Arsenic (As)	mg/L	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	
11	Chromium (Cr)	mg/L	<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	
13	Iron (Fe)	mg/L	2.07		1.27	0.21	2.82		1.46	0.66	
14	Lead (Pb)	mg/L	<0.001		<0.001	<0.001	<0.001		<0.001	<0.001	
15	Manganese (Mn)	mg/L	0.695		0.686	0.457	0.136		0.252	0.419	
16	Mercury (Hg)	mg/L	<0.0001		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	
17	Nickel (Ni)	mg/L	0.001		<0.001	0.002	0.001		<0.001	<0.001	
18	Silver (Ag)	mg/L	<0.001		<0.001	<0.001	<0.001		<0.001	<0.001	
19	Zinc (Zn)	mg/L	<0.005		<0.005	0.023	0.011		0.009	0.007	
20	Total Nitrogen (TN)	mg/L	1	1.2	0.6	0.2	0.3	0.7	0.6	2.7	
21	Total Phosphorous (TP)	mg/L	0.08	0.05	0.06	<0.01	0.03	0.07	0.04	0.61	

Table 10 SW6 – Wilson River south bank (Chainage 16460 to 16600)

No.	Parameter	Unit	6/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	30.4	30.1	31.5	31.2	29.3	28.9	24.8	24.8	26.1	26.0	22.7	22.6	20.8	20.3	22.0	21.6	21.2	20.3
2	Electrical conductivity (EC)	uS/cm	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	461	467	298	301	558	584	841	852
3	Dissolved oxygen (DO)	%	67	65	96	93	75	75	71	70	81	78	67	59	88	88	79	78	69	69
4	pH		7.1	7.1	7.2	7.1	7.2	7.2	6.9	7.1	6.9	7.1	6.2	6.1	6.7	6.6	7.0	7.0	7.0	6.9
5	Turbidity (NTU)	NTU	5	5	6	6	7	7	6	6	5	6	22	20	21	21	16	16	19	19
6	Total suspended solids (TSS)	mg/L	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	14	11	<5	<5	<5	<5	6	9
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	<0.01	<0.01	<0.01	<0.01			0.02	<0.01			0.22	0.26	0.29	0.3	0.11	0.08		
9	Arsenic (As)	mg/L	0.002	0.001	0.002	0.001			0.002	0.003			<0.001	<0.001	0.002	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	<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	<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	<0.05	<0.05	<0.05	<0.05			<0.05	<0.05			0.55	0.61	0.49	0.52	0.72	0.8		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.04	0.042	0.037	0.034			0.071	0.068			0.132	0.112	0.059	0.057	0.057	0.061		
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	<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	<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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.015	<0.005	0.011	0.007			0.008	<0.005			<0.005	0.005	0.008	0.007	<0.005	0.01		
20	Total Nitrogen (TN)	mg/L	0.8	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.2	<0.2	0.9	0.8	0.8	0.7	0.5	0.5	0.6	0.6
21	Total Phosphorous (TP)	mg/L	<0.02	0.03	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.02	<0.02	0.02	0.03	0.02	4.19	0.02	0.02	0.02	0.02

Table 11 SW6 – Wilson River south bank (Chainage 16460 to 16600) cont.

No.	Parameter	Unit	5/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (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	21.3	20.3	19.4	19.1	21.4	20.5	16.0	16.2	18.4	17.8	14.9	15.0	16.0	15.6	14.6	14.3		
2	Electrical conductivity (EC)	uS/cm	1533	1587	2745	2824	1980	2039	1287	1274	451	492	498	516	611	677	621	650		
3	Dissolved oxygen (DO)	%	71	69	75	73	86	83	89	95	78	78	81	78	87	88	94	98		
4	pH		6.9	7.0	7.0	7.0	7.0	6.9	6.4	6.5	6.6	6.6	6.9	6.9	6.9	6.8	6.8	7.0		
5	Turbidity (NTU)	NTU	11	11	13	11	11	11	17	17	14	14	11	12	9	13	8	8		
6	Total suspended solids (TSS)	mg/L	<5	6	12	23	<5	<5	8	8	8	9	<5	<5	<5	<5	<5	<5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.15	0.15			0.15	0.14	0.18	0.26	0.32	0.24			0.12	0.12	0.09	0.09		
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	<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	<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			<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	1.27	1.38			1.27	1.39	0.49	0.58	0.75	0.79			0.69	0.81	0.58	0.63		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.098	0.089			0.071	0.073	0.06	0.089	0.042	0.049			0.031	0.035	0.022	0.02		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	<0.001	<0.001			0.002	0.001	0.002	<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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	<0.005	0.005			0.005	0.007	0.007	0.006	0.01	0.018			0.005	0.016	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	0.4	0.5	0.6	2.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	7.5		
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.02	9.82	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	<0.01	<0.01	0.08	0.02		

Note, no visible explanation for elevated total nitrogen or total phosphorous at SW6b on 15 may 2017 sampling event. No work or runoff in the vicinity of the sampling point. River banks stabilised with large rock in place since 2016.

Table 12 SW6 – Wilson River north bank (Chainage 16830 to 16840)

No.	Parameter	Unit	6/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	30.5	30.5	31.4	31.1	29.0	28.5	24.9	24.9	26.5	26.4	22.6	22.6	20.5	20.5	21.5	21.5	20.3	20.2
2	Electrical conductivity (EC)	uS/cm	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	444	472	275	275	439	454	664	693
3	Dissolved oxygen (DO)	%	67	66	98	95	77	75	71	71	77	77	77	74	94	93	93	90	83	83
4	pH		7.0	7.0	7.1	7.2	7.2	7.2	7.3	7.2	6.9	7.0	6.3	6.2	6.9	6.8	7.2	7.2	6.9	7.0
5	Turbidity (NTU)	NTU	5	6	8	7	7	8	6	5	8	7	24	22	19	19	14	15	17	16
6	Total suspended solids (TSS)	mg/L	<5	<5	8	8	<5	<5	<5	<5	<5	<5	8	12	<5	<5	<5	<5	8	8
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	<0.01	<0.01	<0.01	<0.01			<0.01	<0.01			0.31	0.34	0.24	0.18	0.08	0.07		
9	Arsenic (As)	mg/L	0.002	0.002	0.001	0.001			0.002	0.002			<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	<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	<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	<0.05	<0.05	<0.05	<0.05			<0.05	0.07			0.46	0.79	0.29	0.24	0.26	0.3		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.037	0.039	0.033	0.034			0.079	0.076			0.1	0.13	0.027	0.026	0.021	0.024		
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	<0.0001	<0.0001		
17	Nickel (Ni)	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		
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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	<0.005	<0.005	0.024	0.019			0.006	0.015			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	<0.2	<0.2	<0.5	<0.5	<0.5	<0.5	<0.5	0.1	<0.2	<0.2	0.7	0.8	0.6	0.6	0.3	0.3	0.4	0.5
21	Total Phosphorous (TP)	mg/L	<0.02	<0.02	<0.05	<0.05	<0.05	<0.05	<0.05	<0.01	<0.02	<0.02	0.02	0.02	0.02	0.04	0.02	0.01	0.02	0.02

Table 13 SW6 – Wilson River north bank (Chainage 16830 to 16840) cont.

No.	Parameter	Unit	5/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (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	19.9	19.9	19.0	19.0	20.3	20.3	16.0	15.7	16.9	16.8	14.9	14.9	15.0	14.8	14.0	14.4		
2	Electrical conductivity (EC)	uS/cm	1412	1447	2503	2504	1981	1959	1209	1229	409	427	444	474	485	506	536	593		
3	Dissolved oxygen (DO)	%	72	72	85	82	85	87	100	103	83	81	79	75	96	94	107	106		
4	pH		7.1	7.1	6.9	7.0	6.7	6.8	6.8	6.8	6.8	6.9	7.1	7.0	7.1	7.1	7.2	7.2		
5	Turbidity (NTU)	NTU	11	12	10	10	10	10	17	17	13	14	11	11	8	8	8	8		
6	Total suspended solids (TSS)	mg/L	<5	<5	11	9	5	<5	8	7	<5	11	<5	<5	<5	<5	<5	<5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.12	0.09			0.12	0.12	0.15	0.16	0.39	0.33			0.07	0.1	0.06	0.11		
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	<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	<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			<0.001	<0.001	<0.001	0.003		
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	<0.001	<0.001		
13	Iron (Fe)	mg/L	0.98	1.04			1.26	1.21	0.39	0.4	0.64	0.65			0.41	0.44	0.41	0.54		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.078	0.073			0.064	0.063	0.029	0.034	0.031	0.031			0.018	0.018	0.013	0.017		
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	<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	<0.001	0.006		
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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.008	<0.005			0.006	0.006	<0.005	<0.005	0.014	0.007			0.005	<0.005	0.006	<0.005		
20	Total Nitrogen (TN)	mg/L	0.5	0.4	0.4	0.4	0.5	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.3	0.3	1.3	0.3		
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	<0.01	<0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.02	<0.01	<0.01	<0.01	0.01		

Table 14 SW7 – Cooperabung Creek (Chainage 19660)

No.	Parameter	Unit	6/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	DNS	24.8	DNS	27.7	DNS	26.2	20.9	22.2	21.8	22.7	21.9	22.0	19.4	19.7	19.2	19.4	18.3	18.6
2	Electrical conductivity (EC)	uS/cm		640		576		588	295	626	325	481	150	174	169	244	231	258	220	263
3	Dissolved oxygen (DO)	%		42		148		103	35	38	27	27	86	75	90	81	70	69	53	42
4	pH			7.1		6.9		7.1	6.4	6.4	6.2	6.1	6.4	6.5	6.5	6.7	7.0	7.0	6.8	6.6
5	Turbidity (NTU)	NTU		21		28		14	36	41	21	18	12	16	12	18	17	32	9	9
6	Total suspended solids (TSS)	mg/L		8		7		5	<5	<5	9	<5	<5	<5	<5	<5	<5	<5	<5	5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L		<0.01		0.01			0.09	0.05			0.11	0.12	0.15	0.14	0.06	0.08		
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	<0.001	<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	<0.001	<0.001		
13	Iron (Fe)	mg/L		0.22		0.05			0.93	0.43			0.24	0.23	0.38	0.28	0.41	0.37		
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		0.908		0.289			0.247	0.244			0.023	0.024	0.025	0.043	0.114	0.15		
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	0.002			<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		0.012		0.024			0.017	0.032			0.016	0.013	0.014	0.008	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L		0.3		0.4		0.4	0.7	1.2	0.5	0.4	0.5	0.5	0.4	0.4	0.3	0.4	0.2	0.1
21	Total Phosphorous (TP)	mg/L		<0.01		<0.01		0.01	0.04	<0.01	0.02	0.01	<0.01	0.01	0.02	0.01	0.01	0.02	<0.01	<0.01

- Sampling points present as isolated ponds.
DNS – Sample not taken due to absence or sufficient water to collect sample.

Table 15 SW7 – Cooperabung Creek (Chainage 19660) cont.

No.	Parameter	Unit	5/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (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	17.8	17.3	16.9	17.1	16.3	16.4	15.9	15.9	15.2	15.1	14.1	14.1	12.1	12.6	12.2	12.2		
2	Electrical conductivity (EC)	uS/cm	200	208	199	227	185	202	126	132	178	178	190	221	202	225	201	214		
3	Dissolved oxygen (DO)	%	43	40	71	68	76	84	100	100	80	81	82	84	88	80	82	76		
4	pH		6.9	7.0	7.1	7.2	6.9	7.0	7.0	7.0	6.8	6.9	6.9	6.9	7.3	7.3	7.1	7.1		
5	Turbidity (NTU)	NTU	6	7	13	12	8	15	30	31	16	15	15	20	15	11	9	8		
6	Total suspended solids (TSS)	mg/L	<5	<5	<5	6	<5	<5	<5	<5	7	7	<5	7	<5	<5	<5	<5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.08	0.07			0.09	0.11	0.25	0.25	0.7	0.61			0.1	0.04	0.04	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	<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	<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			<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	0.75	0.69			0.45	0.46	0.31	0.32	0.64	0.61			0.41	0.34	0.36	0.36		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.092	0.126			0.033	0.067	0.012	0.011	0.033	0.033			0.036	0.072	0.035	0.056		
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	<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	<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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	<0.005	0.005			0.007	0.011	<0.005	0.007	<0.005	0.006			<0.005	<0.005	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	0.1	0.1	0.3	0.2	0.2	<0.1	0.3	0.3	0.2	0.2	0.2	0.3	0.1	0.2	<0.1	<0.1		
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	0.02	0.01	0.01	0.01	0.03	<0.01	<0.01	<0.01	<0.01		

Table 16 SW8 – Barrys Creek (Chainage 23775 to 25325)

No.	Parameter	Unit	6/02/17 (D)			10/02/17 (W)			16/02/17 (W)			2/03/17 (W)			6/03/17 (W)			24/03/17 (D)			4/04/17 (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	24.2	25.9	DNS	26.8	23.7	DNS	26.1	22.8	DNS	21.5	23.5	DNS	21.0	23.1	21.2	21.1	21.7	19.6	20.3	20.3
2	Electrical conductivity (EC)	uS/cm		341	403		345	390		363	393		460	306		454	363	133	148	151	158	166	166
3	Dissolved oxygen (DO)	%		24	40		79	41		88	40		37	54		33	56	55	66	83	73	76	97
4	pH			6.6	6.5		6.2	6.1		6.5	6.3		5.8	6.1		5.7	6.5	6.0	6.1	6.1	6.4	6.2	6.3
5	Turbidity (NTU)	NTU		9	7		28	7		14	7		9	40		14	47	10	14	16	9	11	18
6	Total suspended solids (TSS)	mg/L		8	<5		<5	8		7	<5		<5	8		<5	14	<5	<5	<5	<5	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																					
8	Aluminium (Al)	mg/L		0.03	<0.01		0.04	<0.01					0.03	0.06				0.11	0.12	0.1	0.21	0.16	0.22
9	Arsenic (As)	mg/L		0.002	<0.001		<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	<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	<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	<0.001	<0.001
13	Iron (Fe)	mg/L		1.82	0.74		0.24	0.85					0.06	0.11				0.05	0.07	0.07	0.09	0.09	0.14
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	<0.001	<0.001
15	Manganese (Mn)	mg/L		0.596	0.633		0.457	0.699					0.17	0.03				0.003	0.009	0.005	0.004	0.014	0.008
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	<0.0001	<0.0001
17	Nickel (Ni)	mg/L		0.005	<0.001		<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	<0.001	<0.001
19	Zinc (Zn)	mg/L		0.01	0.01		0.007	0.008					0.011	0.008				0.013	<0.005	<0.005	0.013	0.011	<0.005
20	Total Nitrogen (TN)	mg/L		0.2	<0.1		0.2	<0.1		0.3	<0.1		0.9	0.2		1	0.3	0.2	0.3	0.2	0.2	0.2	0.3
21	Total Phosphorous (TP)	mg/L		<0.01	0.09		<0.01	<0.01		0.02	<0.01		0.04	<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 sufficient water to collect sample.

Table 17 SW8 – Barrys Creek (Chainage 23775 to 25325) cont.

No.	Parameter	Unit	20/04/17 (D)			27/04/17 (W)			5/05/17 (W)			15/05/17 (W)			26/05/17 (D)			13/06/17 (W)			23/06/17 (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	DNS	19.3	19.7	DNS	19.1	18.5	DNS	19.1	19.3	DNS	18.7	18.0	18.2	20.2	17.4	16.0	16.3	16.6	17.2	17.8	15.2
2	Electrical conductivity (EC)	uS/cm		214	218		238	235		210	225		223	244	276	246	281	132	137	159	232	177	171
3	Dissolved oxygen (DO)	%		33	53		34	37		23	48		49	50	38	38	49	105	99	100	20	63	67
4	pH			6.8	6.5		6.6	6.0		6.7	6.5		6.7	5.9	6.1	6.0	6.3	7.2	7.0	6.6	6.2	6.4	6.2
5	Turbidity (NTU)	NTU		10	9		9	8		7	6		21	12	18	14	4	23	20	29	12	14	13
6	Total suspended solids (TSS)	mg/L		<5	<5		<5	<5		<5	<5		6	44 / <5	<5	<5	<5	<5	<5	9	<5	<5	6
7	Total Petroleum Hydrocarbons	mg/L																					
8	Aluminium (Al)	mg/L		0.11	0.09					0.1	0.1				0.11	0.13	0.05	0.26	0.25	0.22	0.33	0.75	0.54
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	<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	<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	<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	<0.001	<0.001	<0.001	<0.001	<0.001
13	Iron (Fe)	mg/L		0.3	0.09					0.37	0.11				<0.05	0.05	<0.05	0.12	0.12	0.12	0.12	0.27	0.22
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	<0.001	<0.001	<0.001
15	Manganese (Mn)	mg/L		0.119	0.017					0.149	0.046				0.008	0.021	0.015	0.003	0.004	0.006	0.006	0.009	0.006
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	<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	<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	<0.001	<0.001	<0.001
19	Zinc (Zn)	mg/L		0.006	0.006					0.005	0.005				0.017	0.015	0.031	<0.005	<0.005	<0.005	0.006	0.009	<0.005
20	Total Nitrogen (TN)	mg/L		0.1	<0.1		0.1	<0.1		<0.1	<0.1		<0.1	0.1	<0.1	0.2	<0.1	0.2	0.2	0.2	0.8	<0.1	<0.1
21	Total Phosphorous (TP)	mg/L		<0.01	<0.01		<0.01	<0.01		<0.01	0.02		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

- Sample location persisting as an isolated pond.

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

Note, the two TSS results for 15 May 2017 reflect the primary and duplicate sample results. The primary sample appears to have been contaminated. Water was visibly clear at time of sampling.

Table 18 SW8 – Barrys Creek (Chainage 23775 to 25325) cont.

No.	Parameter	Unit	30/06/17 (W)			7/07/17 (D)			17/07/17 (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	15.9	15.4	14.6	DNS	16.6	13.3	DNS	16.2	13.6													
2	Electrical conductivity (EC)	uS/cm	306	189	193		206	213		202	250													
3	Dissolved oxygen (DO)	%	31	44	67		48	54		32	62													
4	pH		6.4	6.5	6.6		6.8	6.1		6.5	6.7													
5	Turbidity (NTU)	NTU	19	13	14		10	7		9	11													
6	Total suspended solids (TSS)	mg/L	<5	<5	<5		<5	<5		<5	<5													
7	Total Petroleum Hydrocarbons	mg/L																						
8	Aluminium (Al)	mg/L					0.14	0.07		0.05	0.05													
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					0.08	0.06		0.11	0.05													
14	Lead (Pb)	mg/L					<0.001	<0.001		<0.001	<0.001													
15	Manganese (Mn)	mg/L					0.027	0.005		0.067	0.007													
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					0.013	<0.005		0.006	<0.005													
20	Total Nitrogen (TN)	mg/L	0.1	0.1	<0.1		<0.1	<0.1		<0.1	0.2													
21	Total Phosphorous (TP)	mg/L	0.04	<0.01	<0.01		<0.01	<0.01		<0.01	<0.01													

- Sample location persisting as an isolated pond.

