METROPOLITAN COAL

2010 ANNUAL REVIEW




Peabody

METROPOLITAN COAL

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2010 ANNUAL REVIEW

Project No. MET-08-08/8.1
Document No. 00371542

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EXECUTIVE SUMMARY

Metropolitan Coal is wholly owned by Peabody Energy Australia Pty Ltd (Peabody), and is located adjacent to the township of Helensburgh and approximately 30 kilometres north of Wollongong in New South Wales (NSW).

Metropolitan Coal was granted approval for the Metropolitan Coal Project (the Project) under Section 75J of the NSW *Environmental Planning and Assessment Act, 1979* on 22 June 2009. A copy of the Project Approval is available on the Peabody website (http://www.peabodyenergy.com.au).

The Project comprises the continuation, upgrade and extension of underground coal mining operations and surface facilities at the Metropolitan Coal. The Approved underground mining Project layout is shown on Figure ES-1.

The Metropolitan Coal Environmental Management Structure is shown on Figure ES-2.

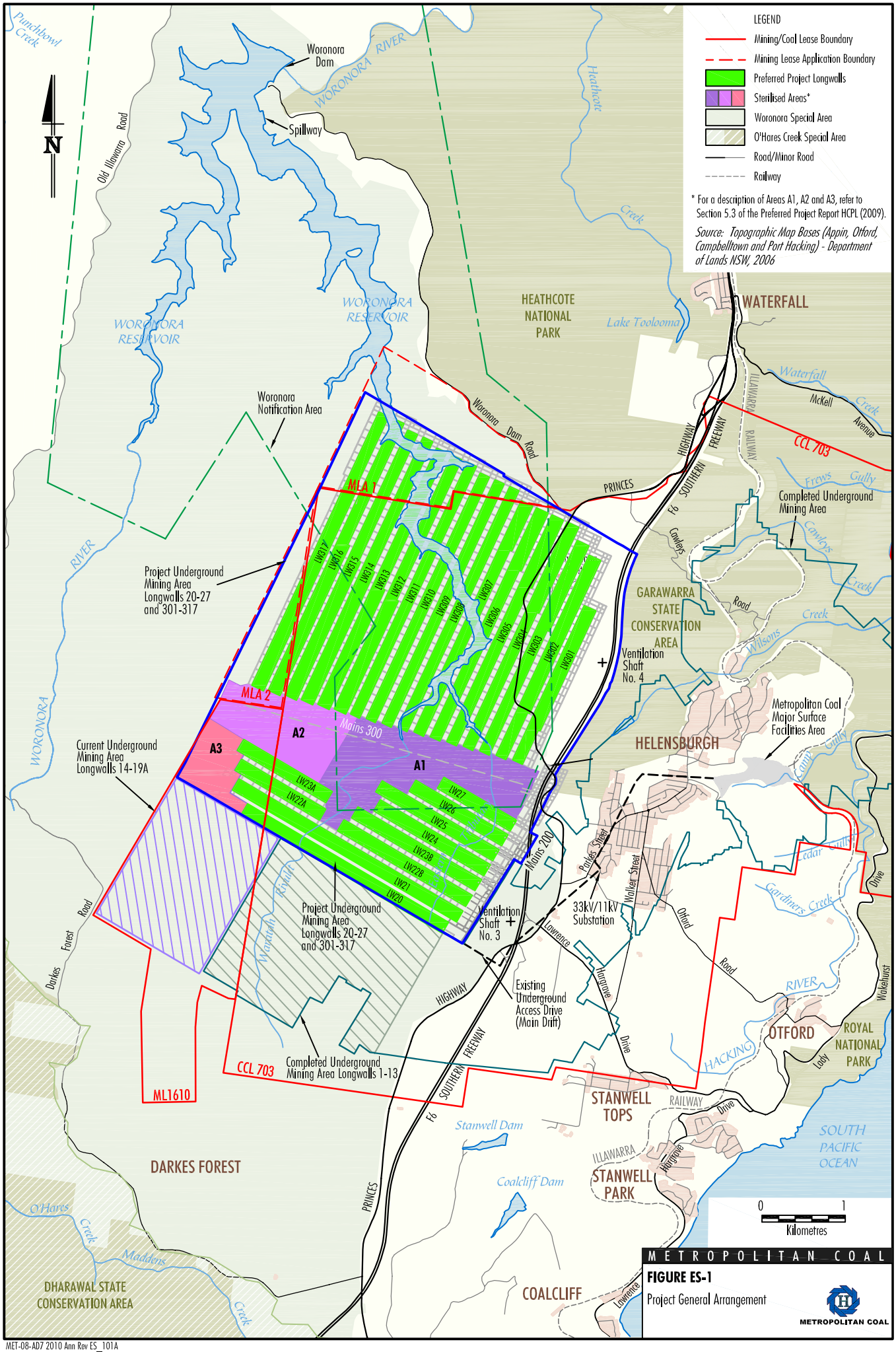
This Annual Review has been prepared to review the environmental performance of the Project during the review period (i.e. from 1 August 2009 to 31 July 2010).

The environmental performance of the Project has been assessed by comparison to the performance indicators and performance measures/criteria identified in the individual management plans and monitoring programs (Figure ES-2).

No Project-related exceedances of performance measures or criteria occurred during the reporting period.

The Annual Review includes:

- A description of the works that were carried out in the review period, and the works proposed to be carried out in the next review period.
- A comprehensive review of the monitoring results and complaints records of the Project during the review period.
- Identification of non-compliances during the review period and describes what actions were and/or will be taken to ensure compliance.
- Identification of trends in the monitoring data over the life of the Project.
- Identification of any discrepancies between the predicted and actual impacts of the Project, and analysis of the potential cause of any significant discrepancies.
- A description of what measures will be implemented over the next review period to improve the environmental performance of the Project.



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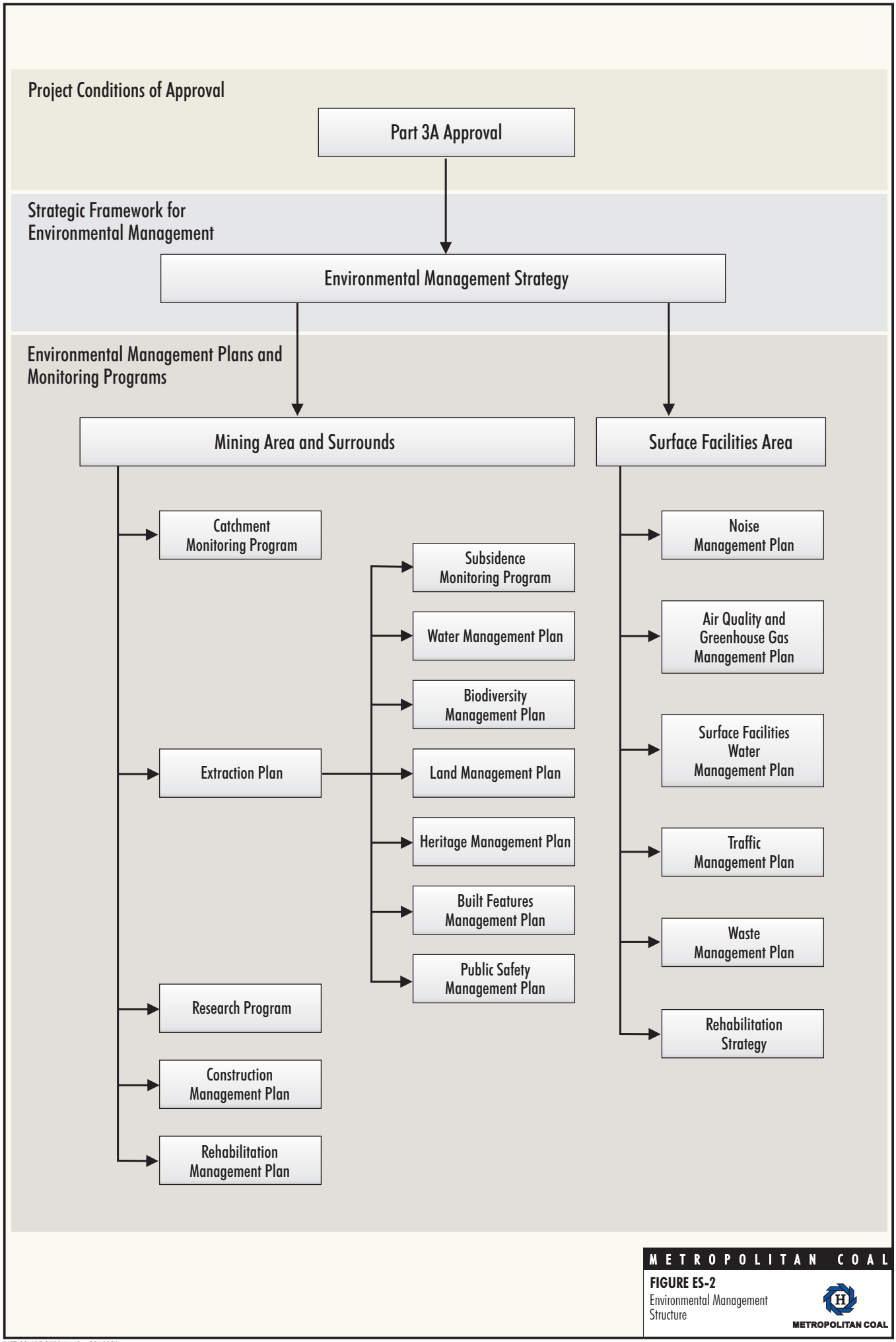

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FIGURE ES-2
Environmental Management Structure

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1 INTRODUCTION

Metropolitan Coal is wholly owned by Peabody Energy Australia Pty Ltd (Peabody), and is located adjacent to the township of Helensburgh and approximately 30 kilometres (km) north of Wollongong in New South Wales (NSW) (Figure 1).

Metropolitan Coal was granted approval for the Metropolitan Coal Project (the Project) under Section 75J of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act) on 22 June 2009 (the Approval). A copy of the Project Approval is available on the Peabody website (http://www.peabodyenergy.com.au).

The Project comprises the continuation, upgrade and extension of underground coal mining operations and surface facilities at Metropolitan Coal. The Approved underground mining Project layout is shown on Figure 2.

In June 2010, Metropolitan Coal submitted the *Metropolitan Mine Replacement Drift Construction Modification Environmental Assessment* (Metropolitan Coal, 2010a) to the NSW Minister for Planning under Section 75W of the EP&A Act to modify the Project to allow for the additional construction of a replacement underground drift, including construction of a new drift portal at the mine's Major Surface Facilities Area. The modification was approved by the Director-General of the Department of Planning in September 2010. The extent of the mine's Major Surface Facilities Area is shown on Figure 3.

The Metropolitan Coal Environmental Management Structure is shown on Figure 4. It includes the *Metropolitan Coal Environmental Management Strategy* (Metropolitan Coal, 2009), developed to provide the strategic context for environmental management at Metropolitan Coal, and management plans and monitoring programs applicable to the underground mining area or mine's surface facilities area.

Figure 4 illustrates that a number of management plans and monitoring programs are included in the *Metropolitan Coal Longwalls 20-22 Extraction Plan* (Metropolitan Coal, 2010b) to manage the environmental consequences of the Extraction Plan, namely the:

- *Metropolitan Coal Longwalls 20-22 Subsidence Monitoring Program* (Metropolitan Coal, 2010c);
- *Metropolitan Coal Longwalls 20-22 Water Management Plan* (Metropolitan Coal, 2010d);
- *Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan* (Metropolitan Coal, 2010e);
- *Metropolitan Coal Longwalls 20-22 Land Management Plan* (Metropolitan Coal, 2010f);
- *Metropolitan Coal Longwalls 20-22 Heritage Management Plan* (Metropolitan Coal, 2010g);
- *Metropolitan Coal Longwalls 20-22 Built Features Management Plan* (Metropolitan Coal, 2010h); and
- *Metropolitan Coal Longwalls 20-22 Public Safety Management Plan* (Metropolitan Coal, 2010i).