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

Table 19 SW9 – Smiths Creek (Chainage 28300)

No.	Parameter	Unit	6/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	27.5	28.3	23.8	25.9	23.8	24.7	24.1	22.7	23.7	23.8	21.5	21.5	19.2	19.2	18.1	18.0	16.4	16.4
2	Electrical conductivity (EC)	uS/cm	770	470	971	510	1262	532	654	362	629	409	132	127	139	134	192	193	218	213
3	Dissolved oxygen (DO)	%	62	32	42	30	66	34	49	15	55	28	93	93	97	98	81	80	73	68
4	pH		7.0	7.0	6.8	7.1	6.9	7.1	7.3	8.8	7.2	7.5	6.4	6.4	6.6	6.6	6.9	7.0	6.8	6.9
5	Turbidity (NTU)	NTU	22	30	24	21	21	21	88	223	70	113	16	16	15	15	13	15	11	12
6	Total suspended solids (TSS)	mg/L	7	11	11	9	9	6	7	75	12	27	<5	<5	<5	<5	<5	<5	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.01	0.02	<0.01	0.01			0.02	0.06			0.14	0.16	0.3	0.32	0.09	0.08		
9	Arsenic (As)	mg/L	<0.001	0.002	0.001	0.002			<0.001	0.002			<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	<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	<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	0.9	1.66	0.78	1.35			0.1	0.1			0.21	0.21	0.33	0.33	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	<0.001	<0.001	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.409	0.723	1.56	1.01			0.127	0.109			0.008	0.01	0.011	0.012	0.024	0.021		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	0.002	<0.001	0.003	0.001			0.002	0.002			<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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.009	0.006	0.01	0.008			0.155	<0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	0.3	0.6	0.5	0.7	0.4	1	0.8	1.6	0.8	1.2	0.5	0.5	0.5	0.5	0.2	0.2	0.2	0.2
21	Total Phosphorous (TP)	mg/L	0.02	0.04	<0.01	0.03	0.01	0.06	0.01	0.09	0.02	0.07	<0.01	<0.01	0.02	0.01	0.01	0.01	0.01	0.01

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

Table 20 SW9 – Smiths Creek (Chainage 28300) cont.

No.	Parameter	Unit	5/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (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	17.2	17.1	16.4	16.3	14.9	14.8	15.3	15.2	14.4	14.3	13.9	13.7	10.6	10.5	12.0	11.6		
2	Electrical conductivity (EC)	uS/cm	209	210	225	220	217	217	147	135	169	170	191	186	204	205	228	225		
3	Dissolved oxygen (DO)	%	62	63	72	77	81	81	101	101	82	80	87	84	91	84	98	92		
4	pH		7.0	7.1	6.9	6.9	7.0	7.0	6.8	6.9	6.9	6.9	7.2	7.3	7.0	7.1	7.2	7.2		
5	Turbidity (NTU)	NTU	11	14	11	10	8	8	27	27	15	15	12	12	11	11	9	13		
6	Total suspended solids (TSS)	mg/L	<5	<5	9	8	<5	<5	5	<5	<5	<5	<5	<5	<5	<5	<5	<5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.14	0.12			0.09	0.08	0.25	0.24	0.61	0.37			0.09	0.06	0.09	0.08		
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	<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	<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			<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	0.62	0.59			0.52	0.52	0.35	0.35	0.56	0.44			0.38	0.38	0.38	0.38		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.06	0.063			0.015	0.014	0.007	0.006	0.011	0.011			0.013	0.011	0.014	0.012		
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	<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	<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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.012	0.007			0.019	<0.005	0.005	<0.005	<0.005	<0.005			<0.005	<0.005	<0.005	0.007		
20	Total Nitrogen (TN)	mg/L	0.2	0.2	0.3	0.1	0.2	0.2	0.4	0.3	0.2	0.3	0.2	0.2	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	0.02	<0.01	<0.01	<0.01	0.02	0.01	<0.01	<0.01	<0.01	<0.01		

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

Table 21 SW10 – Pipers Creek (Chainage 30700)

No.	Parameter	Unit	6/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	32.0	28.4	27.0	25.5	26.5	25.9	23.6	23.3	23.0	23.8	21.8	21.7	19.2	19.2	18.4	18.2	16.5	16.7
2	Electrical conductivity (EC)	uS/cm	516	613	512	649	512	699	373	317	458	442	155	151	160	160	264	254	299	293
3	Dissolved oxygen (DO)	%	33	46	42	49	43	59	41	28	39	38	86	86	92	92	70	68	54	49
4	pH		7.1	7.2	7.1	7.2	7.1	7.2	7.0	7.0	7.0	7.1	6.4	6.3	6.7	6.9	7.0	7.1	6.9	7.0
5	Turbidity (NTU)	NTU	7	23	10	20	10	20	40	43	66	71	16	16	16	16	12	12	12	11
6	Total suspended solids (TSS)	mg/L	<5	9	<5	8	<5	7	18	9	10	12	<5	<5	<5	<5	<5	<5	<5	<5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.02	<0.01	0.01	<0.01			0.06	0.09			0.25	0.27	0.28	0.38	0.09	0.09		
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	<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	<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	<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	0.45	0.19	0.36	0.17			0.81	1			0.36	0.35	0.44	0.48	0.7	0.65		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.315	0.214	0.428	0.269			0.262	0.376			0.019	0.016	0.015	0.014	0.057	0.05		
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	<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	<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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.013	0.028	<0.005	<0.005			0.01	0.005			<0.005	<0.005	0.006	0.065	0.009	0.024		
20	Total Nitrogen (TN)	mg/L	0.3	0.3	0.4	0.3	0.5	0.4	1.1	0.7	1.1	1.2	0.6	0.7	0.6	0.5	1	0.3	0.2	0.7
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	<0.01	<0.01	0.02	0.01	0.04	0.04	0.04	0.06	0.01	0.01	0.02	0.02	0.13	0.01	0.01	0.02

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

Table 22 SW10 – Pipers Creek (Chainage 30700) cont.

No.	Parameter	Unit	5/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (W)			
			SW10a[#] (DS)	SW10b[#] (US)	SW10a[#] (DS)	SW10b[#] (US)	SW10a[#] (DS)	SW10b[#] (US)	SW10a (DS)	SW10b (US)	SW10a[1] (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a (DS)	SW10b (US)	SW10a[#] (DS)	SW10b[#] (US)	SW10a (DS)	SW10b (US)
1	Temperature	^{0}C	17.9	17.2	16.6	16.9	15.0	14.9	15.0	15.0	13.9	13.7	13.3	13.0	10.3	10.2	12.0	11.2		
2	Electrical conductivity (EC)	uS/cm	289	289	276	285	294	289	184	185	254	255	309	312	297	291	328	329		
3	Dissolved oxygen (DO)	%	43	37	63	71	59	60	94	90	81	75	78	76	79	77	87	82		
4	pH		6.9	7.1	6.8	6.9	6.9	7.0	6.9	6.9	6.9	6.9	7.2	7.3	7.0	7.0	7.3	7.4		
5	Turbidity (NTU)	NTU	10	10	165	167	11	11	28	28	11	11	15	14	9	9	14	20		
6	Total suspended solids (TSS)	mg/L	5	<5	47	45	<5	<5	7	<5	8	<5	6	<5	<5	<5	<5	<5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.12	0.12			0.11	0.13	0.39	0.37	0.19	0.21			0.04	0.04	0.06	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	<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	<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			<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	0.85	0.86			0.78	0.76	0.62	0.64	0.62	0.6			0.65	0.61	0.7	0.63		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.119	0.136			0.043	0.041	0.009	0.007	0.025	0.024			0.026	0.028	0.044	0.043		
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	<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	<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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.011	<0.005			0.009	<0.005	<0.005	0.005	<0.005	0.01			<0.005	0.008	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	0.2	0.3	0.7	0.7	0.4	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.3	0.3		
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.03	0.02	0.01	<0.01	0.01	0.01	<0.01	0.01	<0.01	0.01	<0.01	0.01	0.01	0.01		

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

Table 23 SW11 – Unnamed drainage line (Chainage 34650 to 34700)

No.	Parameter	Unit	6/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	27.9	32.2	24.5	28.1	23.6	29.9	24.5	23.8	22.8	27.3	22.6	22.6	20.4	19.8	19.2	21.1	16.8	15.3
2	Electrical conductivity (EC)	uS/cm	1221	1229	1479	1336	1787	1660	468	1334	637	346	186	176	175	163	1330	1089	1890	1206
3	Dissolved oxygen (DO)	%	70	101	78	103	65	120	94	64	74	132	90	101	107	108	86	124	70	65
4	pH		7.5	7.4	7.3	7.4	7.3	7.5	7.6	7.3	7.4	7.2	6.1	5.9	6.3	6.0	6.9	6.7	6.7	6.8
5	Turbidity (NTU)	NTU	14	7	5	5	8	5	145	68	77	56	14	11	27	15	9	8	7	7
6	Total suspended solids (TSS)	mg/L	<5	<5	<5	6	<5	<5	14	14	10	9	<5	<5	<5	<5	<5	<5	<5	5
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	<0.01	<0.01	<0.01	<0.01			0.09	0.02			0.38	0.4	0.33	0.38	0.02	0.02		
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	<0.001	0.002		
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	<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	<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L	<0.001	<0.001	<0.001	<0.001			0.002	0.002			<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			0.11	<0.05			0.25	0.29	0.21	0.23	0.15	0.17		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.111	0.107	0.143	0.117			0.033	0.132			0.079	0.029	0.014	0.014	0.55	0.534		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	<0.001	<0.001	0.001	<0.001			0.002	<0.001			<0.001	<0.001	<0.001	<0.001	0.004	0.003		
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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	<0.005	<0.005	<0.005	0.005			0.007	<0.005			0.038	<0.005	0.005	0.007	0.027	0.006		
20	Total Nitrogen (TN)	mg/L	0.2	0.2	0.3	0.3	0.3	0.3	0.6	0.4	0.6	0.6	0.5	0.4	0.5	0.4	0.2	0.3	0.3	1.2
21	Total Phosphorous (TP)	mg/L	0.01	<0.01	<0.01	<0.01	0.01	<0.01	0.04	0.01	0.02	0.02	<0.01	<0.01	0.01	0.01	<0.01	0.01	0.03	<0.01

Note, sampling points connected for all sampling events with no visible flow with the exception of 13 and 26 June 2017 sampling events.

Table 24 SW11 – Unnamed drainage line (Chainage 34650 to 34700) cont.

No.	Parameter	Unit	5/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (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	18.0	18.8	16.9	18.7	15.9	15.6	15.7	15.8	13.9	13.8	14.7	13.8	10.3	8.1	14.2	14.2		
2	Electrical conductivity (EC)	uS/cm	2245	1752	765	196	556	585	157	156	393	463	477	432	735	696	1171	1097		
3	Dissolved oxygen (DO)	%	73	90.2	70	91	79	85	118	115	77	82	77	98	86	104	80	135		
4	pH		7.1	6.82	6.6	6.5	7.1	6.8	6.3	6.2	6.7	6.4	6.6	6.6	6.8	6.8	6.8	6.8		
5	Turbidity (NTU)	NTU	5	6.4	53	52	39	33	36	35	31	15	26	11	11	6	19	8		
6	Total suspended solids (TSS)	mg/L	6	<5	30	10	8	<5	6	5	8	8	5	5	<5	<5	6	<5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.04	0.05			0.11	0.11	0.52	0.5	0.28	0.44			0.16	0.03	0.04	0.01		
9	Arsenic (As)	mg/L	<0.001	0.002			<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	<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			<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L	<0.001	<0.001			<0.001	0.002	<0.001	<0.001	<0.001	<0.001			<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L	0.17	0.25			0.08	0.24	0.32	0.3	0.28	0.57			0.34	0.2	0.06	<0.05		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.663	1.04			0.111	0.148	0.009	0.009	0.062	0.049			0.186	0.167	0.532	0.07		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	0.002	0.002			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			0.001	<0.001	0.002	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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.01	<0.005			<0.005	0.008	<0.005	<0.005	<0.005	<0.005			0.006	0.007	0.007	<0.005		
20	Total Nitrogen (TN)	mg/L	0.2	0.2	0.6	0.4	0.4	0.6	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.1		
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.02	0.02	0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.01	0.01	<0.01	<0.01	<0.01	<0.01		

Note, sampling points connected for all sampling events with no visible flow with the exception of 13 and 26 June 2017 sampling events.

Table 25 SW12 – Maria River (Chainage 36850)

No.	Parameter	Unit	6/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	26.9	29.9	24.7	24.1	24.5	24.9	24.8	23.7	24.4	24.2	22.3	22.3	19.4	19.4	18.4	19.2	16.2	16.6
2	Electrical conductivity (EC)	uS/cm	239	476	237	485	242	503	368	305	349	323	144	144	149	159	219	220	231	235
3	Dissolved oxygen (DO)	%	22	64	31	40	36	76	54	45	73	79	52	60	73	79	23	48	30	28
4	pH		7.0	7.0	6.9	6.8	7.0	6.9	6.7	6.2	7.0	6.6	5.4	5.5	5.8	5.8	6.4	6.2	6.4	6.0
5	Turbidity (NTU)	NTU	28	35	39	23	46	22	140	248	50	80	13	13	13	15	14	10	16	13
6	Total suspended solids (TSS)	mg/L	9	17	14	16	13	15	9	66	<5	41	<5	<5	<5	<5	<5	<5	14	11
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	<0.01	<0.01	<0.01	<0.01			0.03	0.08			0.48	0.51	0.4	0.44	0.28	0.27		
9	Arsenic (As)	mg/L	0.002	0.002	0.002	0.002			<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	<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	<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L	<0.001	<0.001	<0.001	<0.001			0.002	0.002			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		
13	Iron (Fe)	mg/L	1.27	1.62	1.33	1.79			0.11	0.13			0.57	0.57	0.52	0.54	0.67	0.68		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.292	0.405	0.415	0.472			0.121	0.344			0.073	0.064	0.038	0.039	0.213	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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	<0.001	<0.001	0.001	<0.001			0.002	0.002			0.002	<0.001	<0.001	0.001	0.002	0.002		
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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	<0.005	0.008	0.006	0.005			0.01	0.022			0.006	0.005	0.009	0.006	<0.005	0.005		
20	Total Nitrogen (TN)	mg/L	0.6	1	0.9	1.2	1	2	0.7	0.8	0.7	1.2	0.7	0.7	0.7	0.6	0.9	0.6	0.6	0.5
21	Total Phosphorous (TP)	mg/L	0.03	0.05	0.06	0.05	0.12	0.11	0.04	0.07	0.05	0.11	<0.01	0.02	0.03	0.02	0.04	0.02	0.03	0.02

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

Table 26 SW12 – Maria River (Chainage 36850) cont.

No.	Parameter	Unit	5/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (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	17.4	17.3	16.2	16.2	15.3	15.1	15.2	15.2	14.1	14.1	13.5	13.4	10.5	10.5	11.3	11.7		
2	Electrical conductivity (EC)	uS/cm	225	225	221	215	274	293	147	147	189	196	231	238	274	281	281	284		
3	Dissolved oxygen (DO)	%	15	14	36	42	11	31	88	90	37	43	32	42	25	45	29	55		
4	pH		6.7	6.4	6.6	6.3	6.5	6.3	6.2	6.1	6.2	6.1	6.5	6.5	6.4	6.3	6.9	6.7		
5	Turbidity (NTU)	NTU	12	10	100	60	84	41	34	34	17	17	20	16	11	10	15	10		
6	Total suspended solids (TSS)	mg/L	15	9	28	16	15	<5	9	6	7	20	12	11	<5	<5	<5	<5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.22	0.2			0.24	0.26	0.52	0.52	0.65	0.64			0.2	0.18	0.13	0.12		
9	Arsenic (As)	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		
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	<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			<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	<0.001	<0.001		
13	Iron (Fe)	mg/L	1.22	1.06			1.59	1.62	0.71	0.72	1.02	1.02			1.43	1.32	1.36	1.24		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.272	0.176			0.241	0.229	0.02	0.015	0.053	0.052			0.098	0.091	0.134	0.097		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	0.001	0.003			0.001	0.002	<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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.019	0.008			0.008	0.01	0.005	<0.005	<0.005	<0.005			<0.005	<0.005	<0.005	<0.005		
20	Total Nitrogen (TN)	mg/L	0.7	0.5	1.7	1.1	0.8	0.7	0.6	0.6	0.5	0.5	0.6	0.5	0.5	0.4	0.4	0.4		
21	Total Phosphorous (TP)	mg/L	0.03	0.01	0.05	0.03	0.05	0.04	0.02	0.01	0.01	0.01	0.03	0.02	<0.01	<0.01	0.02	0.01		

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

Table 27 SW13 – Stumpy Creek (Chainage 37700 to 37750)

No.	Parameter	Unit	6/02/17 (D)		10/02/17 (W)		16/02/17 (W)		2/03/17 (W)		6/03/17 (W)		24/03/17 (D)		4/04/17 (W)		20/04/17 (D)		27/04/17 (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	28.4	25.7	23.8	23.2	23.1	22.6	23.7	22.2	23.4	22.3	22.3	22.3	19.6	19.5	18.3	18.2	15.4	15.9
2	Electrical conductivity (EC)	uS/cm	486	284	497	276	490	298	422	356	431	360	125	125	143	133	281	237	350	251
3	Dissolved oxygen (DO)	%	43	55	39	51	50	58	65	39	87	43	79	75	80	75	73	45	72	37
4	pH		7.3	7.1	7.1	6.7	7.3	6.9	7.0	6.5	6.9	6.6	5.5	5.5	5.9	5.9	6.9	6.7	6.7	6.2
5	Turbidity (NTU)	NTU	7	17	8	21	8	18	20	32	33	22	18	18	17	17	26	25	11	16
6	Total suspended solids (TSS)	mg/L	<5	6	6	12	<5	<5	6	7	<5	<5	<5	<5	<5	<5	<5	<5	6	9
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.02	<0.01	0.02	0.04			0.1	0.06			1	0.86	0.74	0.88	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	<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	<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	<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L	<0.001	<0.001	<0.001	<0.001			0.002	0.001			<0.001	<0.001	<0.001	<0.001	0.002	0.003		
13	Iron (Fe)	mg/L	0.44	1.2	0.42	0.83			0.32	0.56			0.69	0.61	0.6	0.68	0.56	0.71		
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	<0.001	<0.001		
15	Manganese (Mn)	mg/L	0.072	0.088	0.063	0.116			0.062	0.133			0.05	0.047	0.028	0.035	0.058	0.111		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	<0.001	<0.001	<0.001	0.001			0.002	0.001			<0.001	<0.001	<0.001	<0.001	0.002	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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	<0.005	<0.005	<0.005	0.01			0.021	0.016			0.009	<0.005	0.01	0.014	0.017	0.006		
20	Total Nitrogen (TN)	mg/L	0.6	0.4	0.6	7.4	0.5	0.6	0.6	0.4	2.5	0.4	0.9	0.9	0.9	0.8	1	0.8	0.7	0.6
21	Total Phosphorous (TP)	mg/L	0.01	<0.01	<0.01	<0.01	0.01	0.02	<0.01	<0.01	0.04	0.01	<0.01	<0.01	0.01	0.02	0.03	0.02	0.02	0.02

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

Table 28 SW13 – Stumpy Creek (Chainage 37700 to 37750) cont.