1.1 PURPOSE AND SCOPE

Condition 3, Schedule 7 of the Project Approval requires the preparation of an Annual Review, as follows:

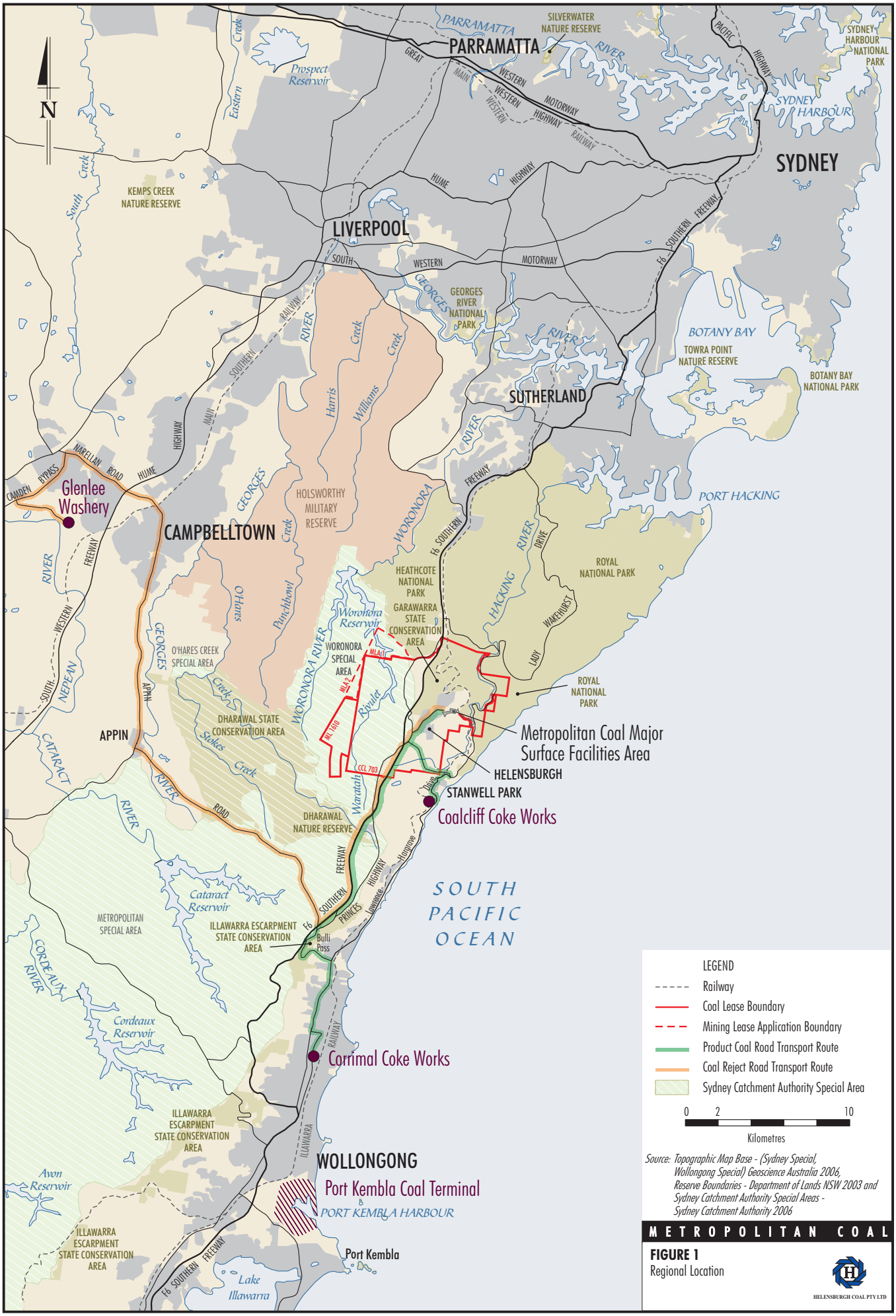
Annual Review

3. By the end of October 2010, and annually thereafter, the Proponent shall review the environmental performance of the project to the satisfaction of the Director-General. This review must:

(a) describe the works that were carried out in the past year, and the works that are proposed to be carried out over the next year;

(b) include a comprehensive review of the monitoring results and complaints records of the project over the past year, which includes a comparison of these results against the

- *the relevant statutory requirements, limits or performance measures/criteria;*
- *the monitoring results of previous years; and*
- *the relevant predictions in the EA, PPR, and Extraction Plan;*



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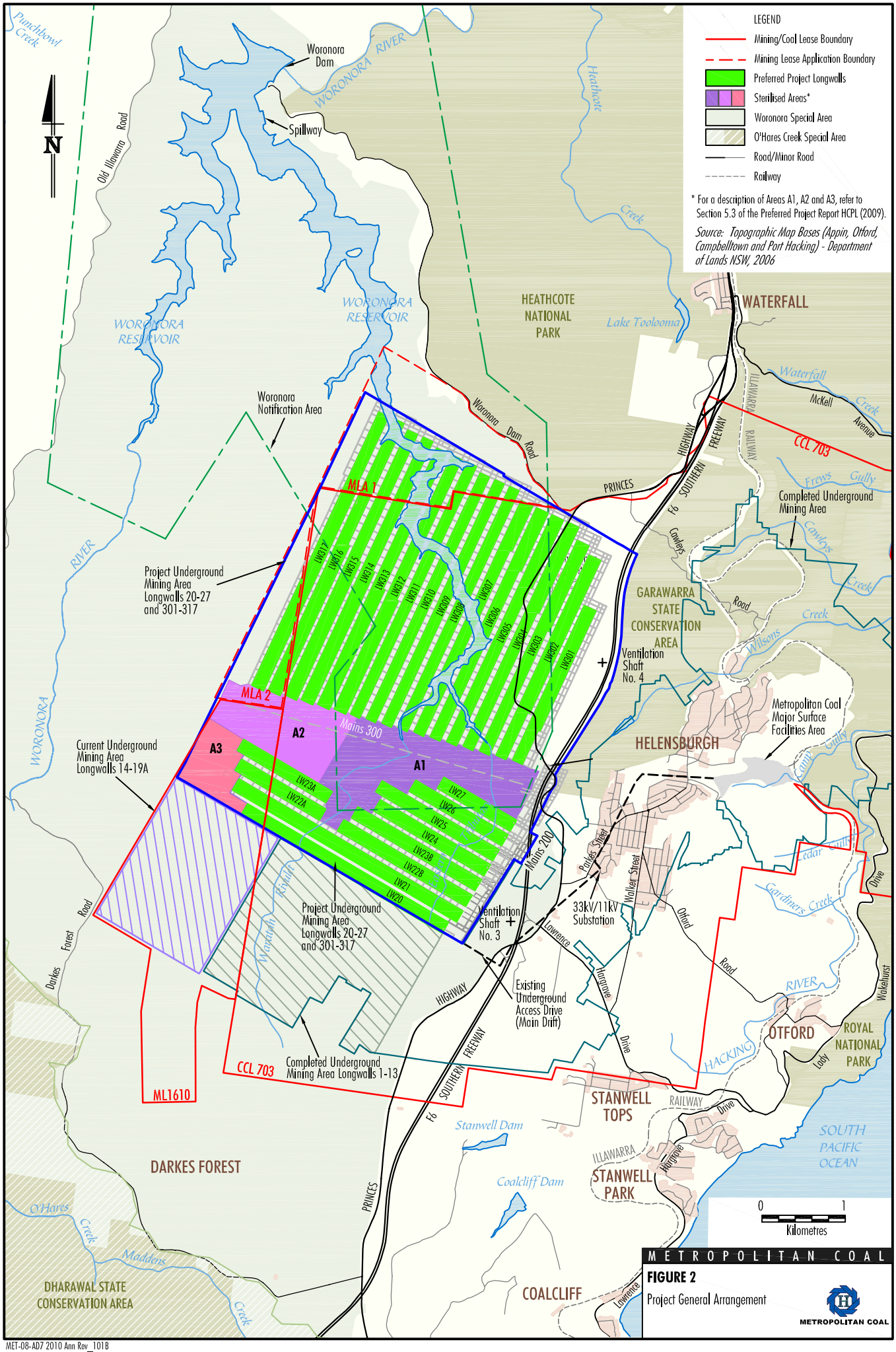

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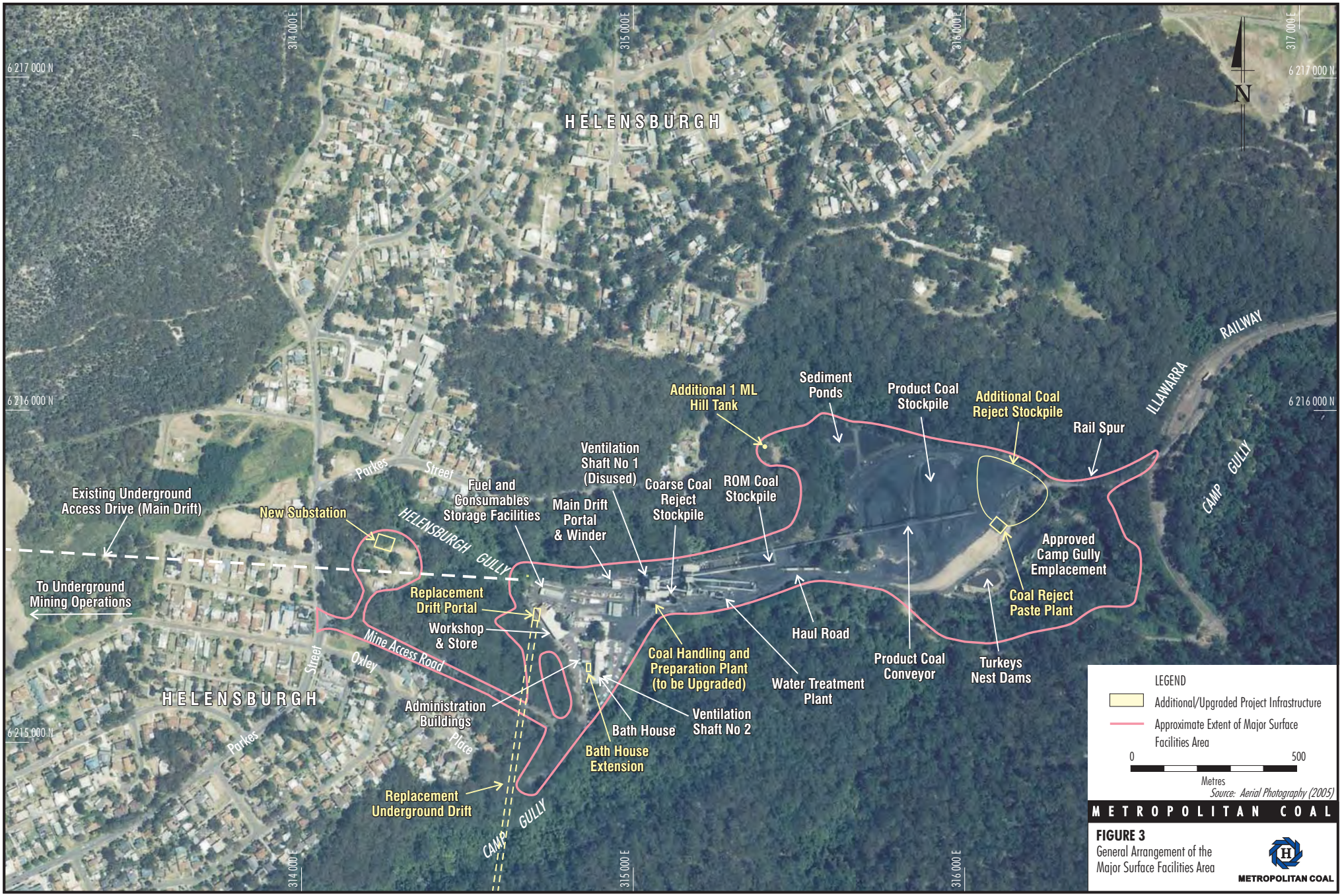

FIGURE 3
General Arrangement of the Major Surface Facilities Area

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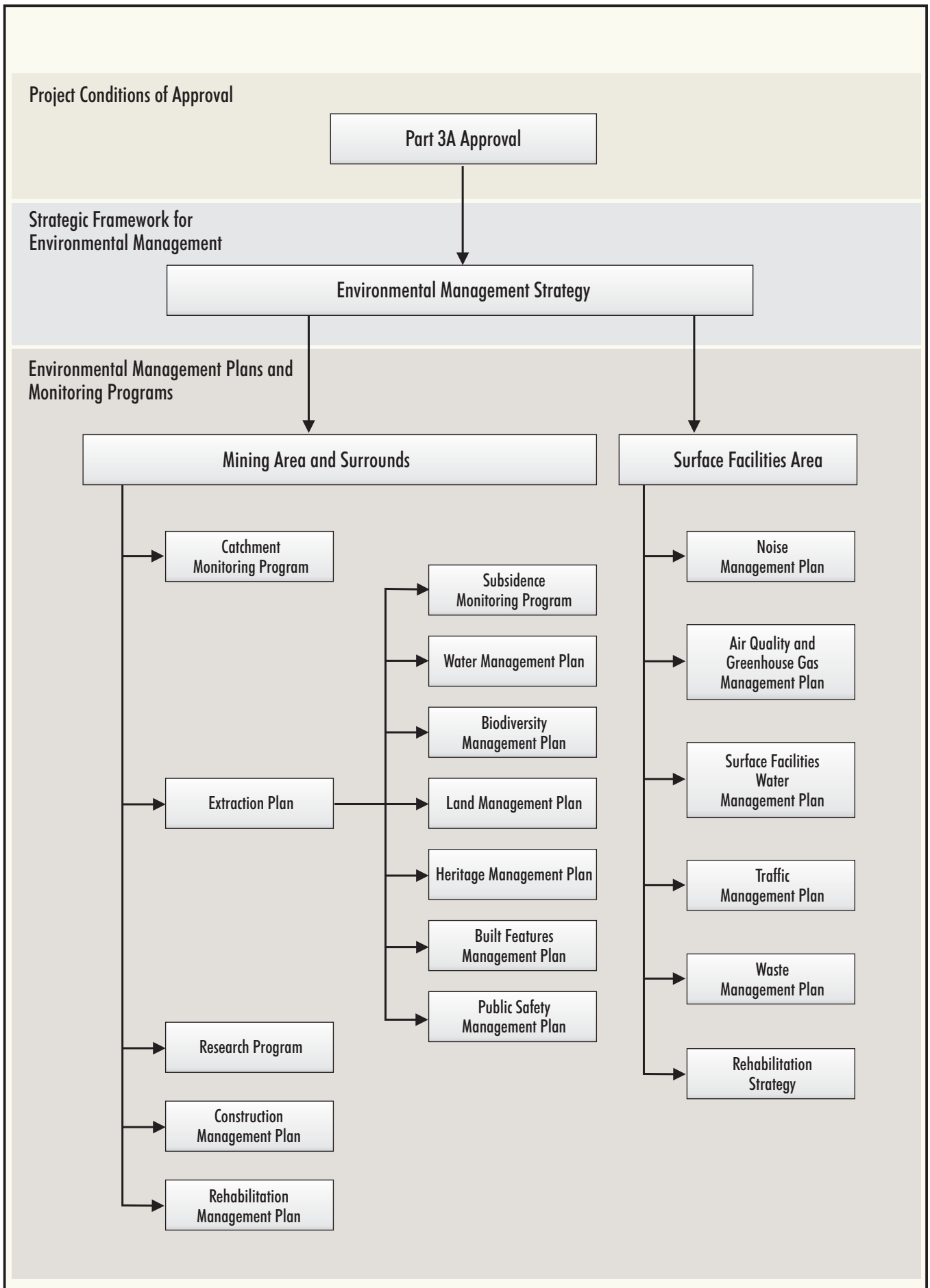

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FIGURE 4
Environmental Management Structure

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(c) identify any non-compliance over the last year, and describe what actions were (or are being) taken to ensure compliance;

(d) identify any trends in the monitoring data over the life of the project;

(e) identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies; and

(f) describe what measure will be implemented over the next year to improve the environmental performance of the project.

This 2010 Annual Review presents data for the past year (i.e. the reporting period) from 1 August 2009 to 31 July 2010.

1.2 STRUCTURE OF THE ANNUAL REVIEW

The remainder of this Annual Review is structured as follows:

- Section 2 summarises the works that were carried out in the reporting period.
- Section 3 describes the environmental performance of mining activities in the underground mining area and surrounds.
- Section 4 describes the environmental performance of mining activities at the surface facilities area.
- Section 5 details the environmental performance of mining activities against other Project Approval requirements.
- Section 6 provides a review of the complaints records for the reporting period.
- Section 7 outlines the works that will be carried out in the next reporting period (i.e. 1 August 2010 to 31 July 2011).
- Section 8 lists the references cited.

Sections 3 and 4 include a comprehensive review of monitoring results, identification of any non-compliance, identification of trends in the monitoring data and the identification of any discrepancies between predicted and actual impacts.

2 WORKS DURING THE REPORTING PERIOD

The layout of Longwalls 20-22 is shown on Figure 5. A summary of the longwall dimensions is provided in Table 1 and a provisional production schedule is provided in Table 2.

In accordance with Condition 5, Schedule 3 of the Project Approval, Metropolitan Coal has carried out first workings in the mining area consistent with the approved mine plan. Metropolitan Coal has also carried out secondary extraction in accordance with the approved mine plan.

Metropolitan Coal commenced the secondary extraction of Longwall 20 in May 2010 (at chainage 2,800 metres [m]). Longwall 20 advanced 315 m as at the 31 July 2010 (Figure 5).

Table 1
Longwall Dimensions

Longwall	Total Void Width (m)	Width of Pillar Preceding Longwall Tailgate (m)	Longwall Length (m)
Longwall 20	163	-*	2,802
Longwall 21	163	55	3,124
Longwall 22A	163	57	1,176
Longwall 22B	163	57	1,788

* The distance between Longwall 20 and Longwalls 1 to 18 is approximately 290 m and the barrier includes several development headings.

Table 2
Provisional Extraction Schedule

Longwall	Start	Finish
Longwall 20	May 2010	September 2011
Longwall 21	October 2011	April 2013
Longwall 22A	April 2013	October 2013
Longwall 22B	October 2013	May 2014

Condition 6, Schedule 2 of the Project Approval requires that Metropolitan Coal not extract more than 3.2 Million tonnes (Mt) of Run-of-Mine (ROM) coal from the mining area in a calendar year. During the 2009 calendar year approximately 1.64 Mt of ROM coal was extracted. From 1 January 2010 to 31 July 2010 a total of 0.83 Mt of ROM coal was extracted from the mining area.

3 REVIEW OF ENVIRONMENTAL PERFORMANCE – UNDERGROUND MINING AREA AND SURROUNDS

3.1 CATCHMENT MONITORING PROGRAM

3.1.1 Background

A comprehensive *Metropolitan Coal Catchment Monitoring Program* (Metropolitan Coal, 2010j) has been prepared in accordance with Condition 2, Schedule 3 of the Project Approval. The Catchment Monitoring Program includes detailed baseline data of existing surface water and groundwater resources, a program for the ongoing development and use of appropriate surface water and groundwater models, a program to monitor and assess impacts on surface water and groundwater resources, and a program to validate and calibrate the surface water and groundwater models.

3.1.2 Baseline Data of Existing Surface Water and Groundwater Resources

Figures 6 to 10 show the meteorological monitoring sites, surface water quantity monitoring sites (i.e. gauging stations and pool water levels), surface water quality monitoring sites, groundwater level monitoring sites and groundwater quality monitoring sites, at which baseline data is available or will be obtained for the Metropolitan Coal underground mining area.

As a component of the Catchment Monitoring Program, Metropolitan Coal will establish a number of new surface water and groundwater monitoring sites to supplement existing baseline data. The status of the new monitoring sites is summarised in Table 3.

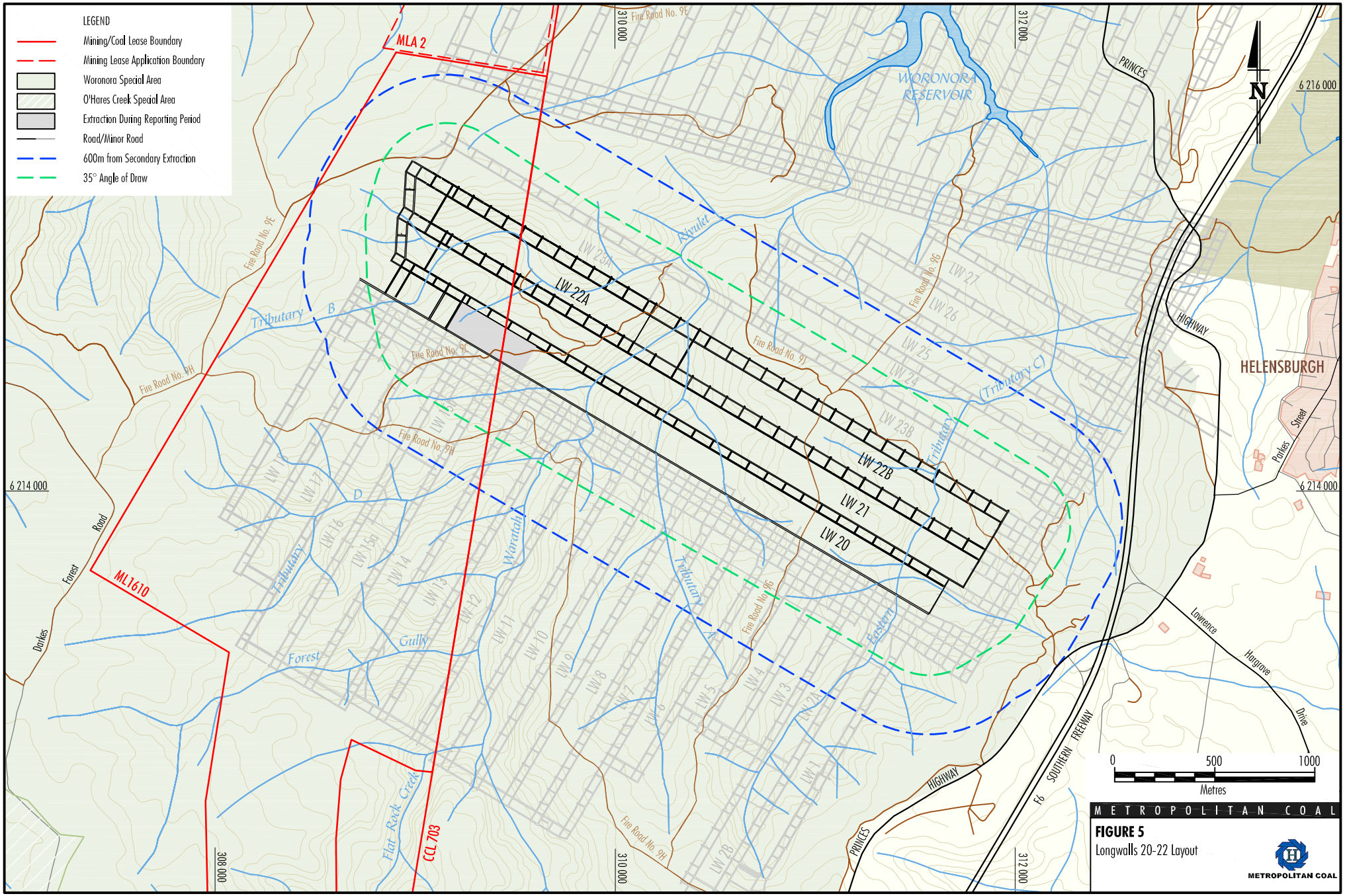

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FIGURE 5

Longwalls 20-22 Layout

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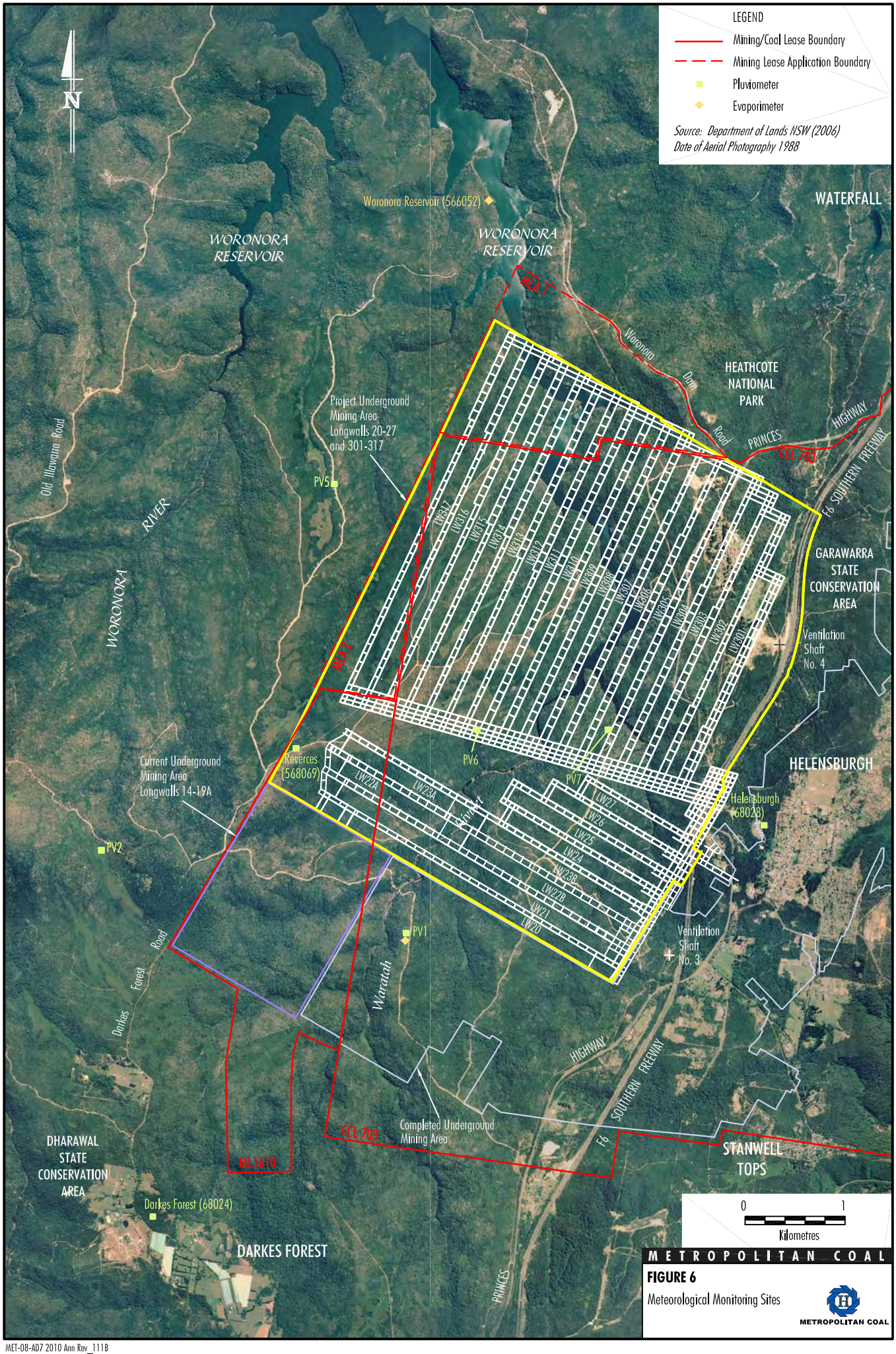
Table 3
Status of New Monitoring Sites