No.	Parameter	Unit	5/05/17 (W)		15/05/17 (W)		26/05/17 (D)		13/06/17 (W)		23/06/17 (D)		30/06/17 (W)		7/07/17 (D)		17/07/17 (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	18.4	16.3	16.1	16.7	15.6	14.7	14.6	14.3	12.7	13.4	13.6	13.5	10.1	9.9	12.3	11.6		
2	Electrical conductivity (EC)	uS/cm	274	180	407	315	808	368	180	176	211	187	332	250	438	244	792	285		
3	Dissolved oxygen (DO)	%	71	35	69	49	91	31	86	75	68	57	77	61	81	48	85	63		
4	pH		6.9	6.9	6.7	6.3	6.9	6.2	6.2	6.0	6.4	6.1	6.8	6.6	6.9	6.3	7.2	6.8		
5	Turbidity (NTU)	NTU	8	15	26	18	71	32	22	24	19	19	17	14	13	14	22	23		
6	Total suspended solids (TSS)	mg/L	6	6	10	<5	14	6	7	11	13	10	<5	7	<5	6	6	<5		
7	Total Petroleum Hydrocarbons	mg/L																		
8	Aluminium (Al)	mg/L	0.2	0.34			0.16	0.13	0.45	0.49	0.52	0.62			0.27	0.24	0.18	0.18		
9	Arsenic (As)	mg/L	<0.001	<0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			0.002	<0.001	0.003	<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	<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			<0.001	<0.001	<0.001	<0.001		
12	Copper (Cu)	mg/L	0.002	0.003			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001			0.001	<0.001	0.002	0.001		
13	Iron (Fe)	mg/L	1.03	1.14			0.14	0.56	0.89	0.97	0.95	1.07			0.91	1.11	0.63	0.8		
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	0.002	<0.001		
15	Manganese (Mn)	mg/L	0.018	0.147			0.024	0.174	0.046	0.056	0.058	0.072			0.032	0.088	0.016	0.079		
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	<0.0001	<0.0001		
17	Nickel (Ni)	mg/L	0.003	<0.001			<0.001	<0.001	<0.001	<0.001	0.001	<0.001			0.003	<0.001	0.006	<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	<0.001	<0.001		
19	Zinc (Zn)	mg/L	0.012	0.005			0.012	0.009	0.01	0.006	0.013	<0.005			0.109	0.006	0.147	0.009		
20	Total Nitrogen (TN)	mg/L	0.6	0.6	4.5	0.6	0.8	0.5	0.6	0.5	0.9	0.6	2.6	0.6	8.4	0.6	21.5	0.5		
21	Total Phosphorous (TP)	mg/L	<0.01	<0.01	0.03	<0.01	0.03	<0.01	<0.01	<0.01	0.02	0.01	0.2	0.01	0.28	<0.01	1.48	0.01		

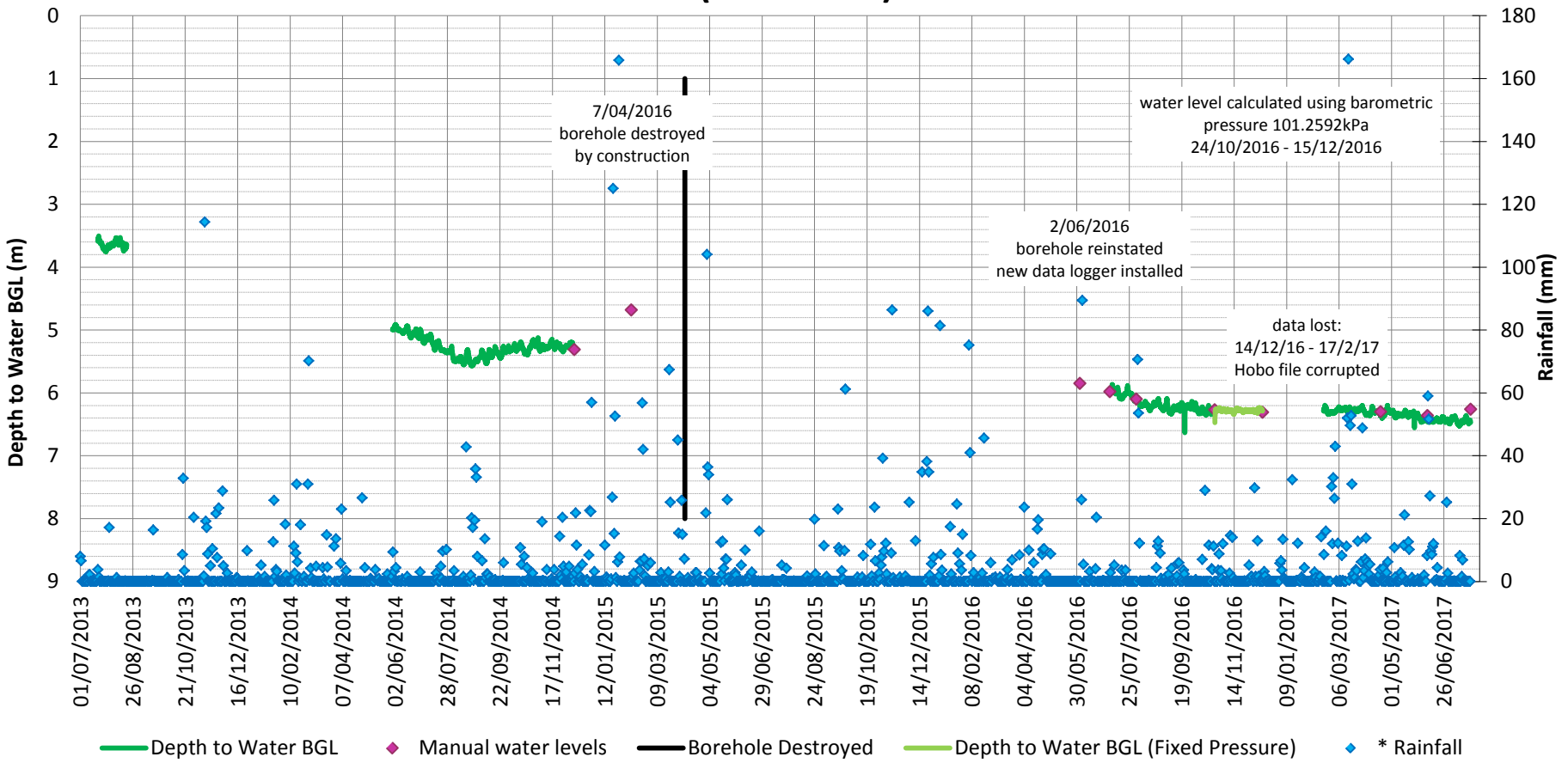
[#] - No obvious movement of water at sampling point or sampling location persisting as an isolated pond.

Note, trend in elevated total nitrogen and total phosphorous commenced in May 2017 and continues beyond this six monthly 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



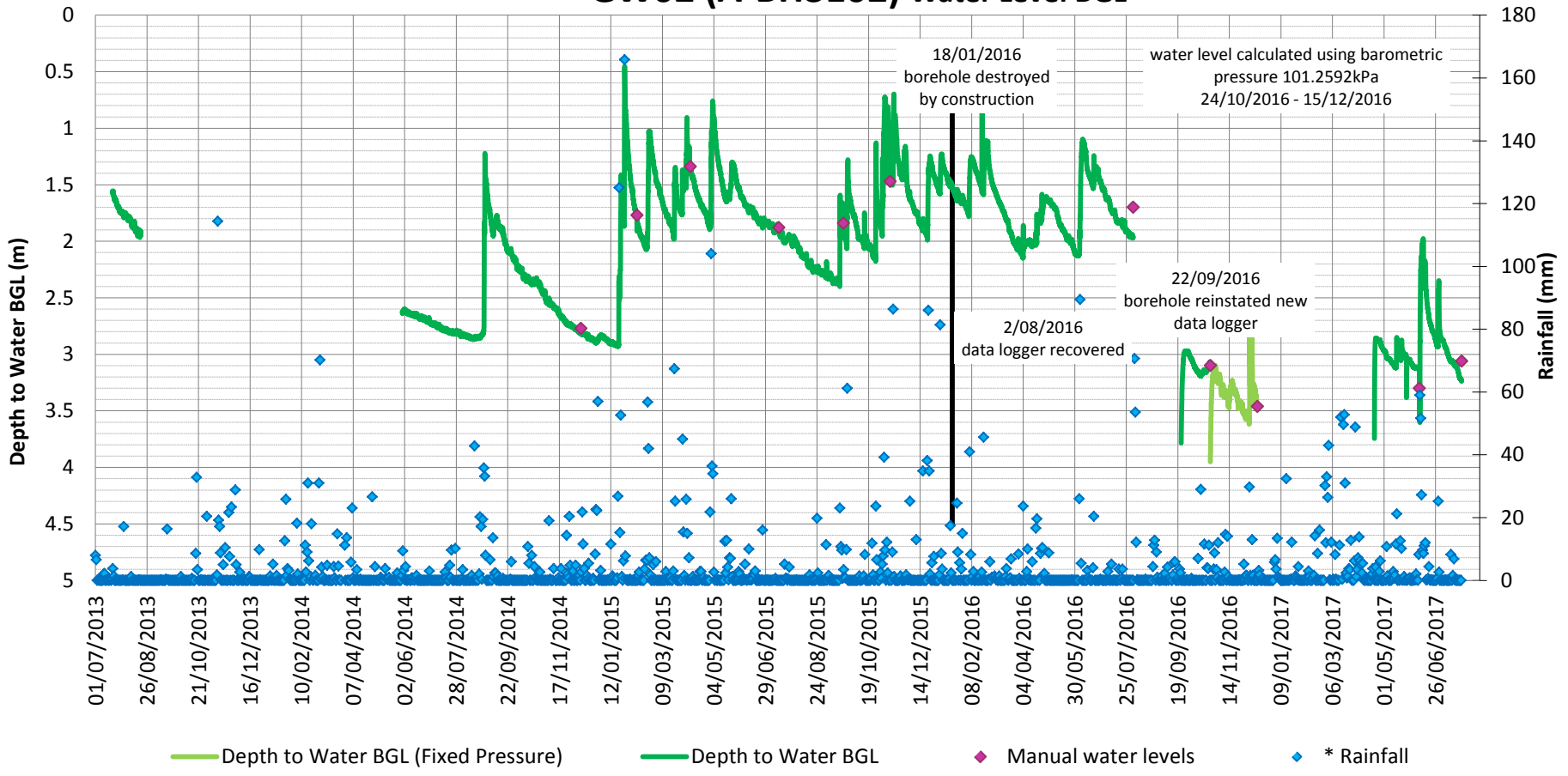
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10886270	
			BH ID	**A-BH3101**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-1**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW02 (A-BH3102) Water Level BGL



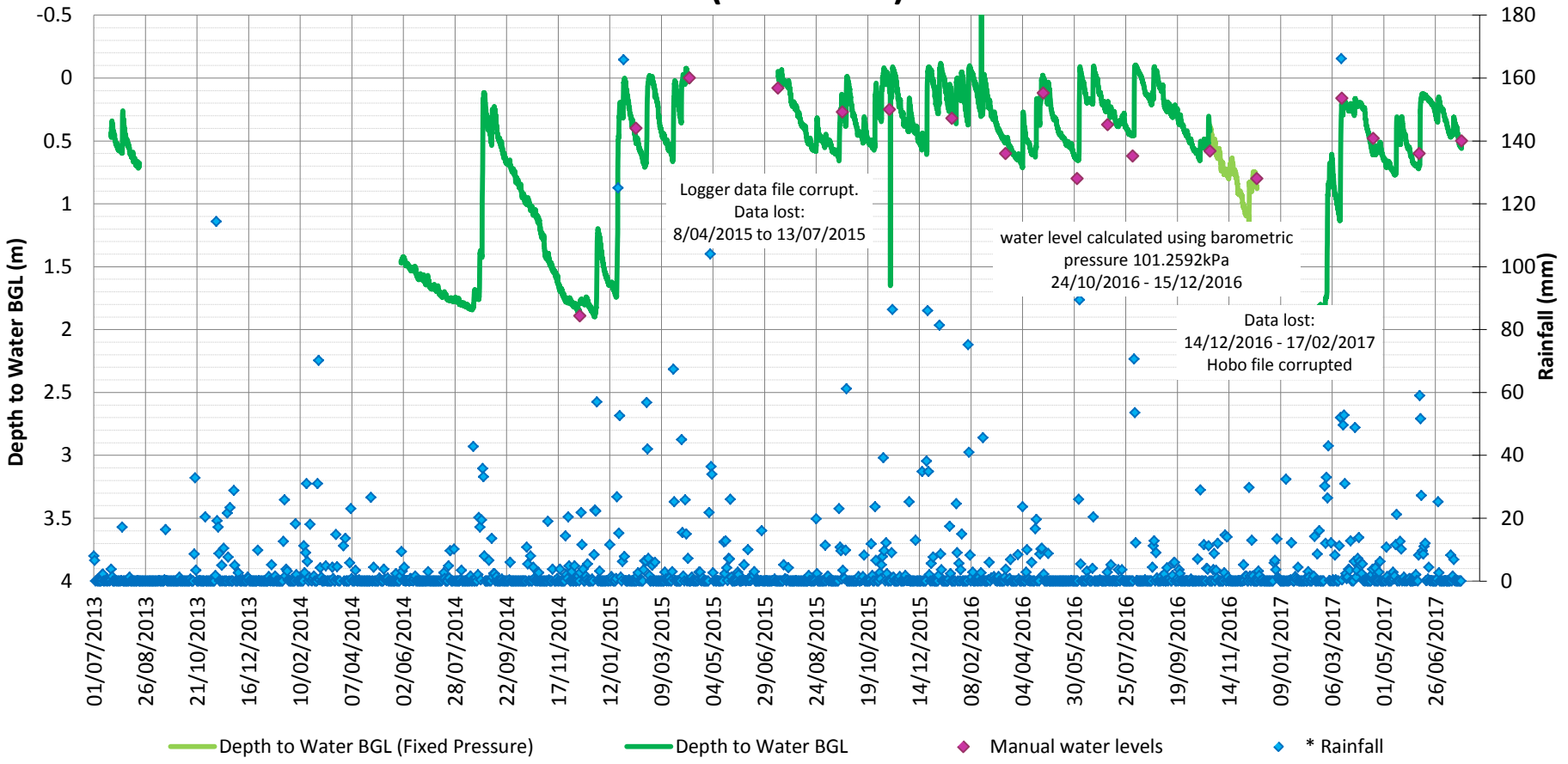
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10283850	
			BH ID	**A-BH3102**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-2**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW03 (A-BH3103) Water Level BGL



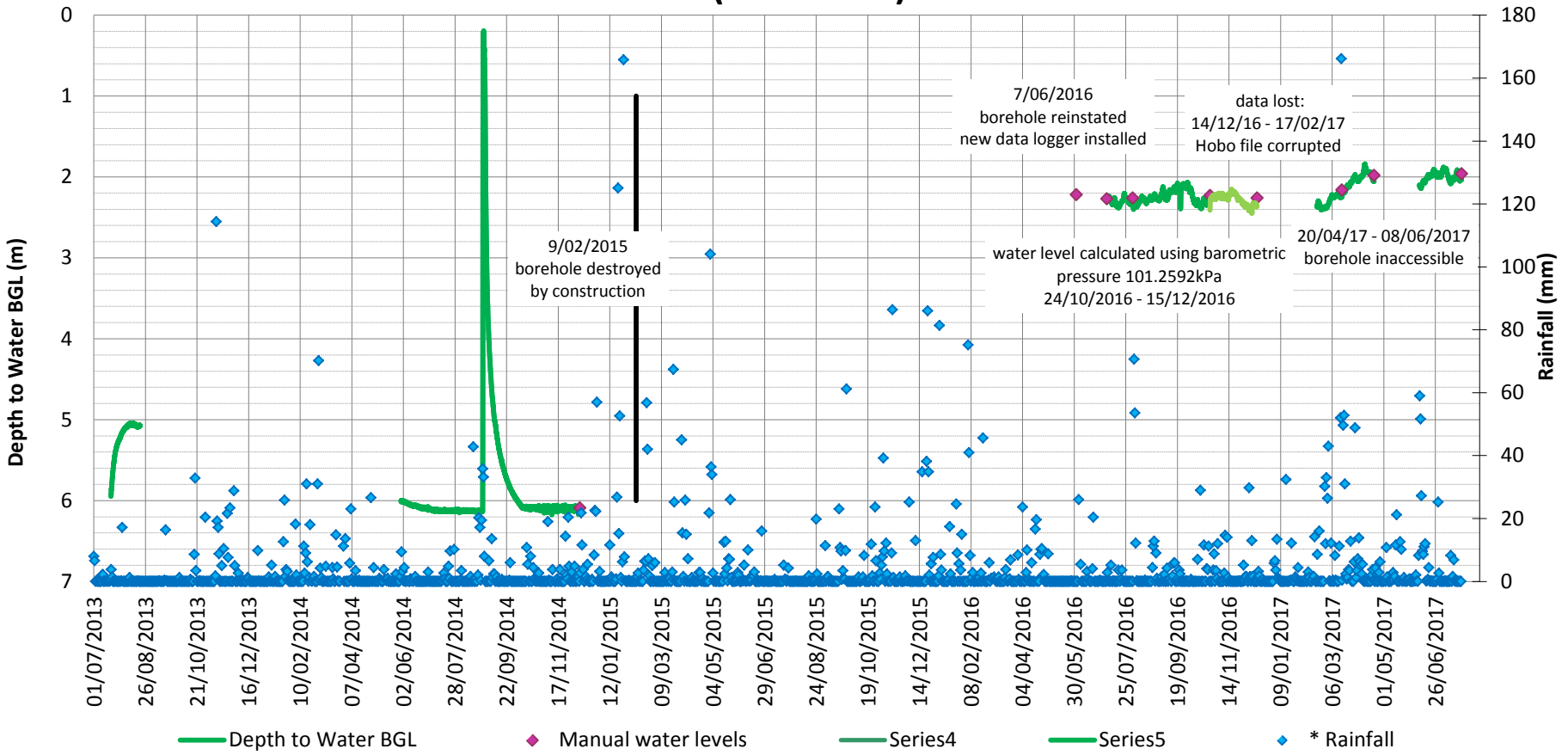
Drawn	**GD**	Client	**RMS**	
Approved	**MD**	Instrument	**HOBO Water Level Data Logger** sn10229626	
		BH ID	**A-BH3103**	
Date	**24/07/2017**	Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-3**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW06 (A-BH3106) Water Level BGL