Monitoring Component	New Monitoring Site	Status
Pluviometer	• Site PV5 - Honeysuckle Creek catchment	• Installed
	• Site PV6 - Waratah Rivulet catchment	• Installed
	• Site PV7 - Eastern Tributary catchment	• Installed
Pan evaporation equipment	• at Site PV1 - Waratah Rivulet catchment	• Equipment currently being sourced
Gauging station	• Eastern Tributary gauging station	• Proposed to be constructed following approval of the Metropolitan Coal Construction Management Plan
	• Honeysuckle Creek gauging station (control)	• Proposed to be constructed following approval of the Metropolitan Coal Construction Management Plan
Pool water levels	• Pools J, K, L, Q, T, U, V and W on Waratah Rivulet	• Installed (awaiting survey data)
	• Pools ETF and ETJ on the Eastern Tributary	• Pool ETF unsuitable for installation of pool water level meter; meter installed in Pool ETG
		• Diver stands to be installed at Pool ETG and Pool ETJ
	• Pools ETM, ETU, ETW, ETAF, ETAG, ETAH, ETAI, ETAQ and ETAU on the Eastern Tributary	• Installed (awaiting survey data)
	• Pools WPR2, WRP3 and WRP4 on Woronora River (control)	• Installed (awaiting survey data)
Swamp water levels	• Swamps 25, 101 (control), 16/17, 20 and Woronora River 1 (control)	• Installed (awaiting survey data)
Shallow groundwater bores	• Site WRGW7	• Bores installed; groundwater level monitoring equipment to be installed in August 2010
	• Site ETGW1	
Deep groundwater bores	• Site 9EGW1B	• Installed
	• Site 9GGW1B	• Installed
	• Site 9GGW2B	• Installed
	• Site 9FGW1B	• Installed
	• Site 9DGW1B (PM01)	• Installed
	• Site 9HGW1B	• Installed
	• Site PM02	• Installed
	• Site 9HGW0 (LW10 Goaf Hole)	• Installed
	• Site PHGW1B	• Installed
	• Site 9EGW2	• To be installed by the end of Longwall 21
	• Site 9FGW2	• To be installed by the end of Longwall 21
	• Site PHGW2	• To be installed by the end of Longwall 21
	• Site F6GW1	• To be installed by the end of Longwall 21
Groundwater quality	• Site WRGW7	• Bores installed; groundwater quality sampling to commence in September 2010
	• Site ETGW1	



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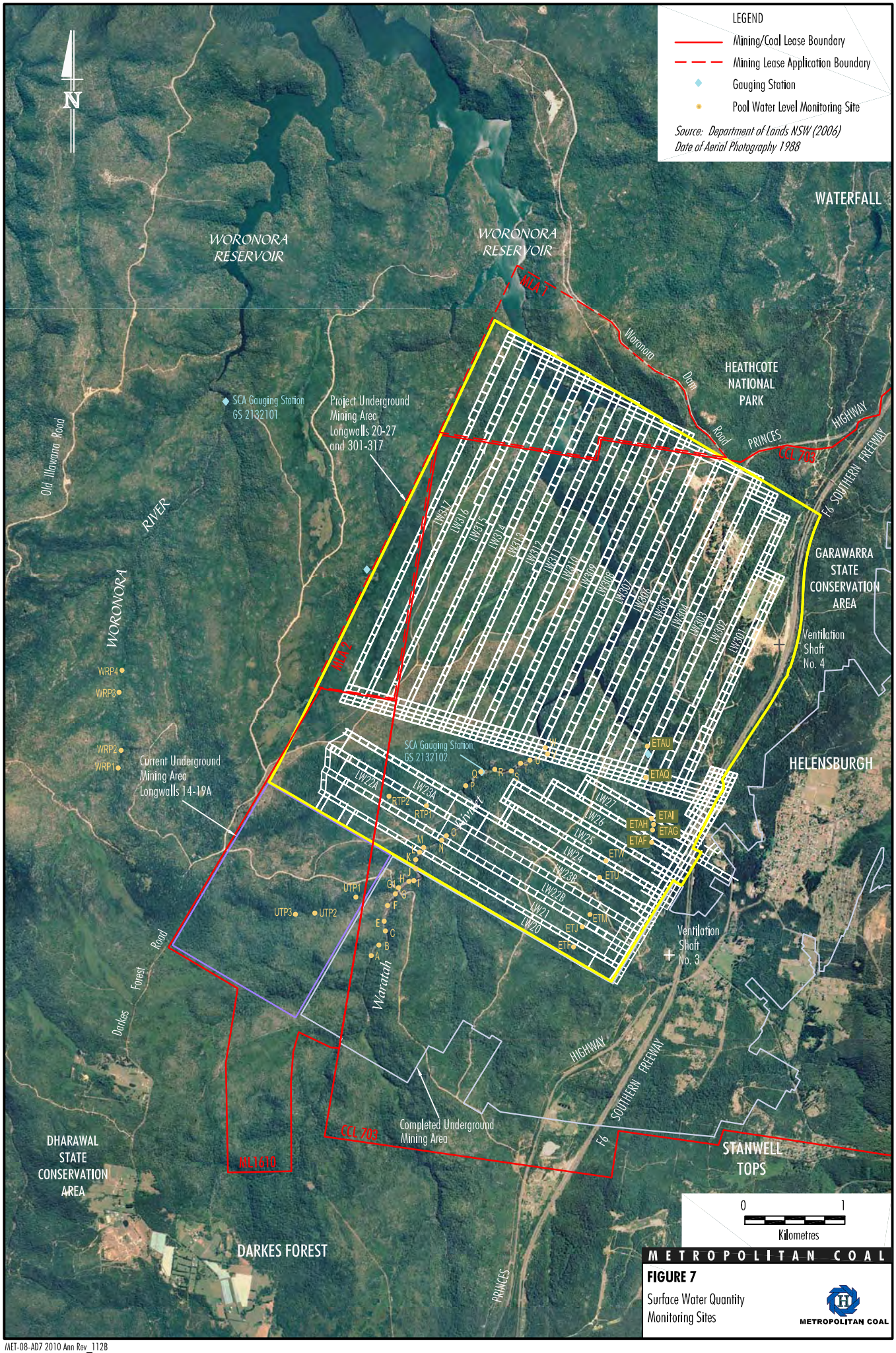

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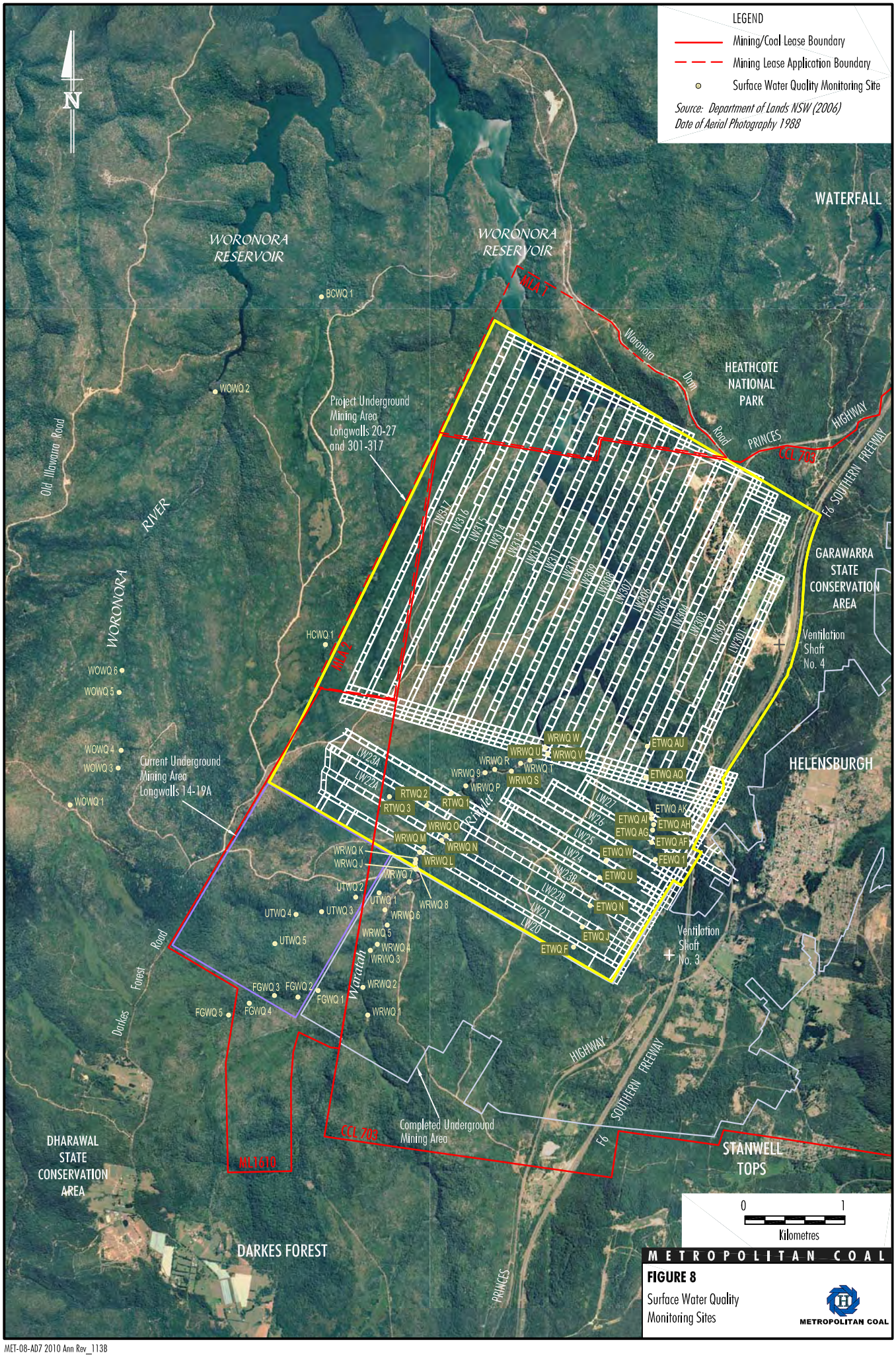

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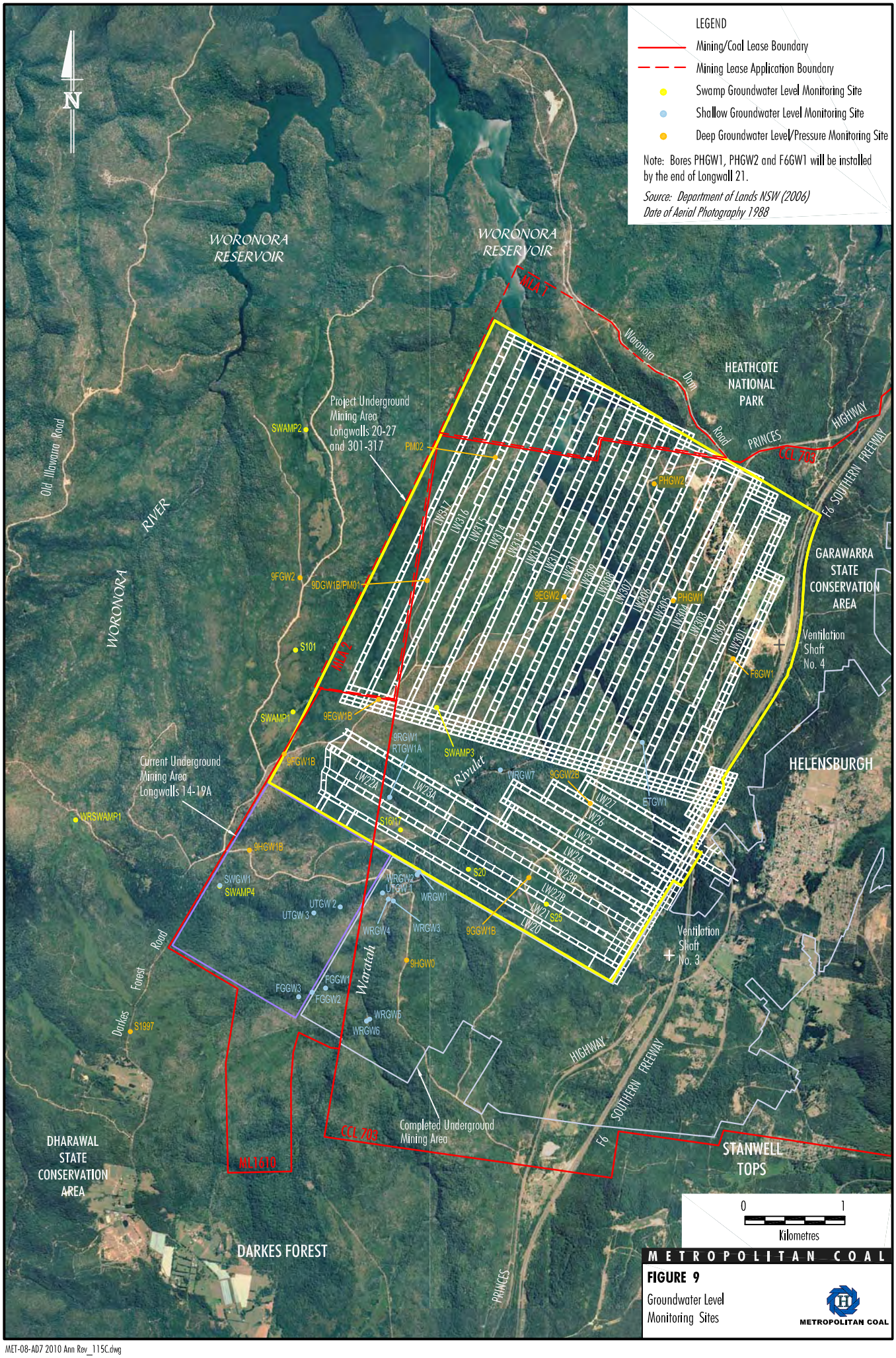

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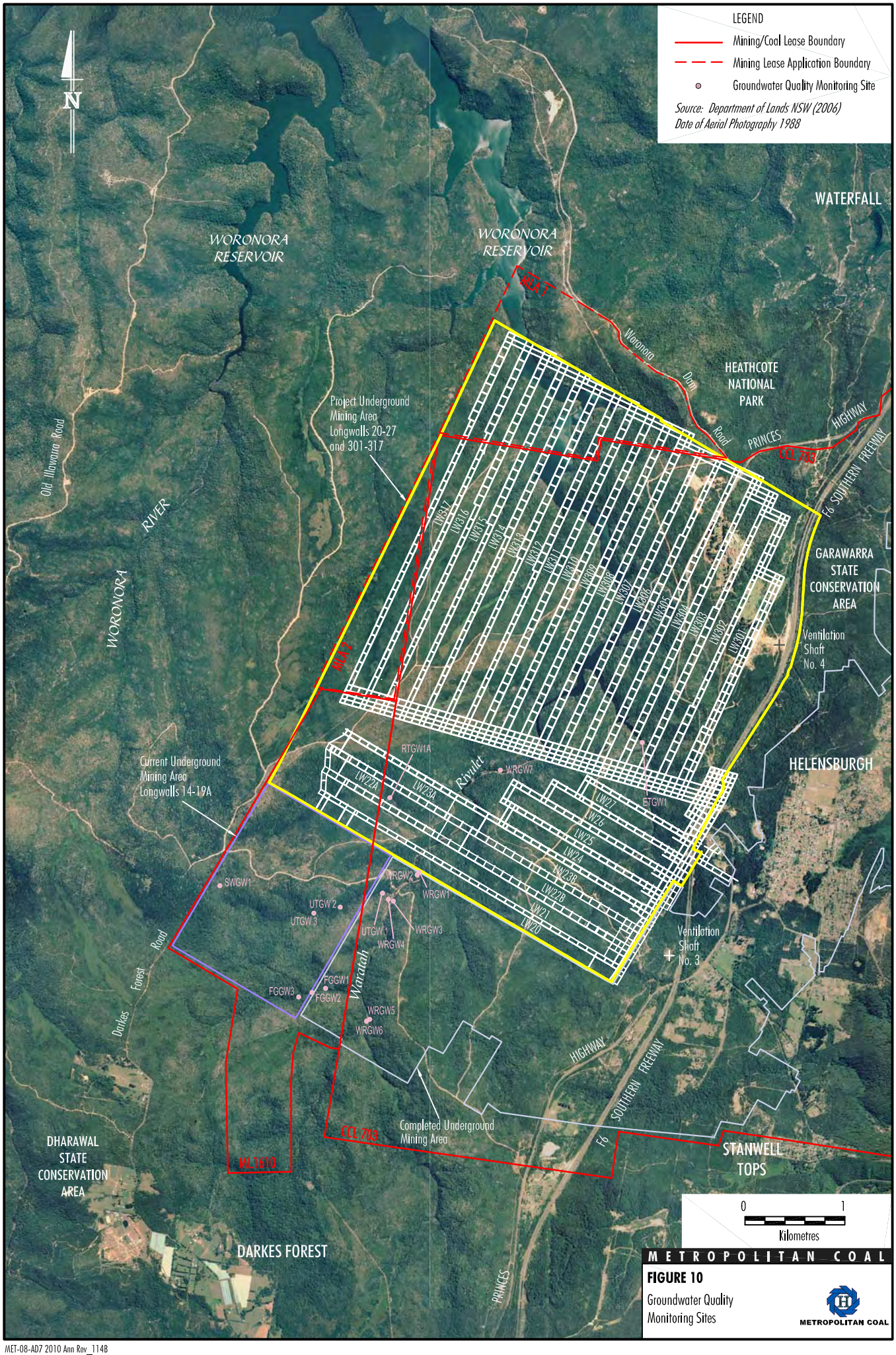

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3.1.3 Surface Water Model Development, Calibration and Verification

Numerical catchment runoff models have been developed using the nationally recognised Australian Water Balance Model (AWBM) (Boughton, 2004) and calibrated for the Waratah Rivulet gauging station (GS 2132102) and the O'Hares Creek gauging station at Wedderburn (GS 213200). The models are progressively updated using the latest monitoring data, and ongoing (periodic) calibration and verification checks are conducted as described below.

During the reporting period, the Sydney Catchment Authority (SCA) provided copies of the rating curve(s) used to generate flow data from the SCA gauging stations and the results of manual gaugings undertaken by the SCA. This information is being used to undertake a critical review of the rating relationships used to generate flow data from the recorded stage (water level) data. Feedback will be provided to the SCA on the outcomes of the review and proposed amendments to the rating curve will be provided.

The calibration and verification program will also involve data checking and correction or removal of erroneous data, however, this will be undertaken following updating of the rating curve by the SCA. The model has been verified by testing the model sensitivity for changes of parameter values and by testing the uniqueness of the model calibration – and its goodness of fit to different components and periods of the flow record.

An AWBM has been fitted to monitored flows at GS2132102 – Waratah Rivulet. Model parameters are presented in Table 4.

Table 4
AWBM Parameters

Surface Store	1	2	3
Surface Store Capacities (C) (mm)	5	130	880
Partial Areas (A)	0.1	0.56	0.34
Baseflow Index (BFI)	0.3		
Baseflow Recession Constant (K_{base})	0.979		
Surface Flow Recession Constant (K_{surf})	0.68		
Evaporation Factor (EvF)	0.85		

The period of available recorded flow data is from 21 February 2007 to 4 May 2010. The monitored flow over this period has averaged 294.6 millimetres (mm)/year while the modelled flow averages 356.6 mm/year.

In order to assess the sensitivity of model predictions to changes in key model parameters, model parameters were varied by +/- 10% and modelled average flow re-calculated. Table 5 summarises the results.

Table 5
Sensitivity Analysis Results

Model Parameter	Change	Predicted Average Flow (mm/year)	Change in Predicted Flow
-	Base Case	356.6	-
C values	-10%	374.3	5.0%
C values	+10%	339.0	-5.0%
BFI	-10%	356.4	-0.06%
BFI	+10%	356.8	0.06%
K_{base}*	-10%	355.4	-0.34%
EvF	-10%	415.5	16.5%
EvF	+10%	300.6	15.7%

* Note K_{base} cannot be increased by 10% as the constant cannot be greater than 1.

Table 5 indicates that the model is relatively sensitive to the adopted evaporation factor and moderately sensitive to the capacity of the conceptual storage volumes used to simulate catchment storage effects.

The model sensitivity to a baseflow "leakage" (or system loss) was also assessed by subtracting a constant 0.025 mm/day from the baseflow store (equivalent to a flow loss of 0.5 megalitres [ML]/day). Chart 1 shows a comparison of hydrographs of recorded flows, modelled flows and modelled flows with the constant baseflow loss.

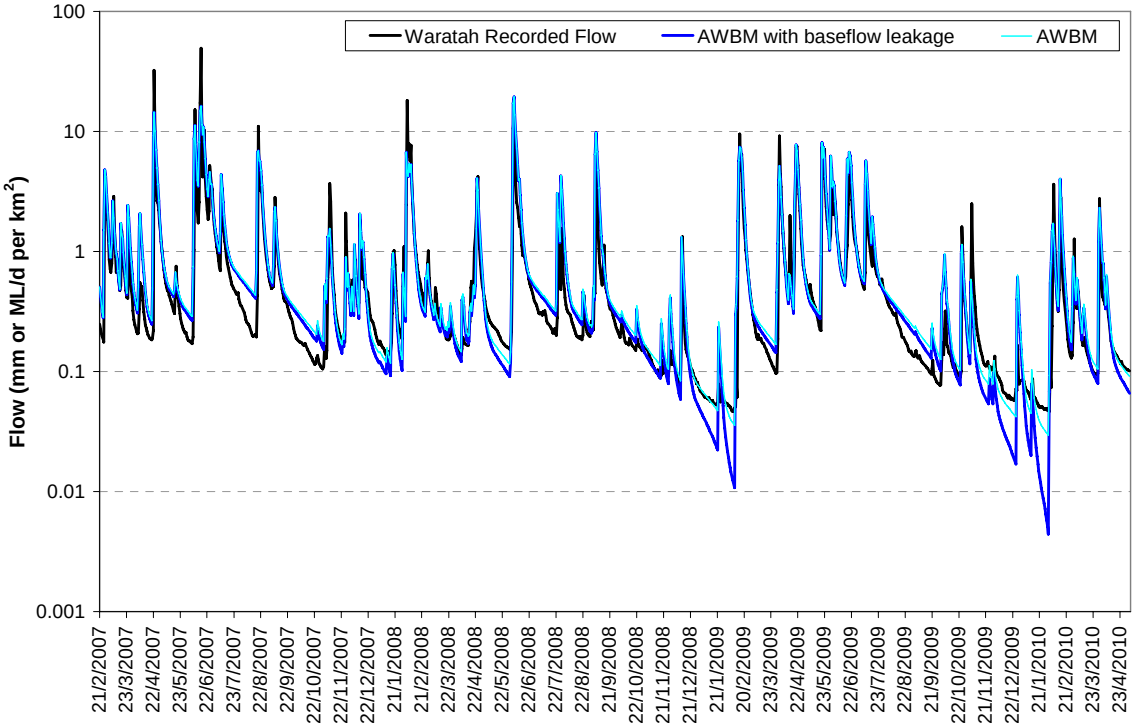


Chart 1 AWBM Model Sensitivity

Chart 1 indicates that the model predictions with a loss of 0.025 mm/day or 0.5 ML/day are inconsistent with the monitored flows. If a loss of this order of magnitude were occurring, it would be expected that it would have been discernable during periods of low flow.

The data from the period following model calibration has been used to verify the reasonableness and robustness of model performance. When checked against streamflow data and concurrent climate data the data indicates that the models provide close predictions of post calibration flow data which verify the current models.

Table 6 shows the calibrated values of these parameters for the SCA owned gauging station on Waratah Rivulet and the Department of Environment, Climate Change and Water (DECCW) gauging station on O'Hares Creek at Wedderburn.

Table 6
Calibrated AWBM Parameters

Gauging Station	AWBM Parameters							
	C1 (mm)	C2 (mm)	C3 (mm)	A1	A2	A3	BFI	K
GS2132102 Waratah Rivulet	5	130	880	0.10	0.56	0.34	0.30	0.979
GS213200 O'Hares Creek at Wedderburn	4	150	400	0.164	0.633	0.203	0.21	0.97

Chart 2 shows flow hydrographs of data recorded at the Waratah Rivulet gauging station and AWBM generated flows that have been derived from catchment rainfall and regional evaporation data.

Chart 3 shows the same data converted to modelled and observed flow duration curves. Charts 2 and 3 indicate that the catchment model is a good fit to the observed data.