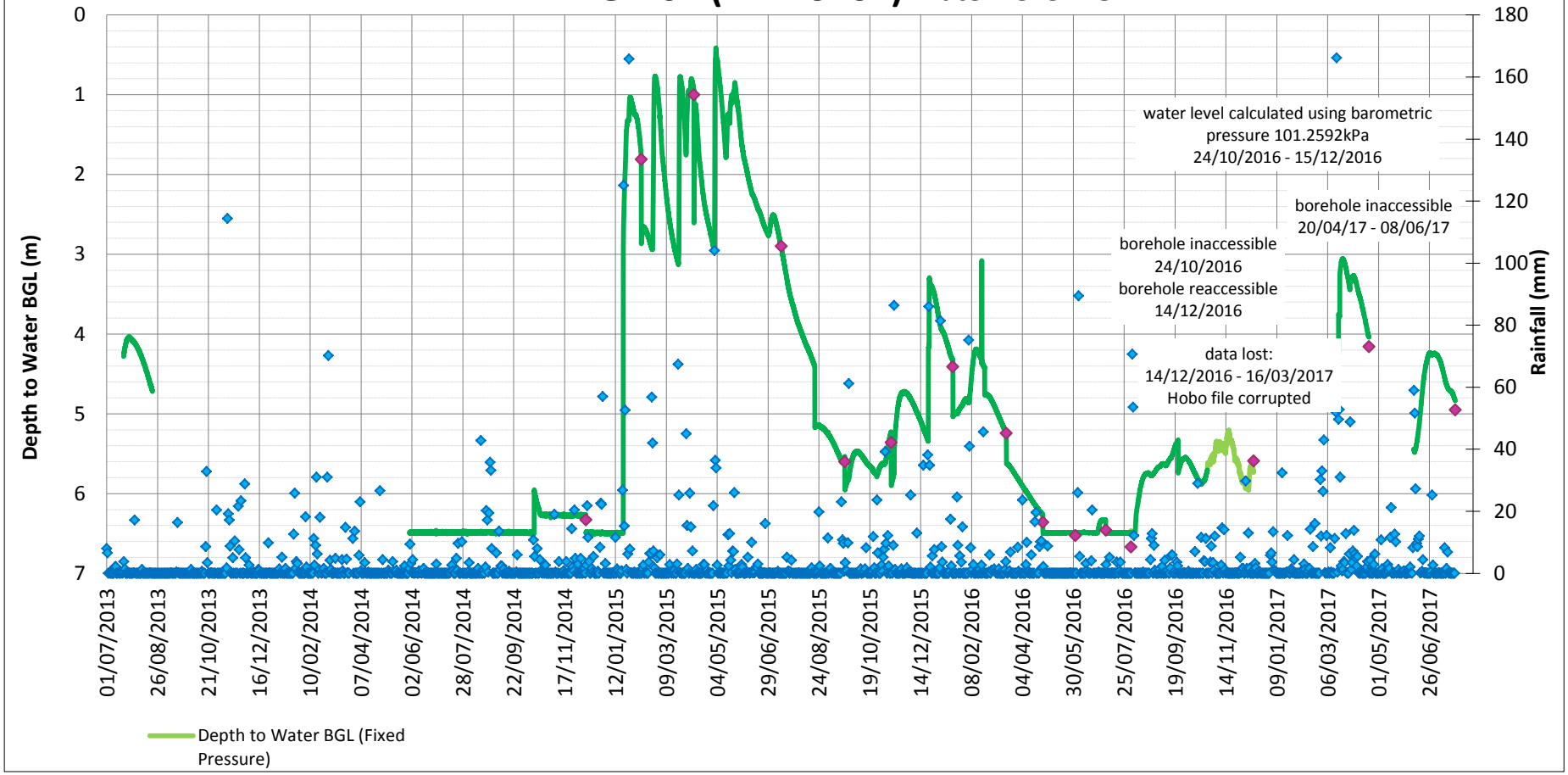
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10932418	
			BH ID	**A-BH3106**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-6**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW07 (A-BH3107) Water Level BGL



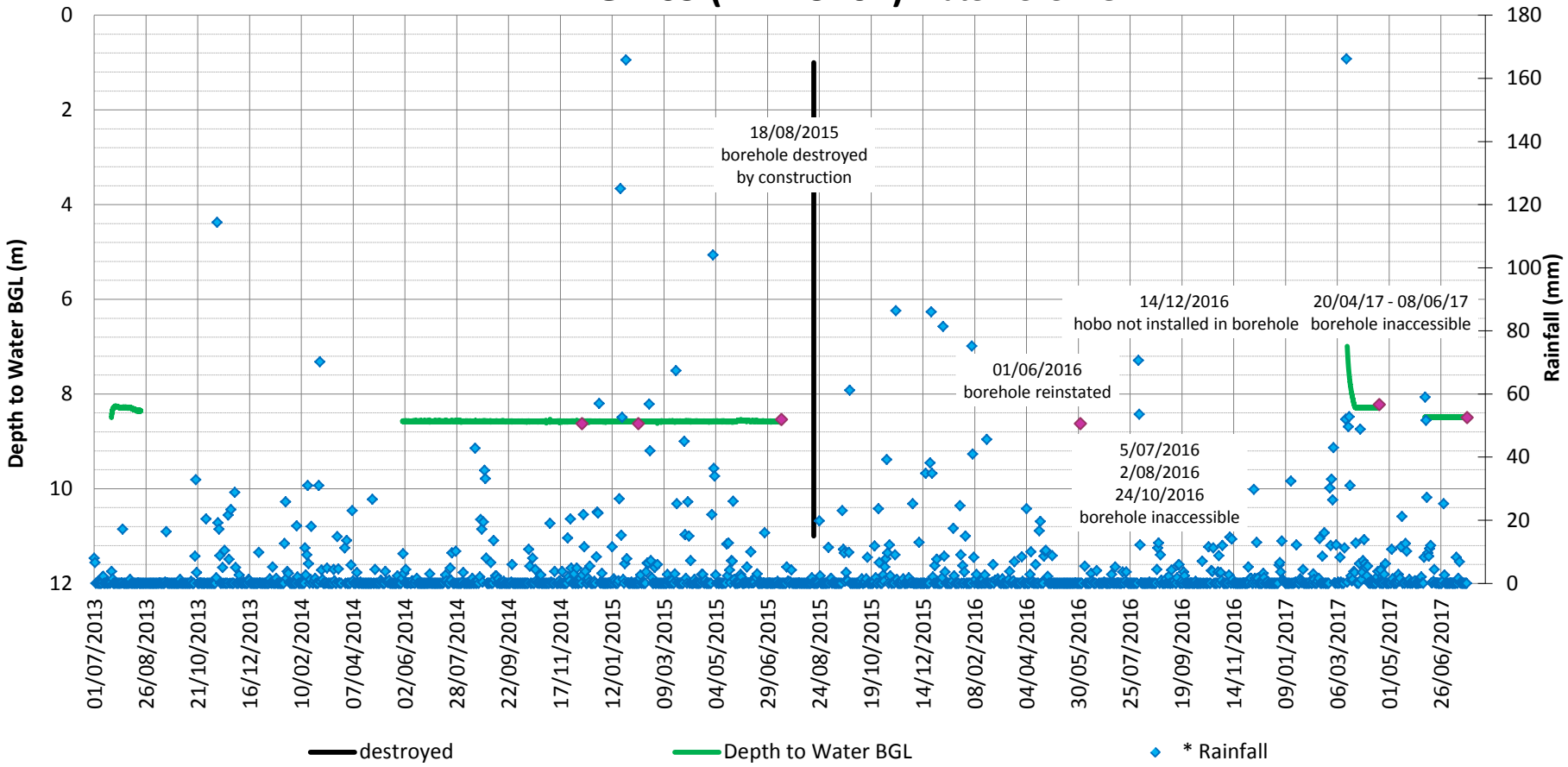
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10229627	
			BH ID	**A-BH3107**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-7**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW09 (B-BH3102) Water Level BGL



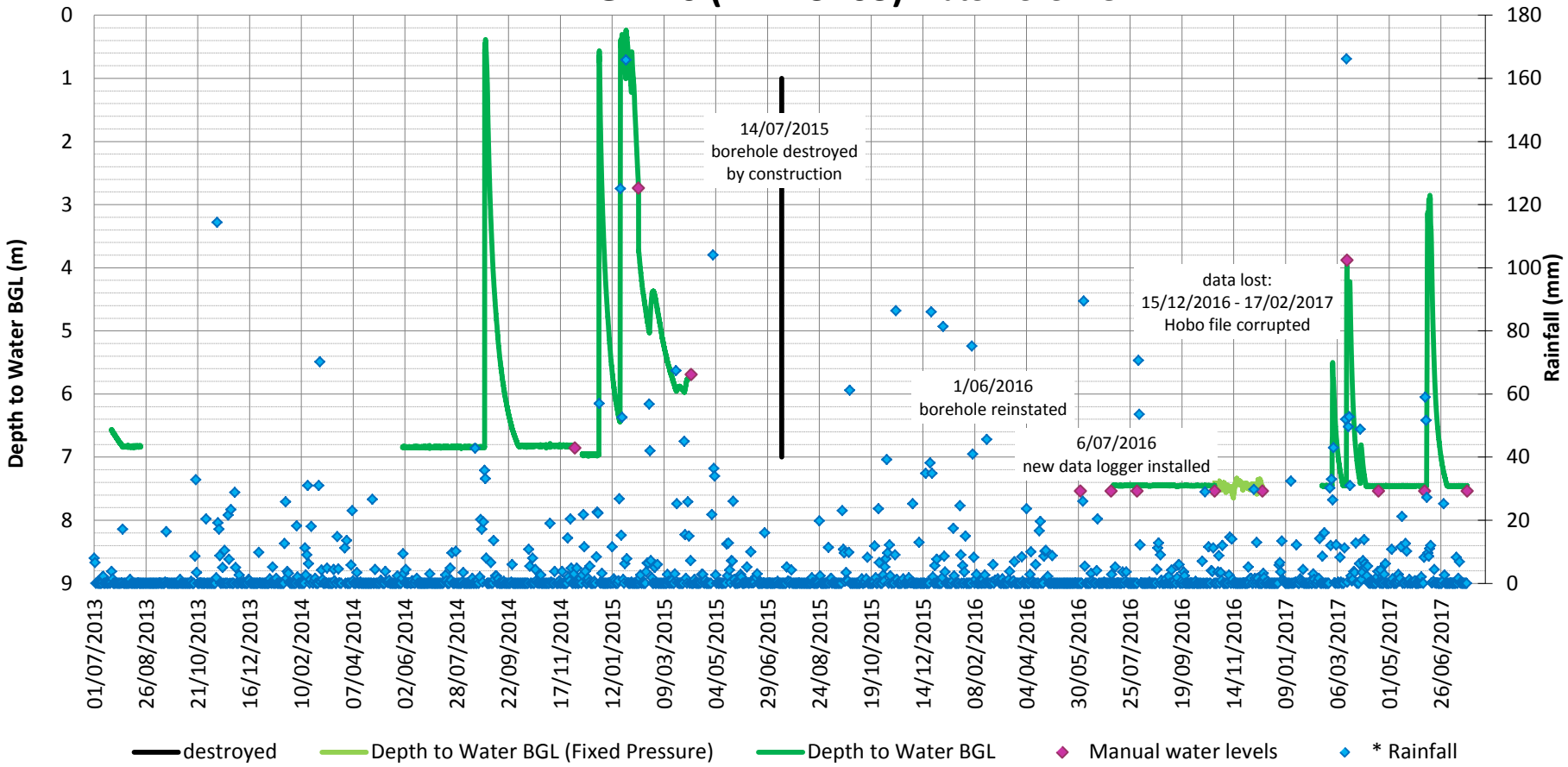
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn 10262198	
			BH ID	**B-BH3102**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-8**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW10 (B-BH3103) Water Level BGL



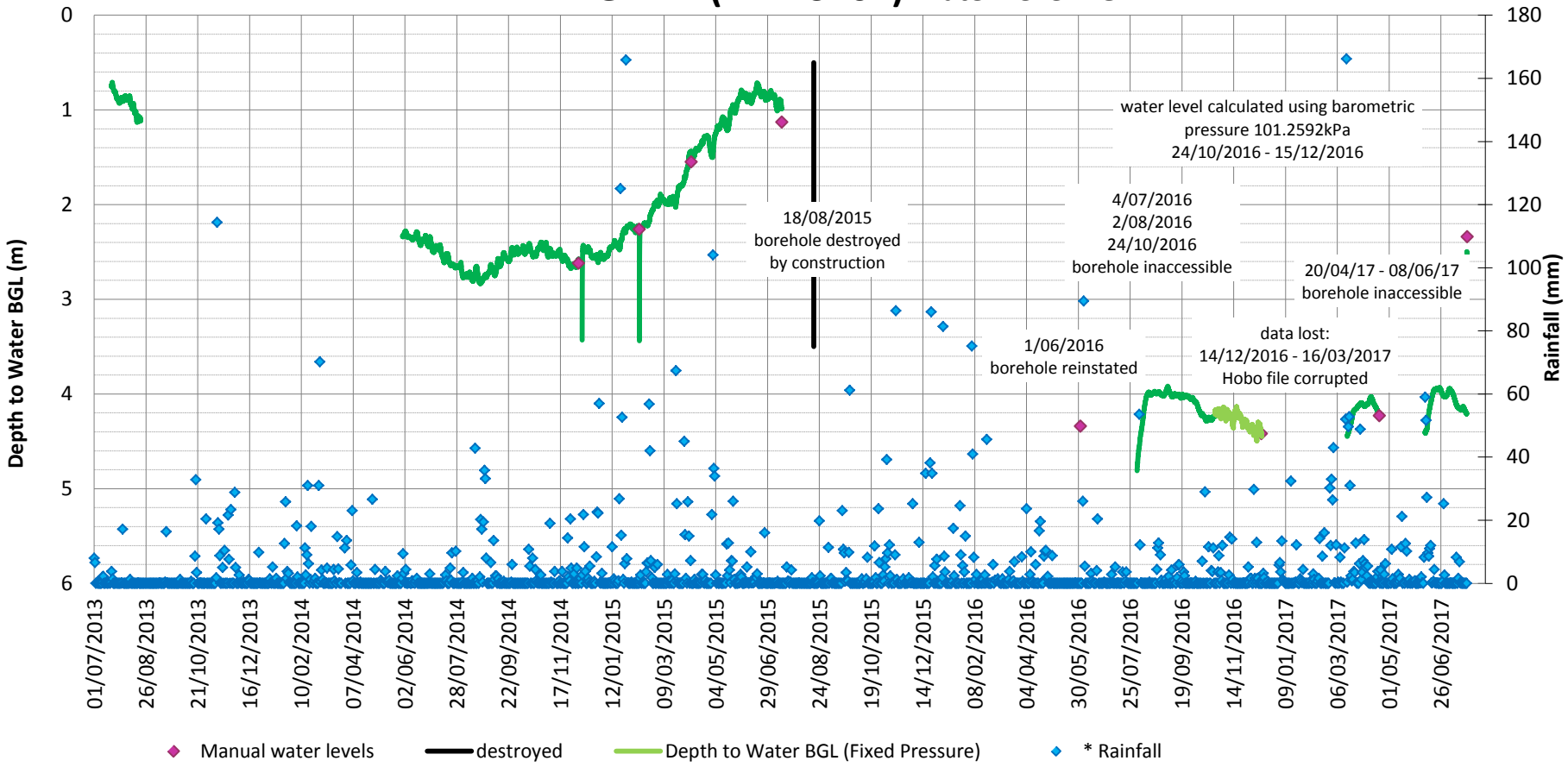
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10238337	
			BH ID	**B-BH3103**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-9**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW11 (B-BH3104) Water Level BGL



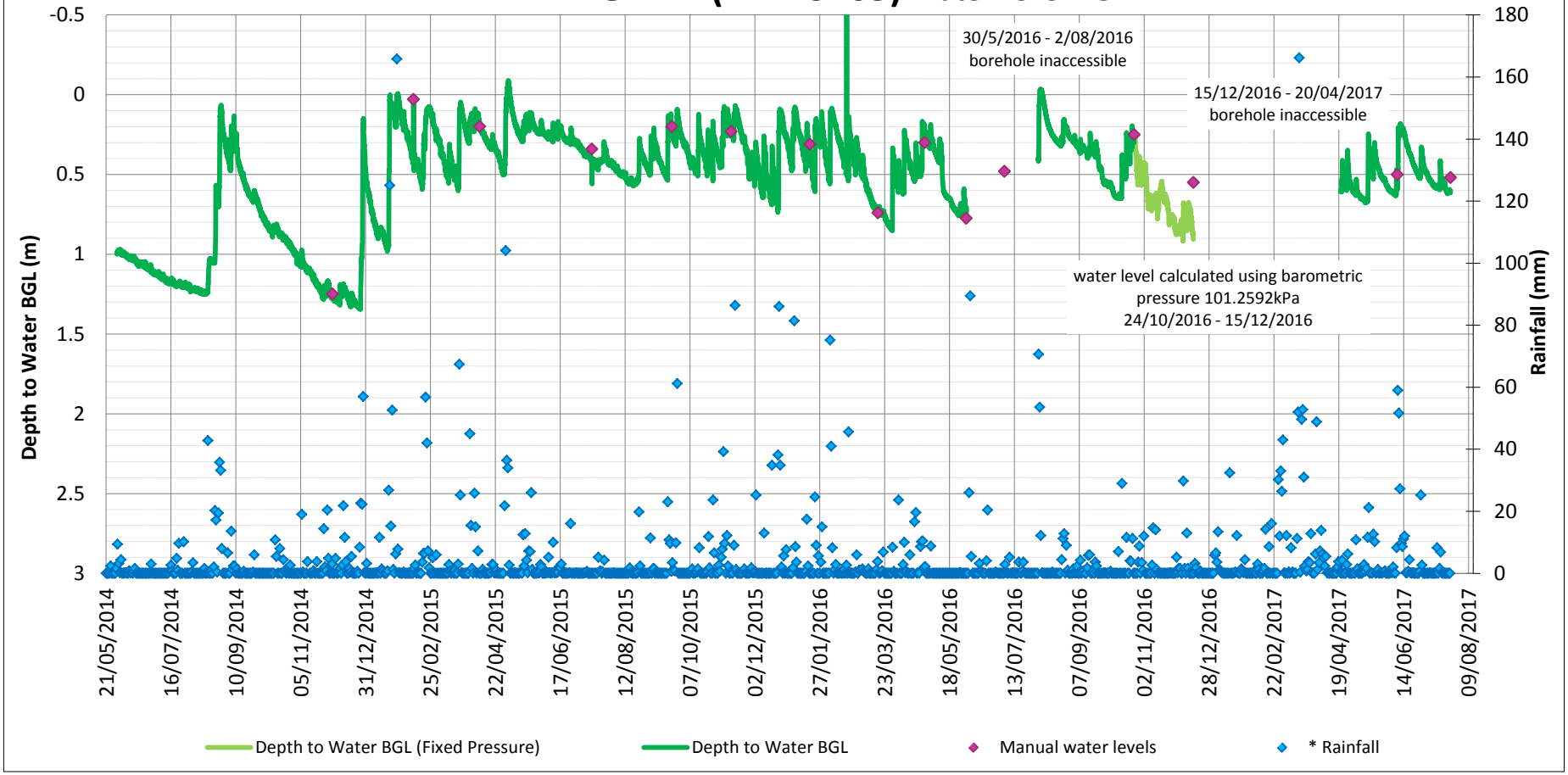
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10224040	
			BH ID	**B-BH3104**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-10**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW12 (B-BH3105) Water Level BGL