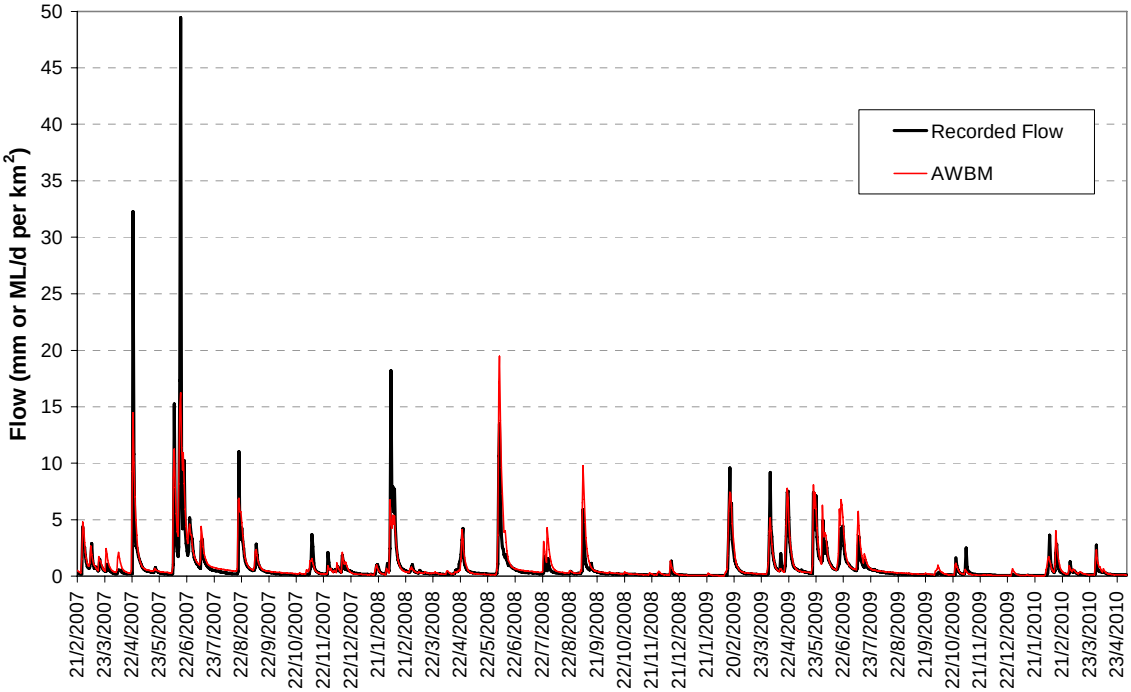


Chart 2 Recorded and Modelled Streamflow Hydrographs – GS2132102 Waratah Rivulet

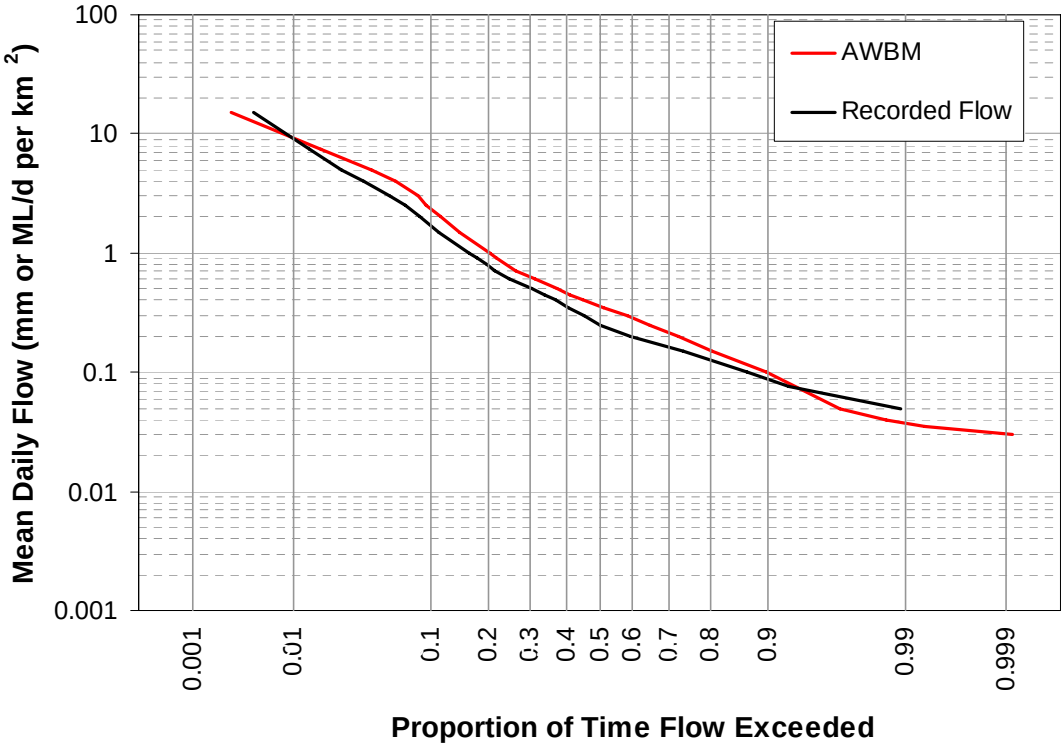


Chart 3 Recorded and Modelled Flow Duration Curves - GS2132102 Waratah Rivulet

Chart 4 presents a comparison of modelled and monitored flows for the post calibration period – i.e. after 14 May 2008. The continued closeness of fit for the post calibration period provides a verification of the original calibration.

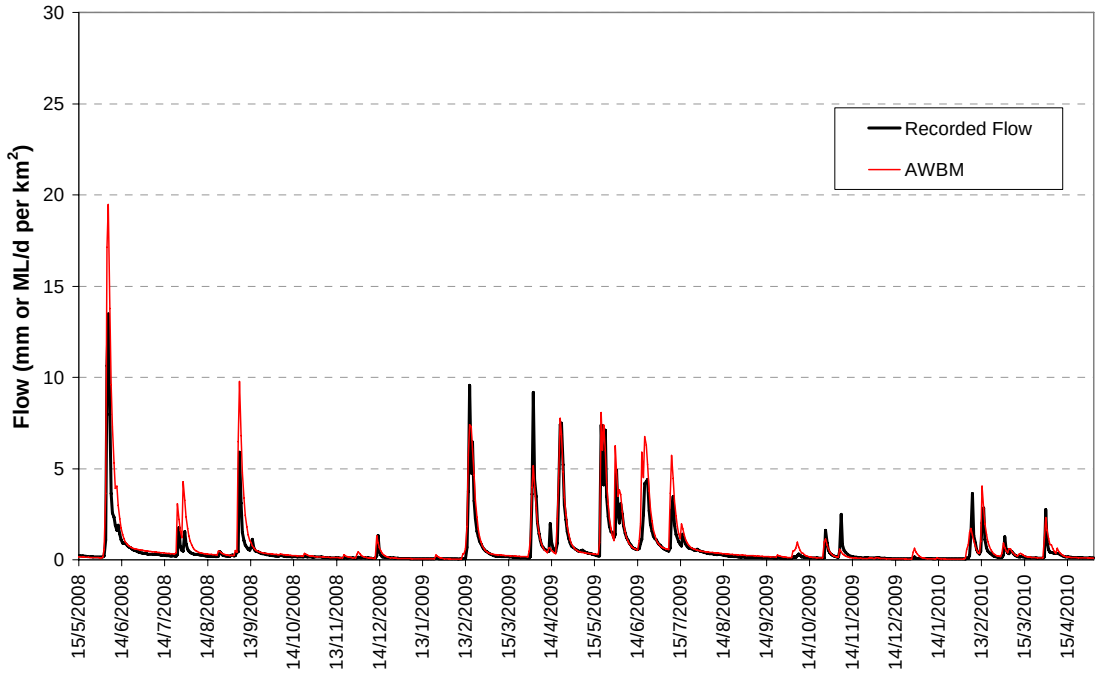


Chart 4 Recorded and Modelled Streamflow Hydrographs – Waratah Rivulet for the Post Calibration Review Period

Whilst additional data has also been recorded at the SCA gauging station on Woronora River (GS 2132101), the data is considered insufficient to enable the development and calibration of a catchment model, due to numerous data gaps.

3.1.4 Groundwater Model Development, Calibration and Verification

A three-dimensional numerical model of groundwater flow has been developed for the mine and its surroundings.

A review of the groundwater model was undertaken during the reporting period by Dr Noel Merrick with the following outcomes. The model outputs were compared with the vertical head profiles measured at three deep holes drilled since the model was originally calibrated, and at the two holes available for model calibration at the time of the Project Environmental Assessment (EA).

The key findings of the post-audit of the groundwater model included:

- The vertical hydraulic gradient profiles at sites 9GGW1B, 9HGW1B and S1997 simulated by the two alternative model variants (termed “high-inflow” and “low-inflow” models) bracket the observed responses. At sites 9GGW1B and 9HGW1B the low-inflow model is marginally better than the high-inflow model (i.e. the low-inflow head profile is closest to the measured profile). At S1997 the high-inflow model gives a good match to the measured profile.
- The review indicates that the results are consistent with the predictions of environmental impacts that were presented in the EA (HCPL, 2008) and the Preferred Project Report (PPR) (HCPL, 2009).

The groundwater models will continue to be refined as new data becomes available.

3.1.5 Assessment of Environmental Performance

The monitoring and assessment of Project impacts on surface water and groundwater resources described in the Catchment Monitoring Program is consistent with the programs described for the Metropolitan Coal Longwalls 20-22 Water Management Plan in Section 3.3 of this Annual Review.

3.1.6 Management and Mitigation Measures

Metropolitan Coal has maintained a register of water monitoring sites that includes the location, the date the site was established, photographs and relevant comments. The monitoring register has been made publicly available on the Peabody website and will be updated as required.

A draft Construction Management Plan (refer to Section 3.10 of this Annual Review) has been prepared and includes:

- the proposed construction of gauging stations on Honeysuckle Creek and the Eastern Tributary in preparation for Longwalls 23-27; and
- proposed upgrades to the SCA-owned gauging stations on Waratah Rivulet (GS 2132102) and Woronora River (GS 2132101) to increase the accuracy of flow data.

3.1.7 Further Initiatives

In accordance with Condition 4, Schedule 7 of the Project Approval, Metropolitan Coal will review and revise the Catchment Monitoring Program within three months of the submission of this Annual Review, to the satisfaction of the Director-General of the Department of Planning.

Metropolitan Coal has proposed to install and commission gauging stations on Honeysuckle Creek and Eastern Tributary, and upgrade the SCA gauging stations on the Waratah Rivulet and Woronora River to improve the accuracy of flow data.

Metropolitan Coal will replace existing pool water level monitoring equipment to improve the accuracy of the water level data. This is discussed further in Section 3.3.

The surface water catchment model will be re-calibrated as data sets from the above instrumentation becomes available. An expert peer review will be conducted of the surface water catchment model re-calibration.

Metropolitan will continue to monitor and assess data quality from the deep piezometer bores, particularly those piezometers exhibiting relatively long equilibration times in low permeability strata.

3.2 SUBSIDENCE MONITORING PROGRAM

3.2.1 Background

The Metropolitan Coal Longwalls 20-22 Subsidence Monitoring Program has been prepared to validate subsidence predictions and analyse the relationship between the subsidence effects and subsidence impacts of the Extraction Plan in accordance with Condition 6, Schedule 3 of the Project Approval.

The objectives of the monitoring program are:

- To monitor the subsidence parameters and subsidence impacts about Longwalls 20-22 extraction.
- To provide subsidence parameter and subsidence impact data required as part of the management of environmental consequences as detailed in the Longwalls 20-22 Extraction Plan. These include the:
  - Water Management Plan;
  - Biodiversity Management Plan;
  - Land Management Plan;
  - Heritage Management Plan;
  - Built Features Management Plan; and
  - Public Safety Management Plan.
- To validate subsidence predictions.
- To provide subsidence data to improve the predictive methods and provide a better understanding of the underlying factors contributing to ground movement.

3.2.2 Monitoring

The Subsidence Monitoring Program includes subsidence parameter monitoring (i.e. the actual movement of the ground surface) and subsidence impact monitoring (e.g. surface cracking). The results of subsidence parameter monitoring are described below. The results of subsidence impact monitoring are described in Sections 3.3 to 3.8.

The subsidence parameter monitoring locations are shown on Figure 11 and are described below. Subsidence movements are surveyed in three dimensions using a total station survey instrument.

As described in Section 2, Longwall 20 has advanced 315 m to the 31 July 2010. Accordingly, only limited subsidence surveys were completed during the reporting period.

D Line

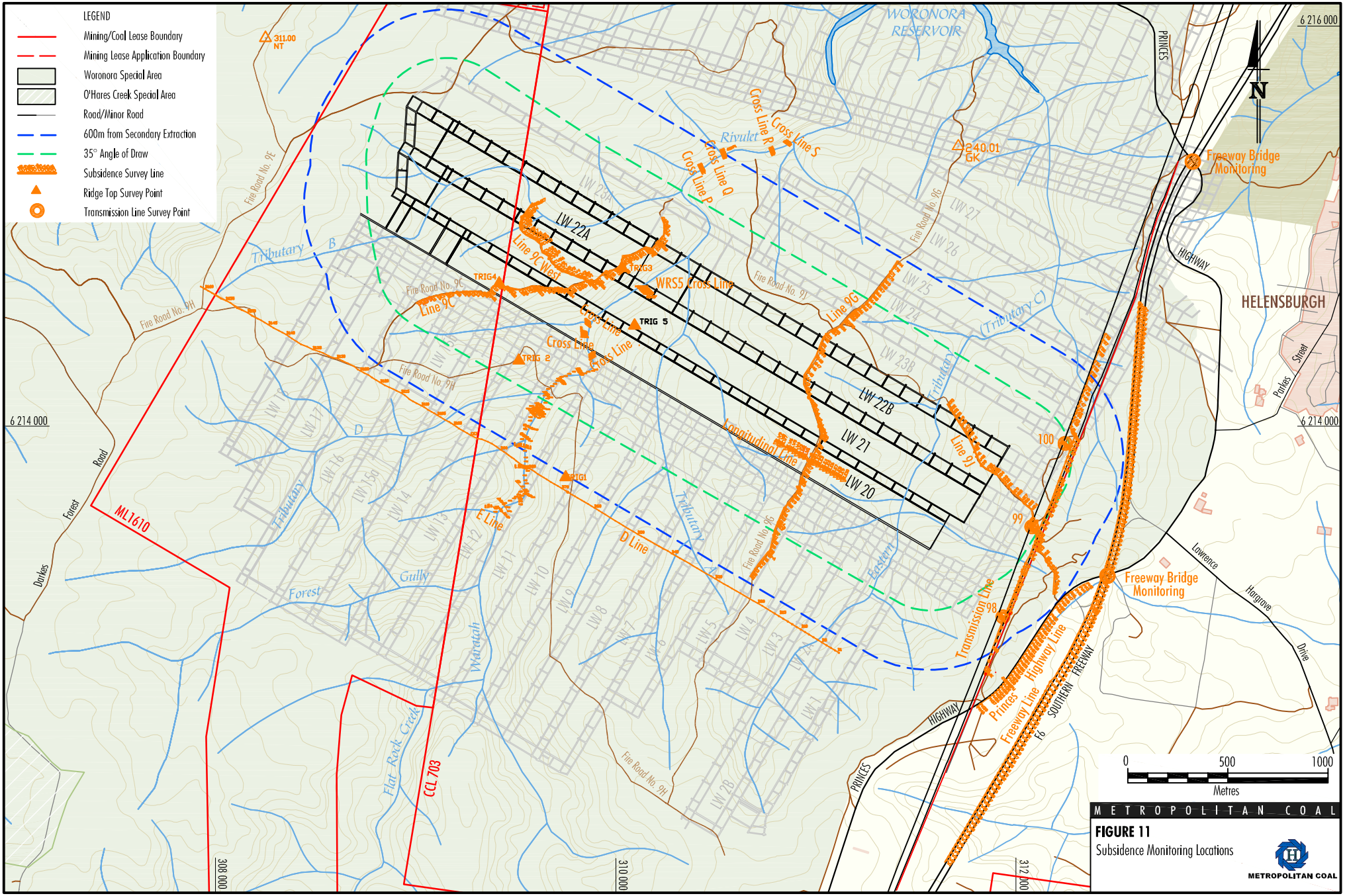
Subsidence monitoring over completed Longwalls 1-18 includes a main subsidence line (D Line) established perpendicular to the longwall panels (Figure 11). D Line will continue to be monitored as part of the Subsidence Monitoring Program to provide general information regarding the movement of the landscape over time (over Longwalls 1-18), in addition to general information regarding ground movement in response to Longwalls 20-22.

D Line will be monitored within three months of the completion of each longwall panel (i.e. Longwalls 20-22).

Line 9G

Line 9G is located along Fire Road 9G, extending from D Line to beyond the Longwalls 20-22 35 degree (°) angle of draw (Figure 11). The purpose of Line 9G is to measure the subsidence parameters (subsidence, tilt, strain) associated with the extraction of each longwall and the cumulative subsidence parameters associated with overall extraction.

Line 9G will be monitored within three months of the completion of each longwall panel.



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Line 9C and Line 9C West

Line 9C and Line 9C West are located along and adjacent to Fire Road 9C (Figure 11).

The purpose of Line 9C and Line 9C West is to:

- supplement the measurement of subsidence parameters from Line 9G to compare the subsidence behaviour in the eastern and western sections of the longwall panels;
- provide a detailed data set for ridge top movement adjacent to the Waratah Rivulet to compare with previous extraction approximately parallel to the Waratah Rivulet (D Line);
- provide a baseline from which ridge to ridge valley closure movements can be measured;
- provide detailed subsidence movements in both longitudinal and lateral directions extending from a ridge top to the base of a valley to measure 'down slope' movement; and
- monitor subsidence in the area of Swamps 16 and 17.

Line 9C and Line 9C West have been surveyed monthly while subsidence has been above 20 mm/month (i.e. in June and July 2010). The maximum subsidence measured as at 31 July 2010 was 43 mm.

Line 9C and Line 9C West will also be monitored once Longwall 20 has passed beyond the subsidence line by at least 600 m, yet prior to the commencement of Longwall 21.

Longitudinal Line

The Longitudinal Line is situated perpendicular to Fire Road 9G (Figure 11).

The purpose of the Longitudinal Line is to:

- supplement the subsidence measurement from Line 9G to compare the subsidence behaviour in longitudinal and transverse directions; and
- provide an indication of the likely subsidence behaviour ahead of longwall extraction to better understand the likely behaviour ahead of the finish lines, in particular in relation to infrastructure.

In accordance with the Built Features Management Plan – Roads and Traffic Authority (RTA), the Longitudinal Line will be monitored monthly once Longwall 20 is within 1,000 m of Longitudinal Line and until Longwall 20 passes Longitudinal Line by 200 m. It is anticipated that re-survey will commence in October 2010.

The Longitudinal Line will also be monitored within three months of the completion of each longwall panel.

Line 9J

Line 9J is located along Fire Road 9J, extending from the Princes Highway to a point 200 m west of the Longwall 21 finish line (Figure 11).

The purpose of Line 9J is to:

- complete the subsidence profile from the F6 Southern Freeway bridge to a point over the goaf where subsidence would be expected to have reached a maximum. In other words, to measure the ground response in the area of greatest strain to provide a high level of confidence in the management of the F6 Southern Freeway bridge; and
- obtain subsidence information across the finish line of the longwall panels to calibrate the subsidence prediction methods.

In accordance with the Built Features Management Plan – RTA, Line 9J will be monitored once when Longwall 20 is approximately 200 m from the finish line. Line 9J will also be monitored within three months of the completion of each longwall panel.

Transmission Line

The Transmission Line is located along the easement containing the TransGrid and Integral Energy high tension transmission lines and generally the fibre optic cables (Figure 11).

The purpose of the Transmission Line is to:

- provide monitoring of ground movements about the transmission lines, towers, and fibre optic cables;
- to supplement the subsidence data about the F6 Southern Freeway; and
- obtain subsidence information ahead of the longwall panels to calibrate the subsidence prediction methods.

In accordance with the Built Features Management Plan – RTA, the Transmission Line will be monitored when Longwall 20 is approximately 200 m from the finish line. The Transmission Line will also be monitored within three months of the completion of each longwall panel.

Each of the four legs of the TransGrid transmission towers 98, 99 and 100 (Figure 11) will also be surveyed in accordance with the Built Features Management Plan – TransGrid.

Princes Highway Line

The Princes Highway Line is located along the verge of the Princes Highway extending from the F6 Southern Freeway bridge to the point where the high tension transmission lines intersect the Princes Highway (Figure 11).

The purpose of Princes Highway Line is to:

- provide monitoring of ground movements about the Princes Highway;
- supplement the subsidence data about the F6 Southern Freeway; and
- obtain subsidence information ahead of the longwall panels to calibrate the subsidence prediction methods.

The Princes Highway Line will be monitored within three months of the completion of each longwall panel.

Freeway Line

The Freeway Line is located along the verge of the F6 Southern Freeway extending from 200 m south of Kelly's Creek to a point 600 m from the edge of Longwall 22 extraction (Figure 11).

The purpose of the Freeway Line is to:

- provide monitoring of ground movements about the F6 Southern Freeway; and
- obtain subsidence information ahead of the longwall panels to calibrate the subsidence prediction methods.

The Freeway Line will be monitored within three months of the completion of each longwall panel.

Waratah Rivulet Cross Lines

A number of cross lines will be monitored for subsidence movement, as described below:

- the existing E Line which runs across the Waratah Rivulet at the WRS3 rock bar in a direction perpendicular to the river;
- 13 existing cross lines across the Waratah Rivulet downstream of the WRS3 rock bar;
- an additional three cross lines above Longwalls 20–22 (Lines 14, 15, and 16), including a cross line across the WRS5 rock bar (WRS5 Line); and
- additional cross lines at Pools P, Q, R and S.

The cross lines will be monitored within three months of the completion of each longwall panel.

Lines 14, 15 and 16 will be surveyed monthly until the longwall passes the Waratah Rivulet and subsidence is less than 20 mm/month. Currently subsidence at the cross lines is within survey error (5 mm). Lines 14, 15 and 16 will also be surveyed within 1 month of the completion of each longwall panel.

Ridge to Ridge

Five monitoring points have been established at ridge top locations on either side of the Waratah Rivulet (Figure 11). The locations were selected on the basis that a direct line of sight exists between the monitoring points. The purpose of the ridge to ridge survey points is to measure total valley closure and compare predicted values with measured values.

The ridge to ridge monitoring points will be surveyed monthly until the longwall passes the Waratah Rivulet and subsidence reduces to less than 20 mm/month. The maximum subsidence measured as at July 2010 was 10 mm.

The ridge to ridge monitoring points will also be surveyed within 1 month of the completion of each longwall panel.

3.2.3 Assessment of Environmental Performance

Line 9C, Line 9C West, Lines 14, 15, and 16 and the ridge to ridge monitoring points were surveyed in June and July 2010.

The maximum subsidence measured at Line 9C and Line 9C West as at July 2010 was 43 mm. At this point in time subsidence at Lines 14, 15, and 16 is less than survey error (5 mm), and the maximum subsidence measured at the ridge to ridge survey points as at July 2010 was 10 mm.

Since Longwall 20 had only advanced some 315 m as at the 31 July 2010, a detailed comparison of predicted versus measured subsidence parameters will be provided in the October 2011 Annual Review. Notwithstanding, the results of the subsidence surveys conducted to date do not indicate subsidence behaviour that would be considered unusual or unexpected.

The results of subsidence impact monitoring are described in Sections 3.3 to 3.8.

3.2.4 Management and Mitigation Measures

At this stage the implementation of the Subsidence Monitoring Program and associated management processes are considered to be adequate.

3.2.5 Further Initiatives

Metropolitan Coal will review and revise the Subsidence Monitoring Program within three months of the submission of this Annual Review in response to consultation undertaken with the RTA Technical Committee. The Subsidence Monitoring Program will be amended to indicate that a survey of Line 9G, the Princes Highway Line and the Freeway Line will also be conducted when Longwall 20 is approximately 200 m from the finish line. This provides an additional round of monitoring prior to the completion of Longwall 20.

Metropolitan Coal will continue to meet with the RTA Technical Committee on a regular basis over the next reporting period, the frequency of which will largely be driven by the location of the longwall.

3.3 WATER MANAGEMENT PLAN

3.3.1 Background

A Metropolitan Coal Longwalls 20-22 Water Management Plan has been prepared to manage the potential environmental consequences of the Extraction Plan on watercourses (including the Woronora Reservoir), aquifers and catchment yield in accordance with Condition 6, Schedule 3 of the Project Approval.

3.3.2 Monitoring

Stream Features

Visual and photographic surveys of the Waratah Rivulet (from Flat Rock Crossing to the full supply level) and Eastern Tributary (from within the 35° angle of draw of Longwalls 20-22 to the full supply level) are conducted monthly when valley closure (as measured by the ridge to ridge survey points) is above 20 mm/month, and within three months of the completion of each longwall.

Visual inspections of Tributary A (within the 35° angle of draw of Longwalls 20-22) and Tributary B (within the 35° angle of draw of Longwalls 20-22) are conducted within three months of the completion of each longwall.

The visual and photographic surveys record the nature and extent of:

- the location, approximate dimensions (length, width and depth), and orientation of surface cracks (specifically whether cracks are developed perpendicular to the stream flow or are controlled by rock joints or other factors, etc.);
- the nature of iron staining (e.g. whether isolated or across the entire streambed);
- the extent of iron staining (e.g. length of stream affected);
- description of gas release (e.g. isolated bubbles or continuous stream and type of gas [methane or carbon dioxide using an OdaLog gas detector]);
- the nature of scouring, for example the depth of scouring, type of soil exposed, any obvious vegetation impact, potential for severe erosion, etc.;
- water discoloration or opacity if present;
- natural underflow if evident (i.e. evidence of surface flows either entering or existing the sub-surface domain via surface cracks in the streambed);
- rock bar characteristics such as extent of cracking, seepage, underflow;
- whether any actions are required (e.g. implementation of management measures, incident notification, implementation of appropriate safety controls, review of public safety, etc.); and
- any other relevant information.

GPS coordinates are recorded where appropriate (e.g. of particular observations and associated photographs).

In the event gas releases are identified, monitoring is conducted weekly to determine the extent of the gas releases, gas concentration and any observable environmental effects.

The monthly visual and photographic surveys, while valley closure (as measured by the ridge to ridge survey points) is above 20 mm/month, record the above parameters by exception (i.e. where they differ to the baseline visual and photographic record). The visual and photographic surveys conducted within three months of the completion of each longwall will provide a detailed photographic record similar to that provided in the Water Management Plan.