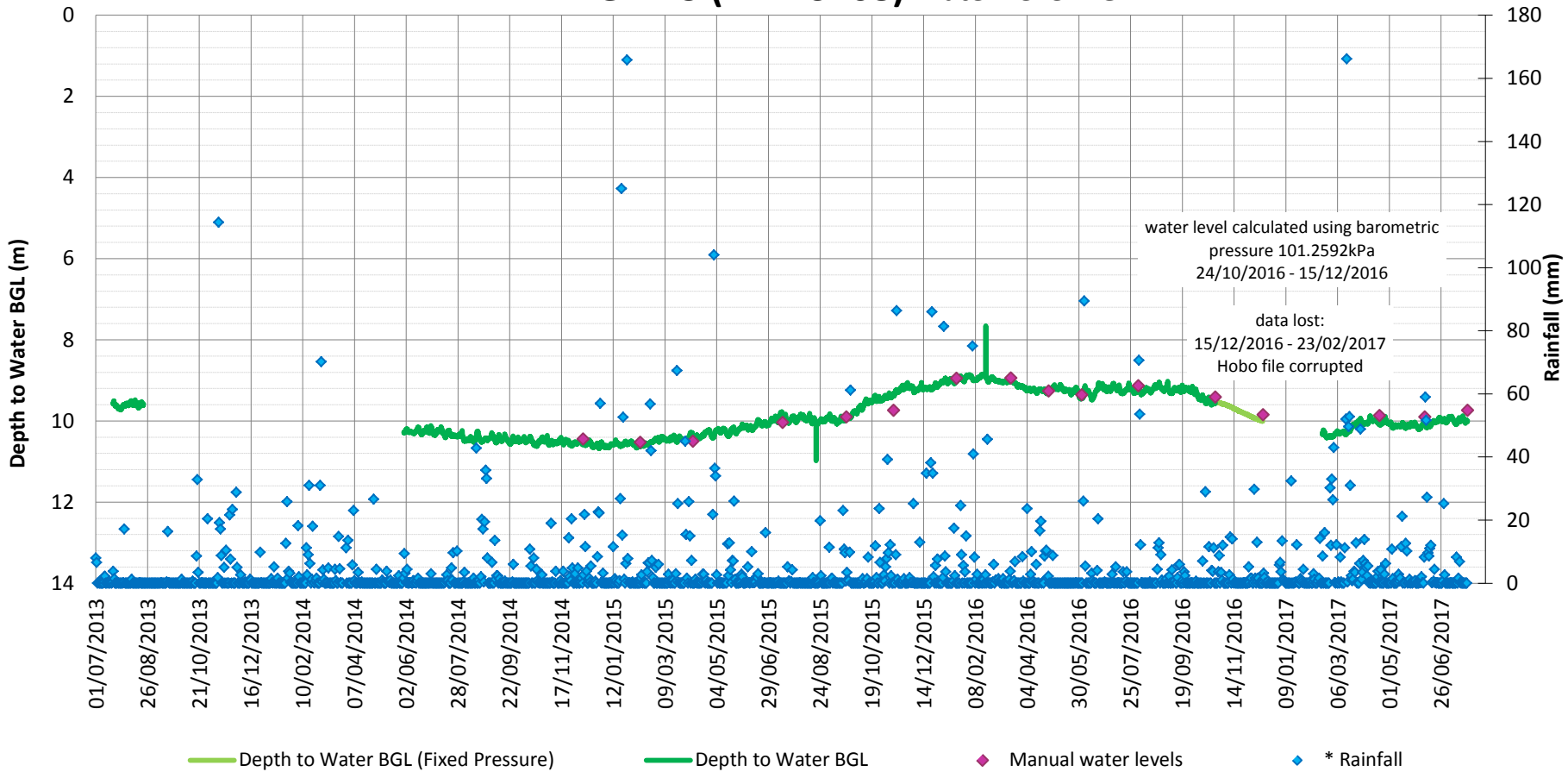
Drawn	**GD**		Client	**RMS**	
Approved	**MD**	Transport Roads & Maritime Services	Instrument	**HOBO Water Level Data Logger** sn10262196	
			BH ID	**B-BH3105**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-11**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW15 (B-BH3108) Water Level BGL



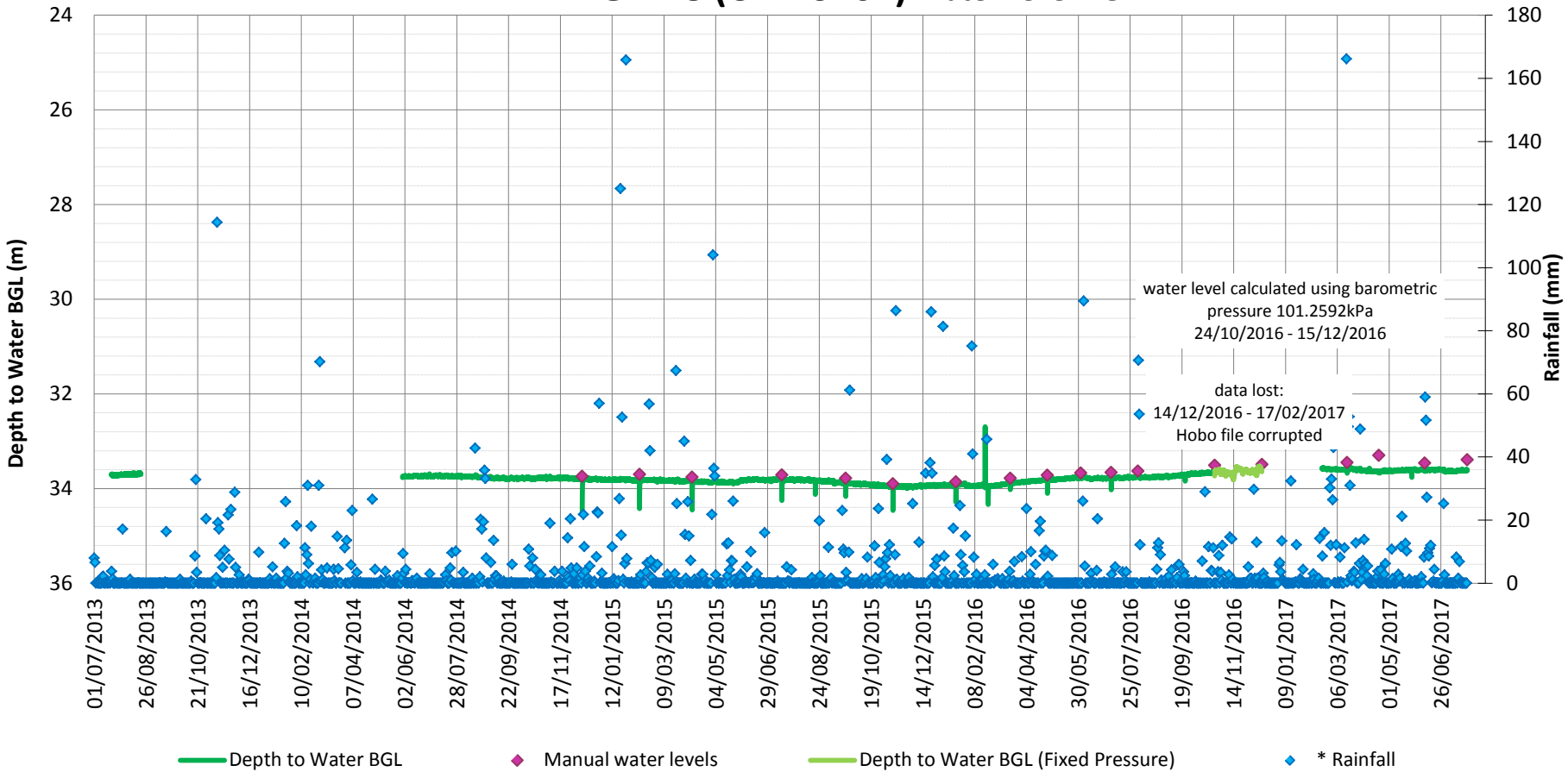
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10238352	
			BH ID	**B-BH3108**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-14**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW18 (C-BH3102) Water Level BGL



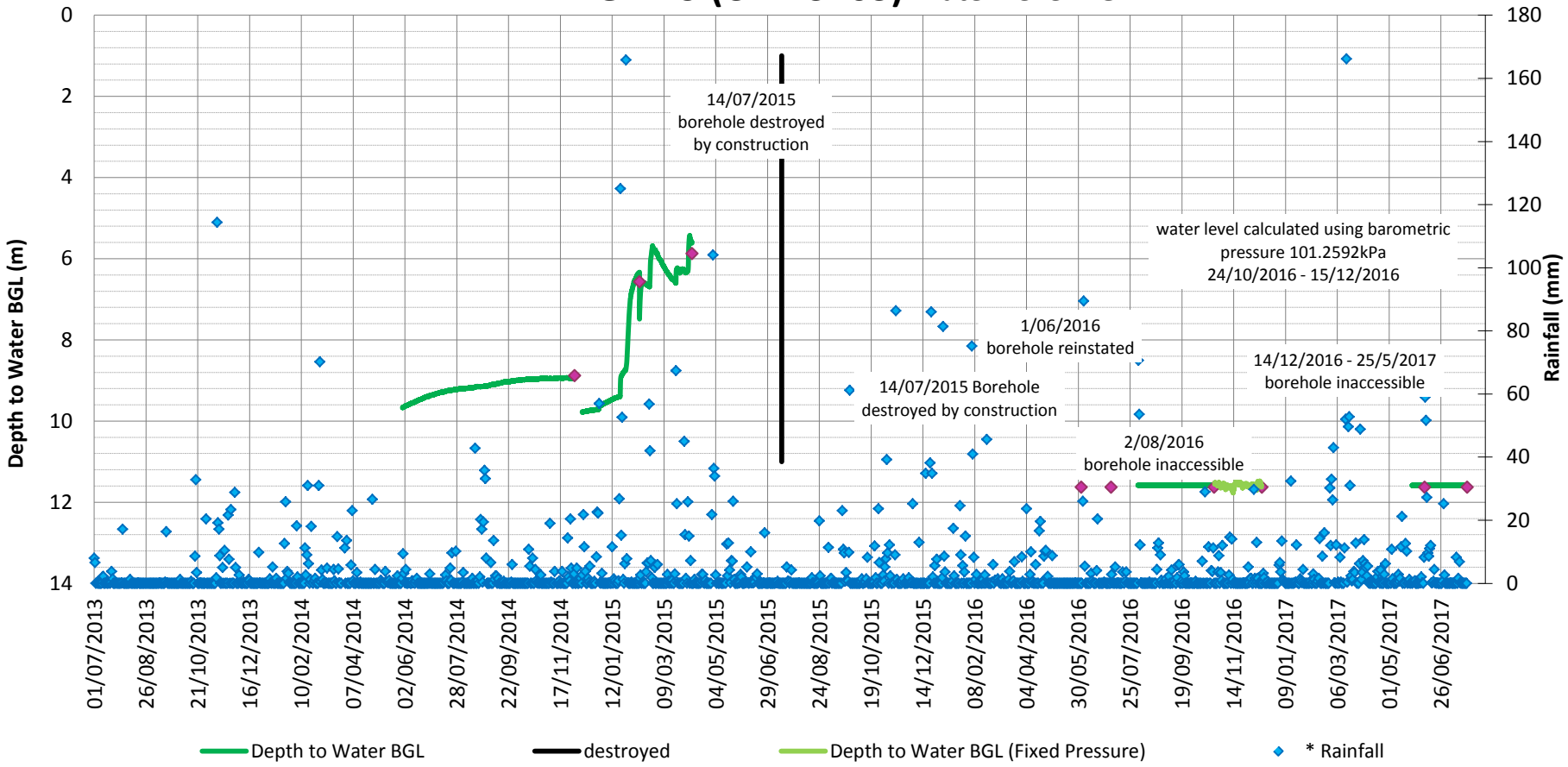
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262195	
			BH ID	**C-BH3102**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-15**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW19 (C-BH3103) Water Level BGL



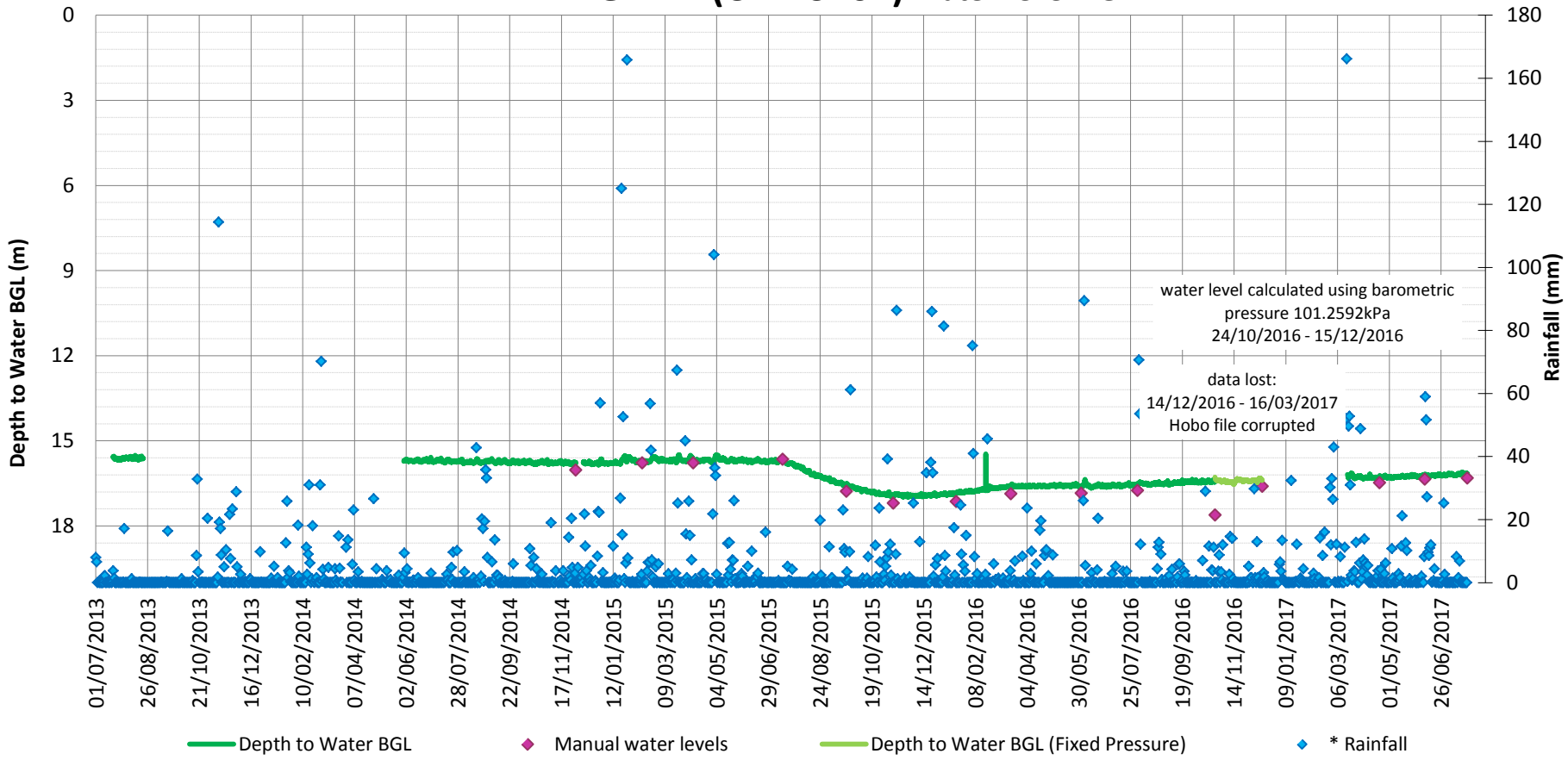
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger**	
			BH ID	**C-BH3103**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-16**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW22 (C-BH3107) Water Level BGL



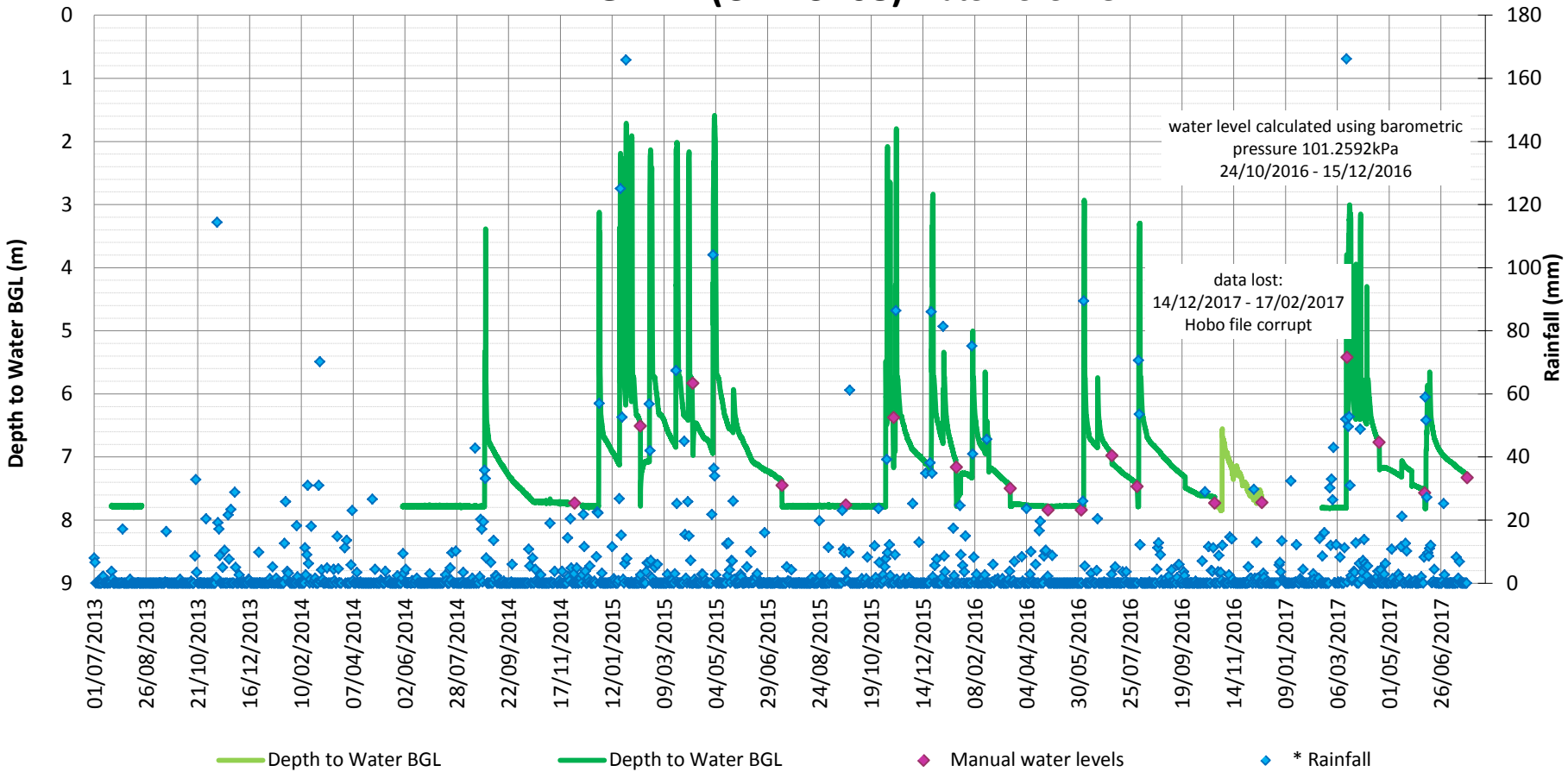
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10280407	
			BH ID	**C-BH3107**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-18**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW24 (C-BH3108) Water Level BGL



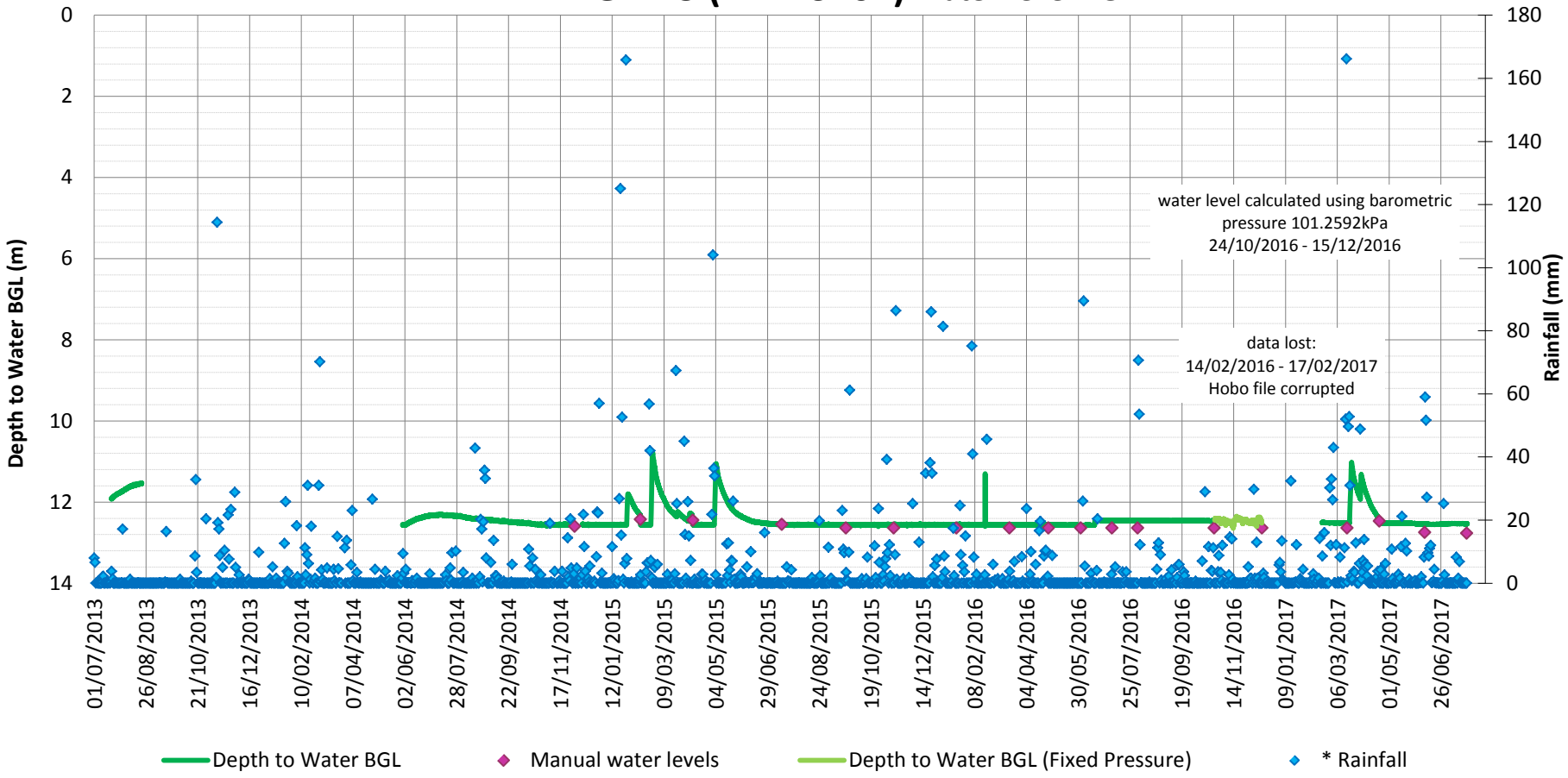
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262197	
			BH ID	**C-BH3108**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-20**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW25 (D-BH3101) Water Level BGL



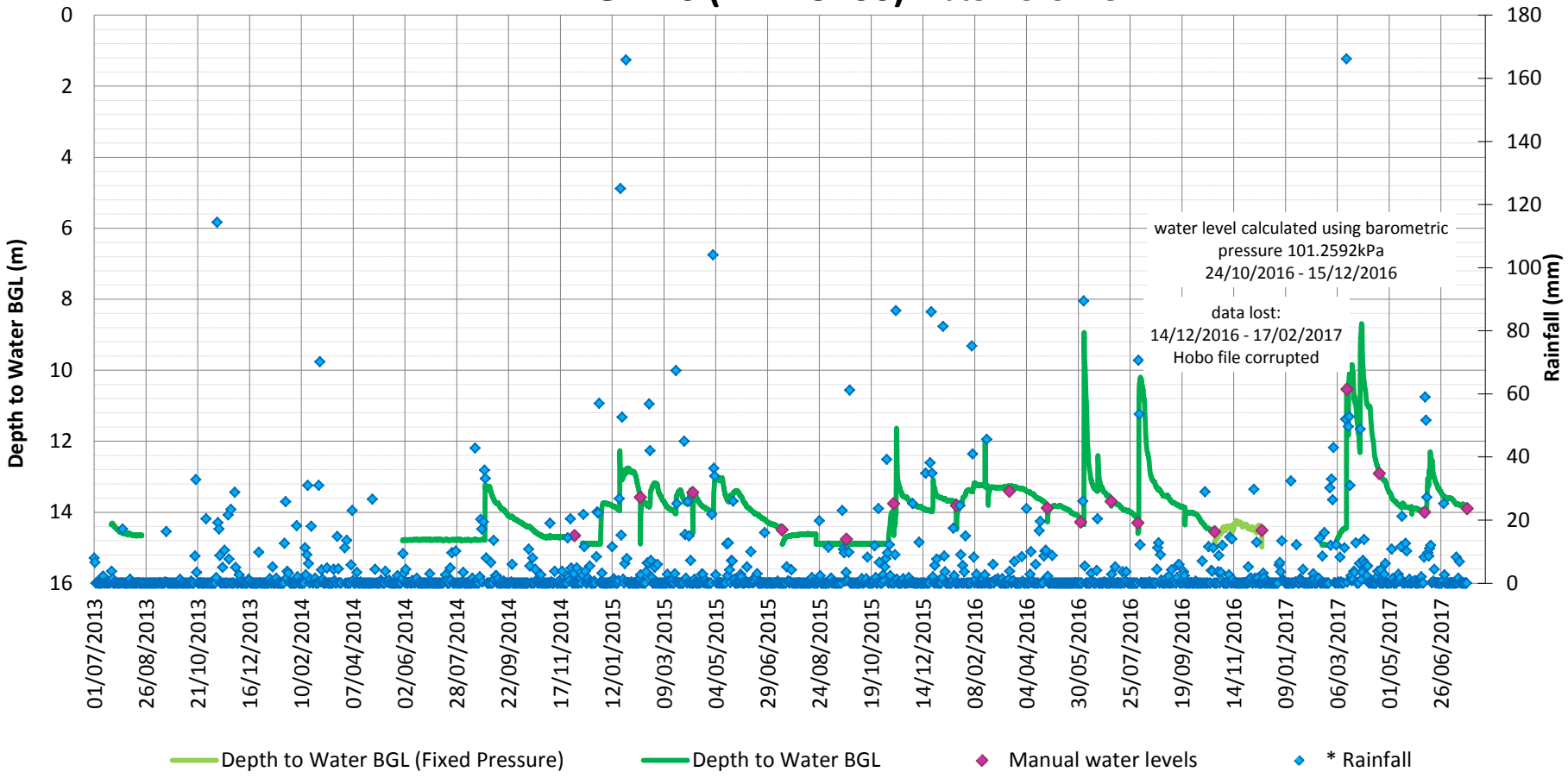
Drawn	**GD**		Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262203	
			BH ID	**D-BH3101**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-21**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW26 (D-BH3106) Water Level BGL



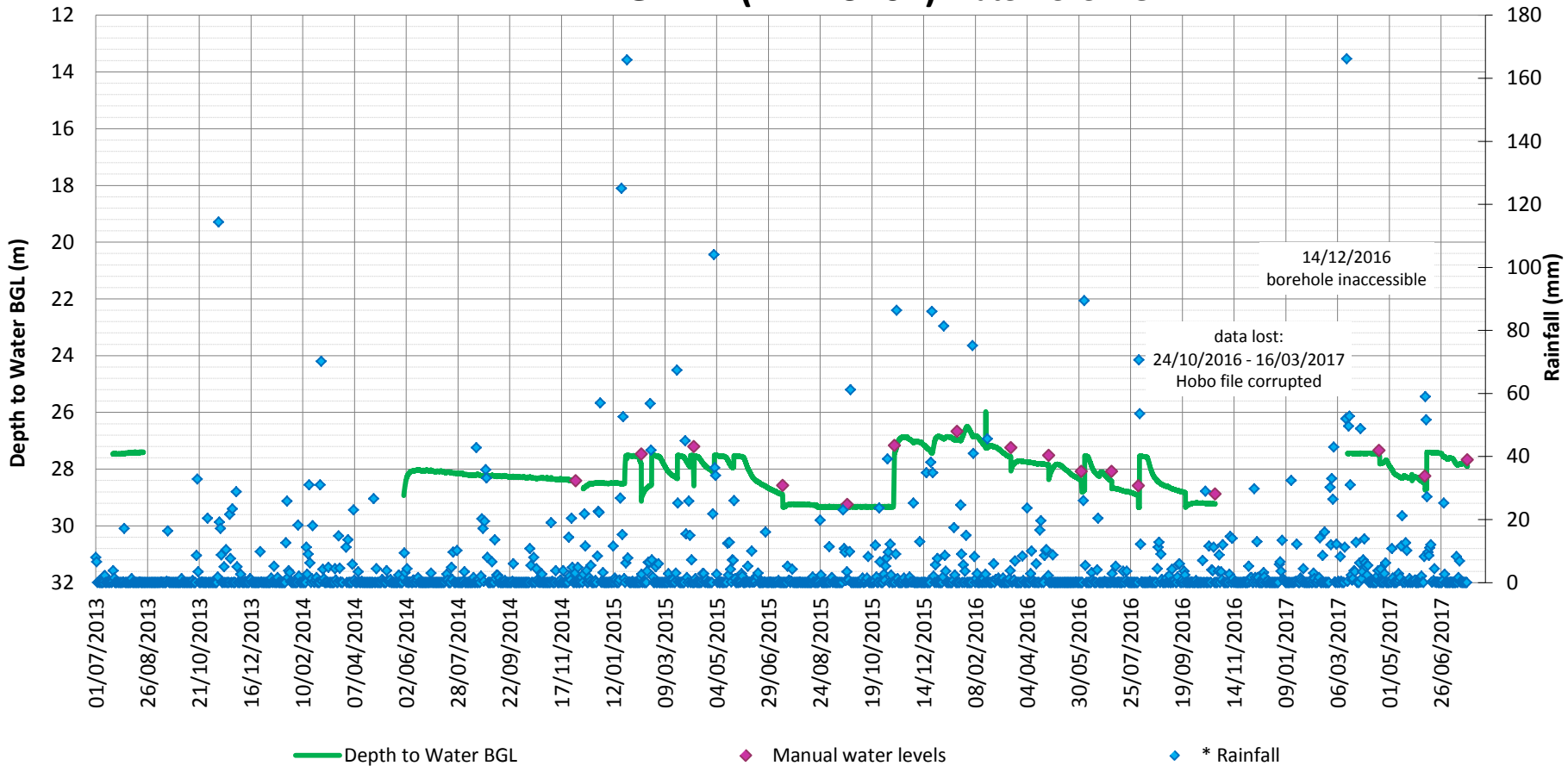
Drawn	**GD**		Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262194	
			BH ID	**D-BH3106**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-22**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW27 (D-BH3102) Water Level BGL



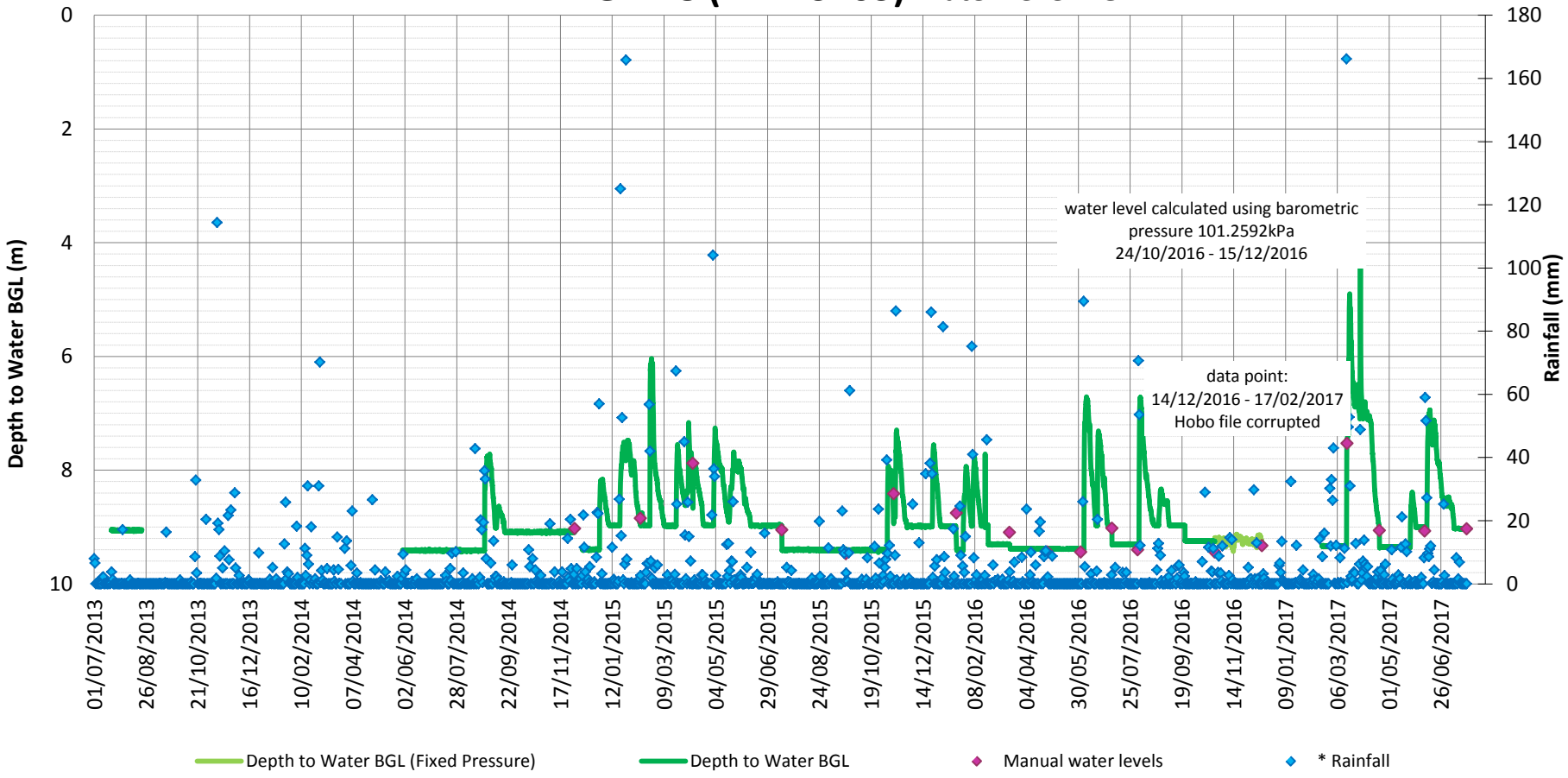
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262200	
			BH ID	**D-BH3102**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-23**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW28 (D-BH3103) Water Level BGL



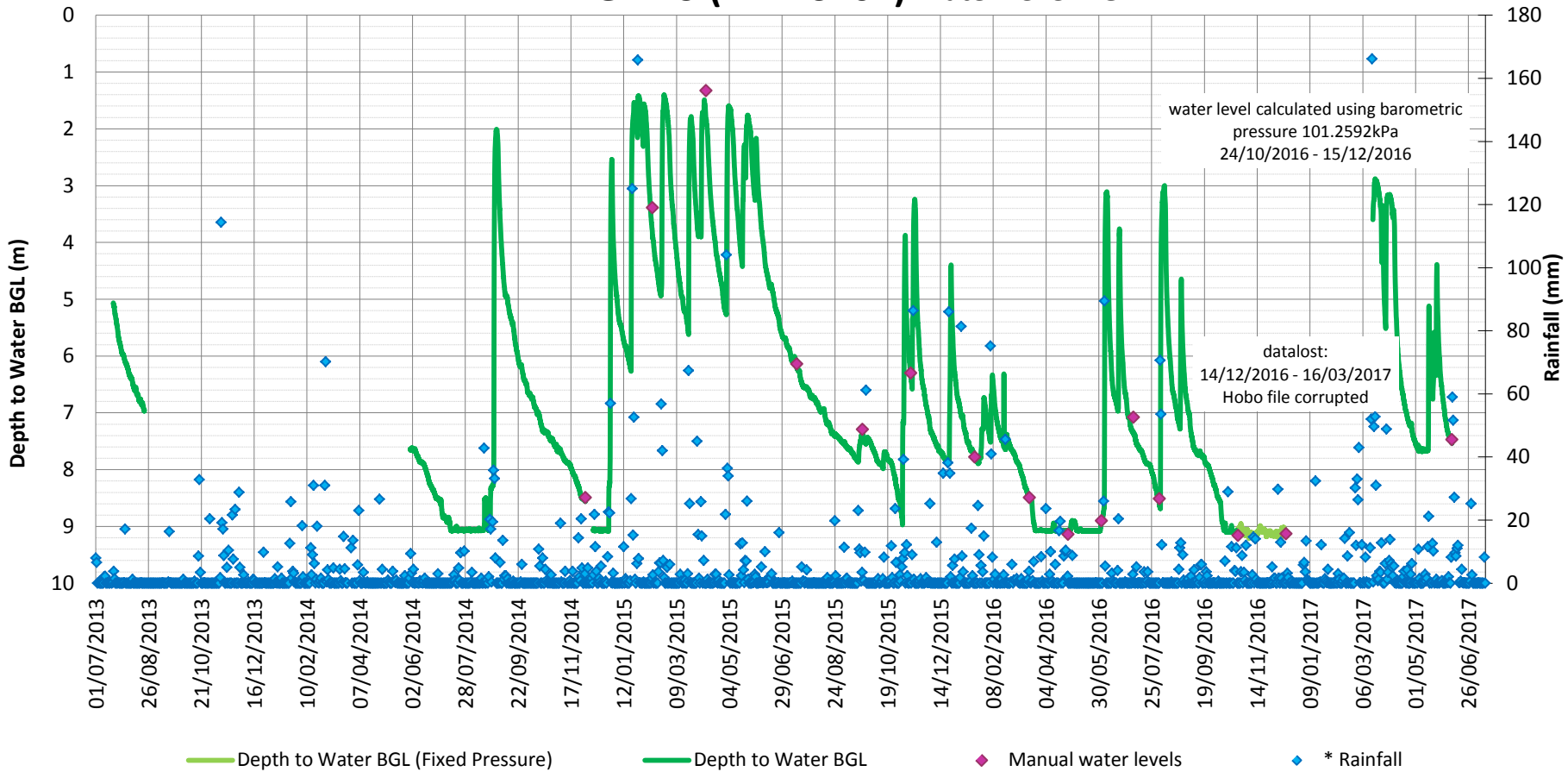
Drawn	**GD**		Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262205	
			BH ID	**D-BH3103**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-24**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW29 (D-BH3104) Water Level BGL



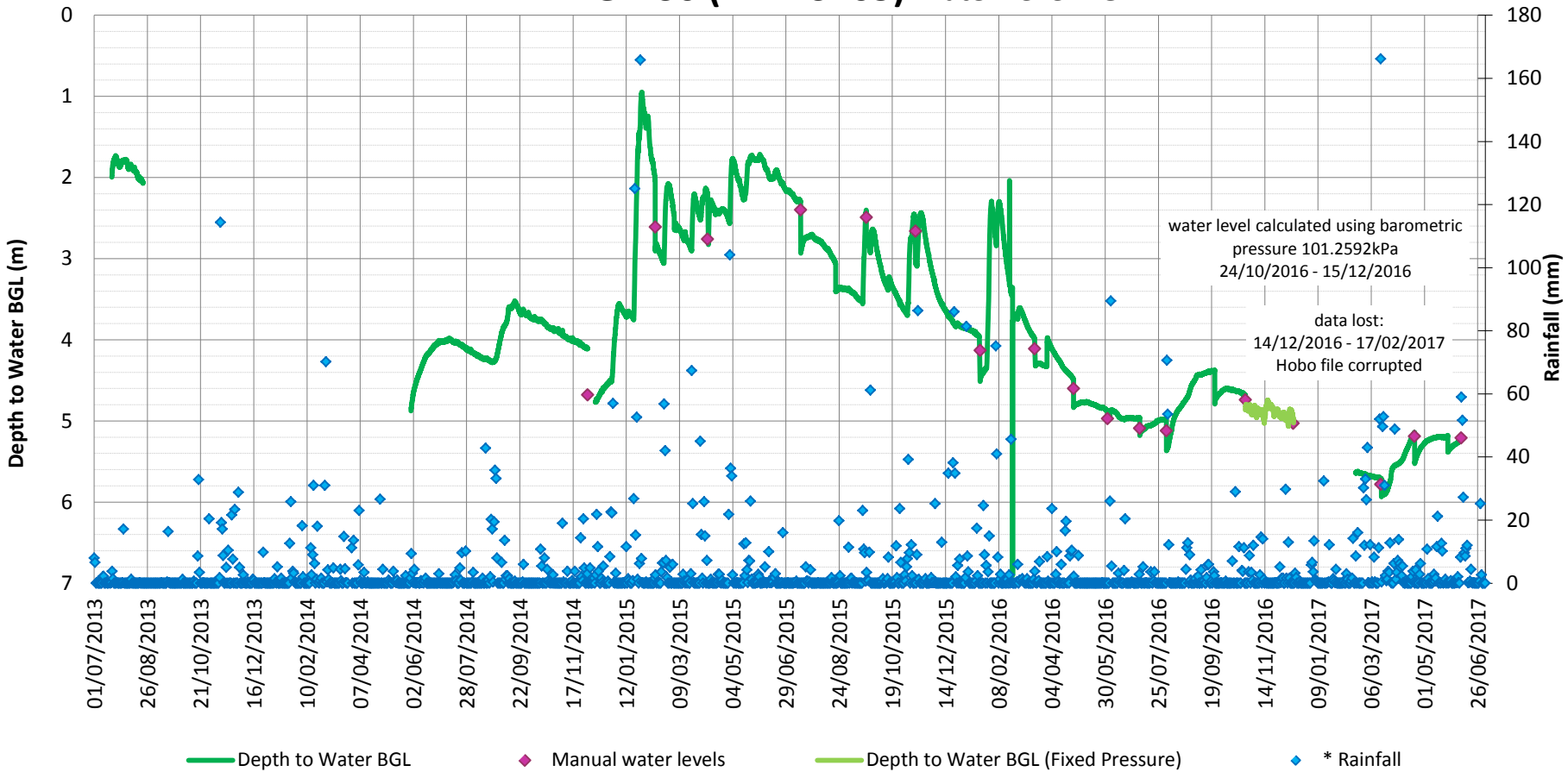
Drawn	**GD**	Transport Roads & Maritime Services	Client	**RMS**	
Approved	**MD**		Instrument	**HOBO Water Level Data Logger** sn10262201	
			BH ID	**D-BH3104**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-25**

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, 2017)

HW10 Pacific Hwy; Oxley Hwy to Kempsey

GW30 (D-BH3105) Water Level BGL



Drawn	**GD**		Client	**RMS**	
Approved	**MD**	Transport Roads & Maritime Services	Instrument	**HOBO Water Level Data Logger** sn10262193	
			BH ID	**D-BH3105**	
Date	**24/07/2017**		Project	**Pacific Hwy (HW10) Oxley Hwy to Kempsey**	Figure no: **B-26**

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, 2017)

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*	
Dissolved Aluminium	mg/L	0.01	2.51	0.1						54.6	<0.01	<0.01	4.93	
Dissolved Arsenic	mg/L	0.001	0.008	0.002						0.016	<0.001	<0.001	0.004	
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001						0.0288	0.0034	0.0031	0.0042	
Dissolved Chromium	mg/L	0.001	<0.001	<0.001						0.068	<0.001	<0.001	0.017	
Dissolved Copper	mg/L	0.001	0.037	0.009						0.379	0.003	0.001	0.031	
Total Iron	mg/L	0.05	2.27	1.8						75.2	16.7	16	7.59	
Dissolved Lead	mg/L	0.001	0.026	0.002						0.047	<0.001	<0.001	0.006	
Total Manganese	mg/L	0.001	0.247	0.052						1.81	1.02	1.33	1.16	
Mercury	mg/L	0.0001	<0.00001	0.00001										
Dissolved Nickel	mg/L	0.001	0.025	0.005						0.036	0.02	0.008	0.01	
Dissolved Silver	mg/L	0.001	<0.001	<0.001						<0.001	<0.001	0.002	<0.001	
Dissolved Zinc	mg/L	0.005	0.347	0.118						0.398	0.045	0.041	0.114	
EC laboratory	uS/cm		4400	2170						8050	7650	8500	7690	
Total Nitrogen	mg/L		0.38	0.5										
Total Phosphorus	mg/L		0.05	0.07										
Ammonia	mg/L		0.02	<0.02										
Phosphate	mg/L													
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		7	13										
Chloride	mg/L		1307	489										
Nitrate			0.08	0.25						0.24	0.32	0.27	0.97	
Sulphate	mg/L		159	274										
Calcium	mg/L		4.41	1.28										
Magnesium	mg/L		87.4	21.7										
Potassium	mg/L		5.78	3.2										
Sodium	mg/L		692	370										

* 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	GW02 Results											
			Dec 14	Feb 15	Apr 15	Jul 15*	Nov 15*	Jan 16	Apr 16*	Aug 16*	Dec 16	Apr 17	Jul 17*	
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

Table 3 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*	
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	
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	
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	
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	
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	
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	
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	
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	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<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	
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	0.01	0.019	0.015	0.028	0.028	0.013	0.085	0.044	0.04	0.006	0.041	
EC laboratory	uS/cm		1290	939	519	1040	725	1080	1420	1460	1700	1300	1580	
Total Nitrogen	mg/L		0.7	0.6	0.59			0.5						
Total Phosphorus	mg/L		0.37	0.11	0.14			0.07						
Ammonia	mg/L		0.17	0.10	0.02			0.02						
Phosphate	mg/L													
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$		147	118	120			96						
Chloride	mg/L		254	163	74			226						
Nitrate			0.02	0.02	<0.01	0.22	0.03	0.10	0.03	0.12	0.03	0.12	0.04	
Sulphate	mg/L		102	80				85						
Calcium	mg/L		30.8	27.4	42.1			36						
Magnesium	mg/L		39.9	24.5	15.4			38						
Potassium	mg/L		3.49	2.93	2.47			1						
Sodium	mg/L		164	105	38.6			127						

* 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 4 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*	
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.

Table 5 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*	
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.

Table 6 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*	
Dissolved Aluminium	mg/L	0.01								39.9	19.3	17	35.2	
Dissolved Arsenic	mg/L	0.001								0.024	0.018	0.01	0.012	
Dissolved Cadmium	mg/L	0.0001								0.0002	0.0004	0.0002	0.0002	
Dissolved Chromium	mg/L	0.001								0.013	0.001	<0.001	0.008	
Dissolved Copper	mg/L	0.001								0.028	0.048	0.118	0.036	
Total Iron	mg/L	0.05								27	24.1	15.7	16	
Dissolved Lead	mg/L	0.001								0.093	0.032	0.023	0.134	
Total Manganese	mg/L	0.001								0.861	0.56	0.582	0.56	
Mercury	mg/L	0.0001												
Dissolved Nickel	mg/L	0.001								0.028	0.032	0.027	0.034	
Dissolved Silver	mg/L	0.001								<0.001	<0.001	<0.001	<0.001	
Dissolved Zinc	mg/L	0.005								0.479	0.488	0.447	0.542	
EC laboratory	uS/cm									5810	6340	7090	7000	
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										0.03	0.12	0.03	0.02	
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 – 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 7 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*	
Dissolved Aluminium	mg/L	0.01		0.2	0.08		71.7	1.70			0.13	0.76	6.81	
Dissolved Arsenic	mg/L	0.001		<0.001	<0.001		0.012	<0.001			<0.001	<0.001	0.003	
Dissolved Cadmium	mg/L	0.0001		<0.001	<0.001		0.0004	<0.0001			<0.0001	<0.0001	<0.0001	
Dissolved Chromium	mg/L	0.001		0.002	<0.001		0.042	0.002			<0.001	<0.001	0.006	
Dissolved Copper	mg/L	0.001		0.001	0.004		7.39	0.020			2	0.026	0.458	
Total Iron	mg/L	0.05		26.7	13.2		31.3	7.07			12.7	4.02	3.88	
Dissolved Lead	mg/L	0.001		<0.001	<0.001		0.154	<0.001			<0.001	<0.001	0.005	
Total Manganese	mg/L	0.001		0.124	0.125		0.254	0.030			0.072	0.052	0.037	
Mercury	mg/L	0.0001		<0.00001	<0.00001			<0.0001						
Dissolved Nickel	mg/L	0.001		0.002	<0.001		0.024	<0.001			0.002	0.001	0.003	
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		0.005	0.011		0.174	0.106			0.029	0.016	0.1	
EC laboratory	uS/cm			212	238		184	169			182	226	225	
Total Nitrogen	mg/L			0.7	0.45			0.7						
Total Phosphorus	mg/L			0.16	0.22			0.10						
Ammonia	mg/L			<0.02	0.01			<0.01						
Phosphate	mg/L													
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$			36	45			16						
Chloride	mg/L			35	38			32						
Nitrate				<0.01	<0.01		<0.01	0.24			<0.01	0.13	0.1	
Sulphate	mg/L			9.5				8						
Calcium	mg/L			22.6	10.2			1						
Magnesium	mg/L			9.09	4.0			1						
Potassium	mg/L			2.92	1.75			<1						
Sodium	mg/L			30.8	46.3			32						

* 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 and August 2016 sampling events.

Table 8 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*	
Dissolved Aluminium	mg/L	0.01	0.02	0.12	1.21	72.9	20.5					1.04	39.4	
Dissolved Arsenic	mg/L	0.001	0.001	<0.001	<0.001	0.028	0.004					0.002	0.01	
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001	0.0024	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	
Dissolved Copper	mg/L	0.001	<0.001	0.004	0.002	0.114	0.082					0.003	0.059	
Total Iron	mg/L	0.05	139	52.1	78.6	75.4	10.7					26.6	28.2	
Dissolved Lead	mg/L	0.001	<0.001	<0.001	<0.001	0.063	0.108					<0.001	0.024	
Total Manganese	mg/L	0.001	0.452	0.125	0.089	0.158	0.037					0.094	0.088	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001									
Dissolved Nickel	mg/L	0.001	0.002	0.005	<0.001	0.015	0.003					0.001	0.012	
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	<0.005	0.063	0.017	0.291	0.074					0.03	0.374	
EC laboratory	uS/cm			1530	435	528	730					639	786	
Total Nitrogen	mg/L			1.6	2.90	0.06								
Total Phosphorus	mg/L			0.27	0.55									
Ammonia	mg/L			0.05	0.04									
Phosphate	mg/L													
Bicarbonate / Alkalinity	mg $CaCO_3/L^{-1}$			37	26									
Chloride	mg/L		264	400	120									
Nitrate				0.02	0.02	0.06	0.02					0.11	0.03	
Sulphate	mg/L		11	24										
Calcium	mg/L		108	23.2	18.3									
Magnesium	mg/L		50	22.8	12.0									
Potassium	mg/L		17.2	9.61	8.88									
Sodium	mg/L		229	264	72.3									

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

Table 9 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*	
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													

* 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.

Table 10 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*	
Dissolved Aluminium	mg/L	0.01	0.17	0.54	0.80									
Dissolved Arsenic	mg/L	0.001	0.002	0.004	0.007									
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001	<0.001									
Dissolved Chromium	mg/L	0.001	0.002	0.004	0.005									
Dissolved Copper	mg/L	0.001	0.087	0.014	0.112									
Total Iron	mg/L	0.05	74.1	23.8	75.4									
Dissolved Lead	mg/L	0.001	<0.001	0.001	0.002									
Total Manganese	mg/L	0.001	0.22	0.15	0.271									
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001									
Dissolved Nickel	mg/L	0.001	0.003	0.003	0.003									
Dissolved Silver	mg/L	0.001	<0.001	<0.001	<0.001									
Dissolved Zinc	mg/L	0.005	0.007	0.018	0.028									
EC laboratory	uS/cm			419	590									
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									
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, insufficient water to collect sample.

Table 11 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*	
Dissolved Aluminium	mg/L	0.01	0.96	0.01	0.01	0.62				2.24	0.04	0.04	1.08	
Dissolved Arsenic	mg/L	0.001	0.003	<0.001	0.001	0.004				0.009	0.001	<0.001	0.002	
Dissolved Cadmium	mg/L	0.0001	0.002	<0.001	<0.001	0.0007				<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	
Dissolved Copper	mg/L	0.001	0.126	0.039	0.018	0.039				0.018	0.041	0.003	0.023	
Total Iron	mg/L	0.05	14	14.5	16.0	1.79				7.19	6.96	1.55	2.76	
Dissolved Lead	mg/L	0.001	0.003	<0.001	<0.001	0.003				0.004	<0.001	<0.001	0.002	
Total Manganese	mg/L	0.001	1.80	0.735	0.069	0.117				0.107	0.097	0.048	0.054	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001									
Dissolved Nickel	mg/L	0.001	0.157	0.043	0.003	0.012				0.01	0.008	0.005	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	0.136	0.045	0.021	0.064				0.389	0.3	0.146	0.208	
EC laboratory	uS/cm		8510	4370	1040	2390				1760	1760	1130	1290	
Total Nitrogen	mg/L		0.7	--	0.56									
Total Phosphorus	mg/L		0.10	0.03	0.075									
Ammonia	mg/L		0.19	0.07	0.02									
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		7	118	273									
Chloride	mg/L		2076	966	140									
Nitrate			0.02	0.01	<0.01	0.02				0.22	0.39	0.15	0.33	
Sulphate	mg/L		1889	928										
Calcium	mg/L		94.7	62.6	8.50									
Magnesium	mg/L		272	103	9.14									
Potassium	mg/L		14.1	12.6	6.05									
Sodium	mg/L		1240	669	200									

* 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 12 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*	
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	
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	
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	
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	
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	
Total Iron	mg/L	0.05	344	191	169	135	74.6	101	49.2		130	69.4	238	
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	
Total Manganese	mg/L	0.001	8.61	4.85		4.97	3.79	4.75	3.74		4.81	6.7	8.41	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<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	
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	0.02	0.018	0.029	0.040	0.034	0.027	0.118		0.039	0.135	0.091	
EC laboratory	uS/cm		4020	2860	2470	2600	1740	1510	1440		2140	2660	4680	
Total Nitrogen	mg/L		3.8	2.0	1.08			3.0						
Total Phosphorus	mg/L		0.70	0.20	0.15			0.14						
Ammonia	mg/L		1.58	1.48	1.05			0.90						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		74	83	56			25						
Chloride	mg/L		354	281	230			159						
Nitrate			<0.01	<0.10*	<0.01	1.53	1.24	0.05	0.26		0.52	0.18	<0.01	
Sulphate	mg/L		1865	1342				478						
Calcium	mg/L		64.2	68.3	62.3			29						
Magnesium	mg/L		217	103	104			61						
Potassium	mg/L		10.6	11.6	11.0			10						
Sodium	mg/L		488	281	264			168						

* 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 13 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*	
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													
Bicaronate / 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.

Table 14 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*	
Dissolved Aluminium	mg/L	0.01	0.05	0.03						6.62	8.49			
Dissolved Arsenic	mg/L	0.001	<0.001	<0.001						0.006	0.006			
Dissolved Cadmium	mg/L	0.0001	<0.001	<0.001						0.0014	0.0008			
Dissolved Chromium	mg/L	0.001	<0.001	0.001						0.001	<0.001			
Dissolved Copper	mg/L	0.001	0.024	0.008						0.313	0.188			
Total Iron	mg/L	0.05	0.79	0.37						41.7	46.9			
Dissolved Lead	mg/L	0.001	<0.001	<0.001						0.009	0.012			
Total Manganese	mg/L	0.001	0.279	0.171						5.86	3.96			
Mercury	mg/L	0.0001	<0.00001	0.00001										
Dissolved Nickel	mg/L	0.001	0.003	0.002						0.247	0.292			
Dissolved Silver	mg/L	0.001	<0.001	<0.001						<0.001	<0.001			
Dissolved Zinc	mg/L	0.005	0.018	0.019						1.07	0.806			
EC laboratory	uS/cm		3690	3230						21000	20800			
Total Nitrogen	mg/L		0.7	1.1										
Total Phosphorus	mg/L		0.03	0.06										
Ammonia	mg/L		0.03	0.04										
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		506	461										
Chloride	mg/L		833	700										
Nitrate			0.22	0.38						0.48	0.05			
Sulphate	mg/L		284	286										
Calcium	mg/L		141	138										
Magnesium	mg/L		32.9	23.9										
Potassium	mg/L		2.76	3.32										
Sodium	mg/L		610	509										

* 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.

Table 15 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*	
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	
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	
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	
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	
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	
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	
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	
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	
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	
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	0.021	0.016	0.020	0.022	0.026	0.015	0.065	0.033	0.028	0.007	0.03	
EC laboratory	uS/cm		3760	3740	3660	3760	3850	3690	3280	3640	3540	3740	3540	
Total Nitrogen	mg/L		0.26	--	0.28			0.6						
Total Phosphorus	mg/L		0.09	0.05	0.08			0.10						
Ammonia	mg/L		0.05	--	0.07			0.05						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		260	239	244			268						
Chloride	mg/L		981	1086	1000			888						
Nitrate			<0.01	<0.01	<0.01	<0.01	0.02	0.05	0.77	0.03	0.03	0.04	0.01	
Sulphate	mg/L		149	164				141						
Calcium	mg/L		30.2	47.7	51.7			56						
Magnesium	mg/L		105	99.3	110			118						
Potassium	mg/L		5.30	8.87	8.54			10						
Sodium	mg/L		507	527	549			539						

* 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 16 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*	
Dissolved Aluminium	mg/L	0.01			0.01	1.16	2.95	0.01	2.12	0.84	<0.01	<0.01	0.73	
Dissolved Arsenic	mg/L	0.001			<0.001	0.002	0.004	0.001	0.003	0.003	<0.001	<0.001	0.002	
Dissolved Cadmium	mg/L	0.0001			<0.001	0.0002	0.0003	<0.0001	0.0005	0.0002	<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	
Dissolved Copper	mg/L	0.001			0.001	0.006	0.012	<0.001	0.03	0.006	<0.001	<0.001	0.004	
Total Iron	mg/L	0.05			19.9	1.73	4.66	8.64	5.18	3.82	8.1	2.33	2.64	
Dissolved Lead	mg/L	0.001			<0.001	0.003	0.061	<0.001	0.003	0.002	<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	
Mercury	mg/L	0.0001			<0.00001			<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	
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			0.026	0.046	0.046	0.022	0.057	0.04	0.02	<0.005	0.051	
EC laboratory	uS/cm				3680	4150	4080	3840	3550	3770	3600	3540	3260	
Total Nitrogen	mg/L				0.55			0.6						
Total Phosphorus	mg/L				0.30			0.11						
Ammonia	mg/L				0.02			0.02						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$				560			382						
Chloride	mg/L				770			799						
Nitrate					<0.01	0.10	0.09	0.05	0.2	0.02	0.18	0.04	<0.01	
Sulphate	mg/L							419						
Calcium	mg/L				165			163						
Magnesium	mg/L				171			190						
Potassium	mg/L				9.85			9						
Sodium	mg/L				355			370						

* 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 17 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*	
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	
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	
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	
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	
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	
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	
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	
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	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001									
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	
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	0.022	0.014	0.022	0.040	0.04	0.007	0.041	0.028	0.007	<0.005	0.033	
EC laboratory	uS/cm		1690	1690	1660	1700	1730	1720	1550	1780	1670	1700	1690	
Total Nitrogen	mg/L		0.46	--	0.37			0.4						
Total Phosphorus	mg/L		0.09	0.06	0.08			0.02						
Ammonia	mg/L		0.14	0.18	0.12			0.08						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		676	645	684			587						
Chloride	mg/L		96	95	98			80						
Nitrate			0.02	<0.01	<0.01	2.02	0.02	0.19	0.02	0.08	0.15	0.04	0.01	
Sulphate	mg/L		168	157				170						
Calcium	mg/L		115	186	199			220						
Magnesium	mg/L		56.6	49.2	55			62						
Potassium	mg/L		4.48	6.15	6.56			6						
Sodium	mg/L		97.7	98.9	101			104						

* 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 18 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*	
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													
Bicaronate / 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.

Table 19 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*	
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													
Bicaronate / 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.

Table 20 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*	
Dissolved Aluminium	mg/L	0.01	0.36	0.03	0.02	12.2	6.33	0.17	4.76	2.78	0.06			
Dissolved Arsenic	mg/L	0.001	0.008	0.002	0.002	0.011	0.004	0.008	0.009	0.011	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			
Dissolved Chromium	mg/L	0.001	0.004	<0.001	<0.001	0.011	0.003	0.001	0.005	0.006	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			
Total Iron	mg/L	0.05	159	86.6	19.3	35.8	7.31	22.0	7.02	9.67	16.8			
Dissolved Lead	mg/L	0.001	0.01	<0.001	<0.001	0.049	0.066	0.001	0.008	0.006	<0.001			
Total Manganese	mg/L	0.001	1.00	0.979	0.557	0.577	0.481	0.652	0.323	0.322	0.406			
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<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			
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	0.022	0.009	0.056	1.16	0.08	0.059	0.146	0.073	0.037			
EC laboratory	uS/cm		1050	714	748	730	562	828	912	811	1090			
Total Nitrogen	mg/L		3.1	2.2	1.22			1.1						
Total Phosphorus	mg/L		0.55	0.42	0.19			0.19						
Ammonia	mg/L		<0.02	<0.02	0.13			<0.01						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		376	292	346			333						
Chloride	mg/L		101	54	58			41						
Nitrate	mg/L		0.01	<0.01	<0.01	0.14	0.12	0.03	0.03	0.13	0.29			
Sulphate	mg/L		54	1.8				<1						
Calcium	mg/L		39.9	38.8	43.8			35						
Magnesium	mg/L		50.3	26.9	14.2			18						
Potassium	mg/L		39.1	18.6	9.83			4						
Sodium	mg/L		220	147	127			145						

* 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 21 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*	
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													
Bicaronate / 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 22 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*	
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	
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	
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	
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	
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	
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	
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	
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	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<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	
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	0.123	0.037	0.035	0.050	0.531	0.206	0.168	0.064		0.043	0.095	
EC laboratory	uS/cm		542	205	177	230	245	246	286	293		291	320	
Total Nitrogen	mg/L		0.6	1.1	1.41			1.2						
Total Phosphorus	mg/L		0.45	0.49	0.90			0.62						
Ammonia	mg/L		<0.02	<0.02	0.02			0.01						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		32	11	9			10						
Chloride	mg/L		62	45	44			40						
Nitrate	mg/L		<0.01	0.01	<0.01	0.06	1.14	0.04	0.05	0.04		0.04	<0.01	
Sulphate	mg/L		137	12				28						
Calcium	mg/L		88.1	41.5	35.6			2						
Magnesium	mg/L		35	18.9	17.7			3						
Potassium	mg/L		9.65	8.94	6.70			1						
Sodium	mg/L		77.6	35.9	34.5			42						

* 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 23 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*	
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	
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	
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	
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	
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	
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	
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	
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	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<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	
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	0.06	0.074	0.063	0.235	0.061	0.072	1.18	0.444	0.069	0.029	0.097	
EC laboratory	uS/cm			595	558	840	410	622	763	690	453	590	571	
Total Nitrogen	mg/L			1.3	1.10			2.3						
Total Phosphorus	mg/L			0.3	0.365									
Ammonia	mg/L			0.09	0.02			<0.01						
Phosphate	mg/L							0.63						
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		32	<5	<5			6						
Chloride	mg/L		136	154	150			164						
Nitrate				<0.01	<0.01	<0.50	<0.01	<0.01	0.04	0.02	0.32	0.04	<0.01	
Sulphate	mg/L		37	26				31						
Calcium	mg/L		7.57	1.69	1.75			2						
Magnesium	mg/L		12.6	6.71	7.63			6						
Potassium	mg/L		10.1	5.48	5.97			1						
Sodium	mg/L		100	94.4	99.5			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.

Table 24 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*	
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													
Bicaronate / 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.

Table 25 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*	
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	
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	
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	
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	
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	
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	
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	
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	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<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	
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	0.165	0.178	0.179	0.779	0.268	0.382	0.308	0.413	0.28	0.117	0.257	
EC laboratory	uS/cm			896	750	1190	997	951	1050	776	785	600	842	
Total Nitrogen	mg/L			1	0.57			0.5						
Total Phosphorus	mg/L			0.23	0.135			0.14						
Ammonia	mg/L			0.03	0.01			<0.01						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$			26	34			27						
Chloride	mg/L		281	250	220			271						
Nitrate				0.01	<0.01	<0.01	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Sulphate	mg/L		32	11				12						
Calcium	mg/L		38.2	18.4	4.70			3						
Magnesium	mg/L		46.5	57.4	20.5			13						
Potassium	mg/L		12.6	14.6	6.87			5						
Sodium	mg/L		229	153	131			169						

* 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 26 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*	
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	
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	
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	
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	
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	
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	
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	
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	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<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	
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	0.020	0.066	0.021	0.420	0.049	0.041	0.069	0.341		0.02	0.052	
EC laboratory	uS/cm			514	353	438	544	660	736	593		334	393	
Total Nitrogen	mg/L			0.8	0.64			0.6						
Total Phosphorus	mg/L			0.31	0.17			0.36						
Ammonia	mg/L			0.05	0.04			0.04						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		231	51	50			45						
Chloride	mg/L		139	76	65			128						
Nitrate				0.09	0.08	0.26	0.21	0.05	0.01	0.03		0.44	0.51	
Sulphate	mg/L		55	73				61						
Calcium	mg/L		71.1	25.4	10.3			30						
Magnesium	mg/L		18.5	8.8	4.55			12						
Potassium	mg/L		7.35	7.48	4.37			5						
Sodium	mg/L		90.5	52.6	55.1			78						

* 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 27 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*	
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													
Bicaronate / 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 and August 2016 sampling events.

Table 28 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*	
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	
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	
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	
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	
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	
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	
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	
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	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<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	
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	
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	
EC laboratory	uS/cm		274	145	158	195	211	205	253	201	240	240	227	
Total Nitrogen	mg/L		5.5[%]	0.7	0.68			1.9						
Total Phosphorus	mg/L		1.23[%]	0.1	0.085			0.40						
Ammonia	mg/L		0.03	<0.02	0.09			0.02						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		46	17	23			16						
Chloride	mg/L		46	27	29			33						
Nitrate			0.01	0.01	0.1	0.64	0.03	0.04	0.15	0.33	1.09	0.02	0.08	
Sulphate	mg/L		28	6.4				22						
Calcium	mg/L		36.3	0.74	0.77			<1						
Magnesium	mg/L		85.1	1.77	2.05			2						
Potassium	mg/L		39.9	2.08	1.95			2						
Sodium	mg/L		67.4	24.3	29.2			39						

* 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 29 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*	
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	
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	
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	
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	
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	
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	
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	
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	
Mercury	mg/L	0.0001	<0.00001	<0.00001	<0.00001			<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	
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	0.310	0.018	0.029	0.068	0.098	0.236	0.173	0.372	0.291	0.35	0.247	
EC laboratory	uS/cm		2820	435	511	677	1020	1420	1290	1880	2280	2600	2260	
Total Nitrogen	mg/L		0.6	0.6	0.88			1.7						
Total Phosphorus	mg/L		0.11	0.06	0.10			0.32						
Ammonia	mg/L		0.03	<0.02	0.11			<0.01						
Phosphate	mg/L													
Bicaronate / Alkalinity	mg $CaCO_3/L^{-1}$		<5	120	95			9						
Chloride	mg/L		798	39	76			355						
Nitrate			0.24	<0.01	0.12	0.03	0.41	0.34	0.02	0.01	0.07	0.02	0.06	
Sulphate	mg/L		232	32				102						
Calcium	mg/L		3.37	15.6	5.74			2						
Magnesium	mg/L		31.9	3.58	3.73			11						
Potassium	mg/L		6.59	1.96	6.33			2						
Sodium	mg/L			78.2	105			263						

* 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 30 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 31 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		
GW01 (mTOC)	20.11	6.1	6.17	6.27	6.31	6.22	6.20	NA	6.30	NA	6.36	6.26		
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		
GW02 (mTOC)	3.57	Destroyed	2.93	3.10	3.46	3.84	No access	No access	2.82	NA	3.30	3.06		
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		
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		
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		
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		
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		
GW07 (mAHD)														
GW08 (mTOC)	19.09	8.07	Dry	Dry	Dry	8.26	Dry	3.12	7.98	NA	Dry	8.26		
GW08 (mAHD)														
GW09 (mTOC)	17.57	No access	No access	No access	Dry	Dry	Dry	No access	Dry	Dry	No access	Dry		
GW09 (mAHD)														
GW10 (mTOC)	15.38	Dry	Dry	Dry	Dry	Dry	Dry	3.88	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		
(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		
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		
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		
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		
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		
GW15 (mAHD)														
GW16 (mTOC)	14.14	Destroyed	Destroyed	Destroyed	Dry	Dry	Dry	Dry	Dry	Dry	Dry	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		
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		
GW18 (mAHD)														
GW19 (mTOC)	51.81	No access	Dry	Dry	Dry	No access	No access	No access	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		
GW19 (mAHD)														
GW20 (mTOC)	87.18	No access	32.83	Dry	Dry	Dry	Dry	No access	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		
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		
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		
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		
GW24 (mAHD)														
GW25 (mTOC)	61.72	Dry	Dry	Dry	Dry	Dry	Dry	Dry	12.47	NA	12.75	12.77		
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		
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		
GW27 (mAHD)														
GW28	54.65	9.40	9.05	Dry	9.33	Dry	Dry	7.53	9.06	NA	9.07	9.03		

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		
(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		
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		
GW30 (mAHD)														

Table 32 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
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

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
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 33 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		
GW01	~~0.1~~	~~5.701~~	5504	5660	740.1	727.6	47.7	3651	6806	3393	4118		
GW02	~~Destroyed~~	~~0.771~~	1186	486	988	No access	No access	406	545	574	608		
GW03	~~37.1~~	~~1.297~~	1551	1525	1422	1254	503	1420	1273	1278	1535		
GW04	~~49.2~~	~~0.735~~	1829	No access	No access	No access	No access	No access	No access	No access	No access		
GW05	~~76.1~~	~~5.896~~	4594	No access	No access	No access	No access	No access	No access	No access	No access		

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		
GW06	~~47.1~~	~~5.070~~	5241	4314	6079	6052	2740	3185	5712	No access	4603		
GW07	~~Insufficient~~	~~0.141~~	No access	175	242	31.5	No access	161.8	218.7	No access	219.9		
GW08	~~Insufficient~~	~~Insufficient~~	Insufficient	Insufficient	737	Insufficient	270.3	4.8	218.7	Insufficient	762		
GW09	~~No access~~	~~No access~~	No access	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	No access	Insufficient		
GW10	~~Insufficient~~	~~Insufficient~~	Insufficient	Insufficient	Insufficient	Insufficient	61.7	Insufficient	Insufficient	Insufficient	Insufficient		
GW11	~~0.9~~	~~No access~~	No access	1383	2089	1756	No access	1166	No access	No access	1211		
GW12	~~No access~~	~~0.022~~	1713	1609	1971	No access	2.8	119.8	1907.0	993	4538		
GW13	~~5.5~~	~~0.218~~	357	234.8	236.8	301.5	303.7	310.5	284	319.3	Destroyed		
GW14	~~16807~~	~~17.467~~	No access	8707	19353	No access	No access	No access	No access	No access	No access		
GW15	~~3142~~	~~2.160~~	2621	7244	3503	3370	1596	3511	3075	1015	1567		
GW16	~~Destroyed~~	~~Destroyed~~	Destroyed	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient		
GW17	~~3218~~	~~3.109~~	2758	2302	3428	3144	1498	3400	2802	1479	3199		
GW18	~~1473~~	~~1.415~~	1496	1427	1646	1527	760	1778	1431	780	1668		
GW19	~~No access~~	~~Insufficient~~	Insufficient	Insufficient	No access	No access	No access	Insufficient	Insufficient	Insufficient	Insufficient		
GW20	~~No access~~	~~0.833~~	Insufficient	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	Insufficient	Insufficient		
GW21	~~668~~	~~0.486~~	777	901	1172	1377	No access	No access	633	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		
GW23	~~244~~	~~No access~~	283	262	332	2.7	No access	318.6	253.6	146.2	316.9		
GW24	~~52.8~~	~~0.557~~	409.1	264.1	Insufficient	Insufficient	128.1	634	581	154.2	4.6		
GW25	~~Insufficient~~	~~Insufficient~~	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	185.1	Insufficient	Insufficient	Insufficient		
GW26	~~599~~	~~0.664~~	423.5	632	786	758	84.0	368.3	708.0	379	779		
GW27	~~463.4~~	~~No access~~	539	No access	No access	566	No access	343.5	334.7	221.5	397.8		
GW28	~~Insufficient~~	~~229.6~~	Insufficient	Insufficient	Insufficient	Insufficient	117.1	299.3	170.6	Insufficient	232.3		
GW29	~~184~~	~~412.1~~	258.7	225.3	202.6	199.9	No access	261.6	151.4	44	299.2		
GW30	~~1495~~	~~1897~~	1697	1405	2274	2132	1017	2533	2216	1099	278.0		

Table 34 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
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

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
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 35 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		
GW01	6.6	6.6	5.9	6.0	6.1	5.7	5.8	5.8	6.8	6.8	5.5		
GW02	Destroyed	7.8	6.5	6.2	6.6	No access	No access	7.4	7.1	7.1	6.4		
GW03	6.1	7.6	5.8	5.7	6.5	6.0	6.4	6.4	7.1	7.2	6.4		
GW04	7.7	8.3	5.9	No access	No access	No access	No access	No access	No access	No access	No access		
GW05	7.1	6.5	6.3	No access	No access	No access	No access	No access	No access	No access	No access		
GW06	4.4	5.1	4.2	3.2	3.8	3.5	3.3	3.3	4.2	No access	2.8		
GW07	Insufficient	5.9	No access	4.9	5.4	5.2	No access	5.5	5.7	No access	4.5		
GW08	Insufficient	Insufficient	Insufficient	Insufficient	5.9	Insufficient	5.6	5.6	5.7	Insufficient	6.5		
GW09	No access	No access	No access	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	No access	Insufficient		
GW10	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	4.8	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		
GW12	No access	4.5	5.4	5.3	5.7	No access	4.4	3.5	3.7	3.6	4.7		
GW13	7.0	5.7	5.4	4.9	5.8	5.6	5.1	5.2	5.3	5.8	No access		
GW14	3.1	3.0	No access	3.2	3.9	No access	No access	No access	No access	No access	No access		
GW15	5.8	5.7	5.9	5.9	5.9	6.2	5.8	6.1	6.5	6.0	4.8		
GW16	Destroyed	Destroyed	Destroyed	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient		
GW17	6.5	7.1	5.9	5.7	5.8	6.0	5.8	6.0	6.7	5.6	5.0		
GW18	7.5	7.9	6.4	6.2	7.4	6.6	6.5	6.9	6.1	6.6	6.4		
GW19	No access	Insufficient	Insufficient	Insufficient	No access	No access	No access	Insufficient	Insufficient	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		
GW20	No access	8.0	Insufficient	Insufficient	Insufficient	Insufficient	No access	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		
GW22	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		
GW24	7.5	8.0	6.6	7.1	Insufficient	Insufficient	6.6	5.7	7.2	7.5	7.1		
GW25	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	4.9	Insufficient	Insufficient	Insufficient		
GW26	6.6	6.2	5.0	4.7	6.8	5.6	6.0	5.3	5.8	5.9	5.2		
GW27	7.1	No access	6.3	No access	No access	6.4	No access	6.1	6.0	6.4	5.1		
GW28	Insufficient	~~662~~	Insufficient	Insufficient	Insufficient	Insufficient	5.9	5.5	6.0	Insufficient	5.4		
GW29	7.4	6.5	5.8	5.5	6.4	5.9	No access	5.6	6.1	6.6	5.5		
GW30	7.5	5.5	4.8	4.4	5.8	4.9	4.4	5.2	5.0	5.5	4.3		

Table 36 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
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

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
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 37 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		
GW01	20.5	19.7	20	23.5	22.2	23.8	24.3	21.4	21.4	20.7	20.6		
GW02	Destroyed	18.3	18.7	20.8	21.0	No access	No access	21.6	20.4	20.5	19.2		
GW03	24.4	16.5	16.7	19.4	20.9	21.5	22.3	20.4	19.3	18.1	16.3		
GW04	19.8	17.7	17.6	No access	No access	No access	No access	No access	No access	No access	No access		
GW05	18.0	17.5	16.9	No access	No access	No access	No access	No access	No access	No access	No access		
GW06	21.2	18.5	18.5	21.9	23.5	24.7	24.3	22.7	20.8	No access	18.7		
GW07	Insufficient	20.1	No access	20.1	21	21.8	No access	21.4	20.5	No access	19.9		
GW08	Insufficient	Insufficient	Insufficient	Insufficient	20.3	Insufficient	21.0	21.8	19.4	Insufficient	19.6		
GW09	No access	No access	No access	Insufficient	Insufficient	Insufficient	No access	Insufficient	Insufficient	No access	Insufficient		

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		
GW10	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	22.6	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		
GW12	No access	17.3	18.1	22	23.7	No access	26.0	22.4	20.7	20.1	18.6		
GW13	18.7	21.1	18.8	21.8	23.5	24.2	24.4	20.5	20.5	19.9	No access		
GW14	17.6	18.5	No access	20.6	22.2	No access	No access	No access	No access	No access	No access		
GW15	19.8	20.1	20.2	20.7	21.5	20.4	20.9	21.4	20.8	20.6	20.1		
GW16	Destroyed	Destroyed	Destroyed	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient		
GW17	19.6	19.4	19.3	20.4	20.2	20.7	20.0	20.0	19.3	19.1	19.3		
GW18	19.1	19.2	19.3	20.5	20.1	20.8	20.0	19.9	19.1	19.0	19.0		
GW19	No access	Insufficient	Insufficient	Insufficient	No access	No access	No access	Insufficient	Insufficient	Insufficient	Insufficient		
GW20	No access	19.4	Insufficient	Insufficient	Insufficient	Insufficient	No access	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		
GW22	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		
GW24	19.8	19.3	19.4	21.3	Insufficient	Insufficient	20.3	19.5	19.4	19.1	19.6		
GW25	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	Insufficient	20.4	Insufficient	Insufficient	Insufficient		
GW26	18.7	18.9	19.4	20.6	21.0	21.8	20.0	20.1	19.5	19.4	19.6		
GW27	18.3	No access	19.7	No access	No access	21.1	No access	21.0	19.4	19.3	19.4		
GW28	Insufficient	19.3	Insufficient	Insufficient	Insufficient	Insufficient	20.5	20.4	20.1	Insufficient	19.7		
GW29	17.7	19.0	18.8	19.8	19.8	20.2	No access	19.8	19.6	19.5	19.4		
GW30	19	19.4	19.1	19.7	20.5	21.6	20.1	20.4	19.9	20.1	19.8		

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