During the reporting period, visual inspections were conducted along the Waratah Rivulet in July 2010. Slight movement along an existing north-south joint was noted at the seep area located immediately downstream of Flat Rock Crossing. The subsidence crack was closed and consisted of slight flaking along a north-south joint. No strike slip or vertical displacement of the stream bedrock was evident. No additional subsidence impacts, such as cracking or gas releases were observed during the visual inspections.

Surface Water Flow

Surface water flow monitoring has included continuous flow monitoring at the SCA-owned gauging stations on the Waratah Rivulet (GS2132102) and Woronora Reservoir (GS2132102) and at the DECCW gauging station on O'Hares Creek at Wedderburn (GS213200).

Chart 5 shows concurrent streamflow data from the SCA-owned gauging stations on Waratah Rivulet and Woronora River and the DECCW-owned gauging station on O'Hares Creek at Wedderburn. Streamflow is expressed on a per unit catchment area basis (in mm) to allow direct comparison of flow magnitudes without having to adjust for contributing catchment area. Flows are plotted on a logarithmic scale to emphasise the lower flow range. Flow duration curves for each station for the period since February 2007 are shown on Chart 6.

Of the three streams, Waratah Rivulet yielded the highest flow per unit catchment area in medium and low flows, with strong low flow persistence. O'Hares Creek (at Wedderburn) yielded similar flows, with slightly greater high flows, but notably steeper flow recession and lower magnitude low flows. The Woronora River recorded the lowest flows per unit catchment, with the steepest flow recessions.

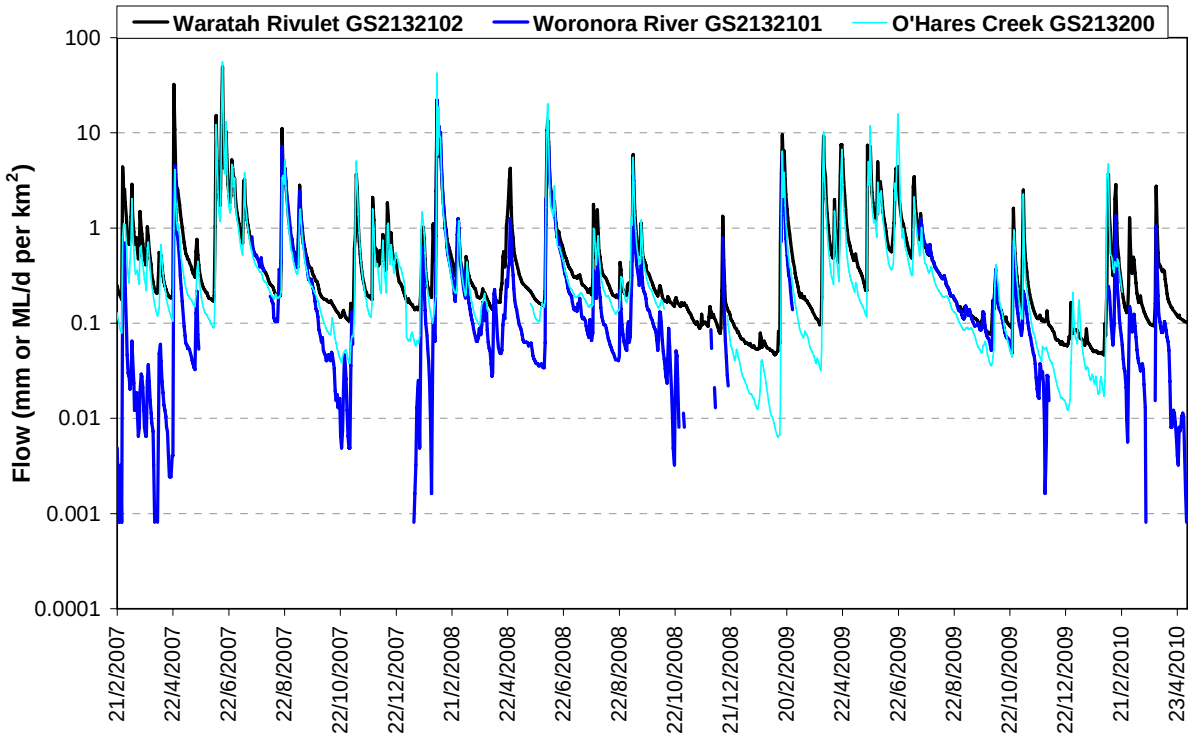


Chart 5 **Recorded Streamflow Hydrographs – Waratah Rivulet, Woronora River and O'Hares Creek at Wedderburn**

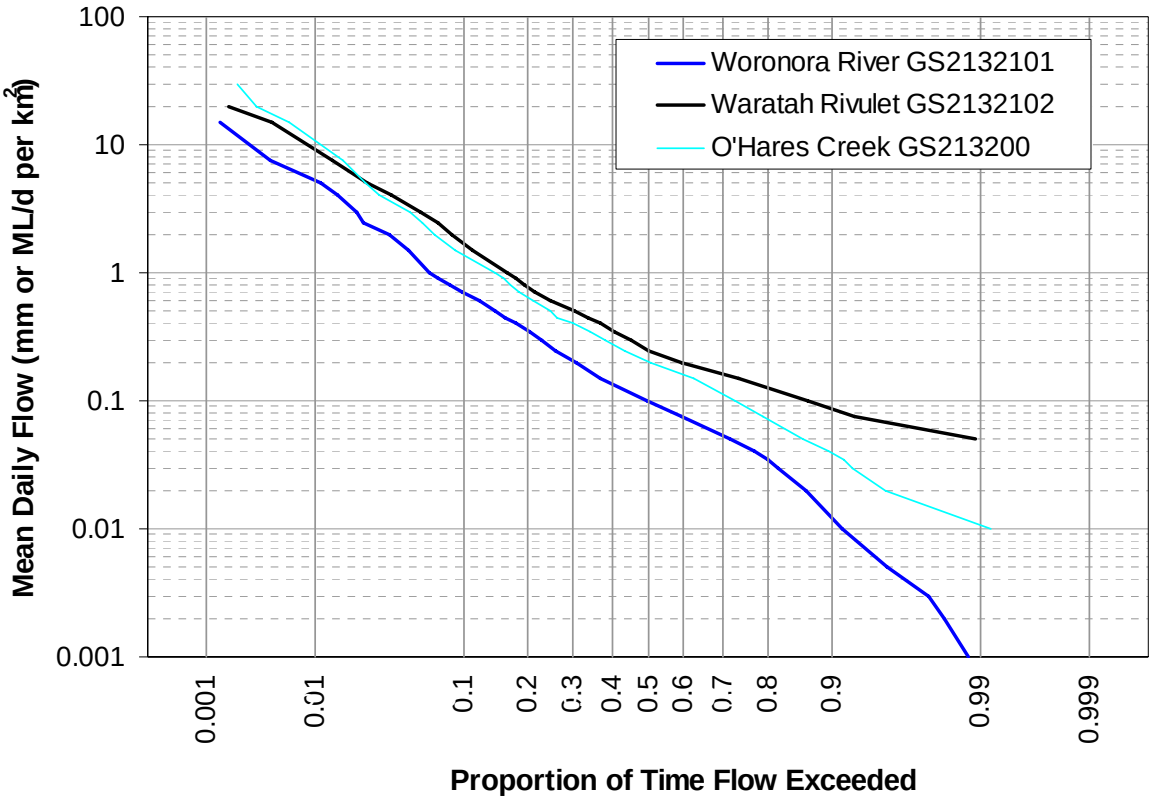


Chart 6 **Flow Duration Curves – Waratah Rivulet, Woronora River and O'Hares Creek at Wedderburn**

Pool Water Levels

Water levels in a number of pools on the Waratah Rivulet, Eastern Tributary, Tributary B and Woronora River have been either manually monitored on a daily basis or using a continuous water level sensor and logger (Figure 7).

The results of pool water level monitoring results are discussed in Sections 3.11 in relation to the initiation of stream remediation.

Woronora Reservoir Leakage

Metropolitan Coal will investigate the development of a suitable performance indicator to assess potential leakage from the Woronora Reservoir for future longwalls in consultation with the SCA, with a view to trialling the performance indicator during the mining of Longwalls 26 and 27.

Stream Water Quality

Surface water quality sampling has been conducted monthly at a number of sites on Waratah Rivulet, Tributary B, Tributary D, Eastern Tributary, Far Eastern Tributary, Honeysuckle Creek, Bee Creek and the Woronora River (Figure 8).

Water quality parameters sampled include electrical conductivity (EC), pH, redox potential (Eh), dissolved oxygen (DO), turbidity, calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), chloride (Cl), sulphate (SO_4), bicarbonate (HCO_3), total nitrogen (Ntot), total phosphorus (Ptot), nitrate (NO_3), barium (Ba), strontium (Sr), manganese (Mn), iron (Fe), zinc (Zn), cobalt (Co) and aluminium (Al). Samples collected for cation, anion and metal analysis have been field filtered.

Unfiltered water quality samples will also be collected at a number of sites on the Waratah Rivulet, Eastern Tributary and Woronora River (Figure 8) and analysed for total iron.

Data for all water quality parameters are graphically presented for each site in Appendix 1. The results of key water quality parameters, namely pH, electrical conductivity, iron (filtered), manganese (filtered) and aluminium (filtered) are graphically presented for a selection of sites in Charts 7 to 11: Woronora River (sites WOWQ1 and WOWQ2), Waratah Rivulet (sites WRWQ6, WRWQ8 and WRWQ9) and Eastern Tributary (sites ETWQF and ETWQJ).

The raw data graphically presented in Appendix 1 demonstrates that the overall water quality of most indicator parameters has not been noticeably affected by mining.

Mine subsidence impacts on water quality in the Waratah Rivulet have resulted in localised and transient changes (spikes or pulses) in iron (Chart 9) however the highest isolated spike in dissolved iron was recorded on the Woronora River control site. Dissolved manganese (Chart 10) concentrations were higher on Waratah Rivulet at sampling sites WRWQ6 and WRWQ8 than at other sites with higher spikes in concentration being recorded at the control site. Dissolved aluminium concentrations (Chart 11) were consistently higher at control sites WOWQ1 and to a lesser degree WOWQ2 on the Woronora River than at other sites. There is no apparent trend either between sites or over time on either the Waratah Rivulet or the Eastern Tributary. The spikes in dissolved iron on Waratah Rivulet may be associated with mining effects however they appear to be both isolated (localised) and transient – and have not been detected at the downstream sampling site WRWQ9.

There does not appear to be any noticeable link between subsidence effects and pH or electrical conductivity of water.

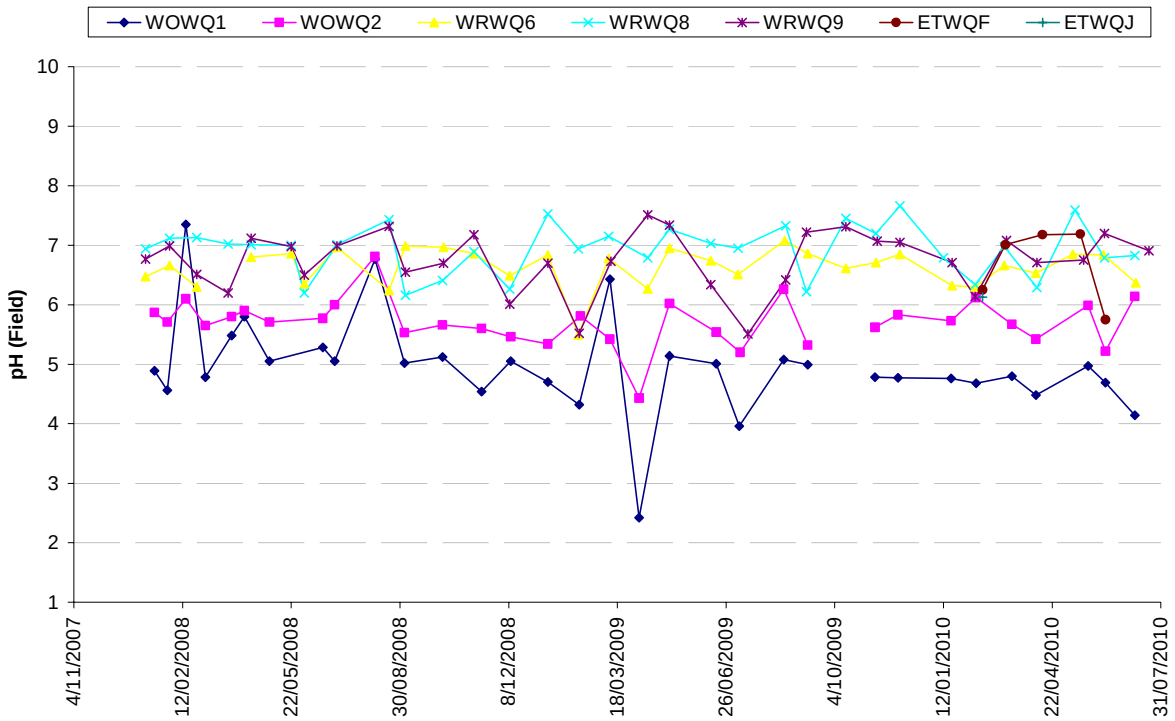


Chart 7 pH

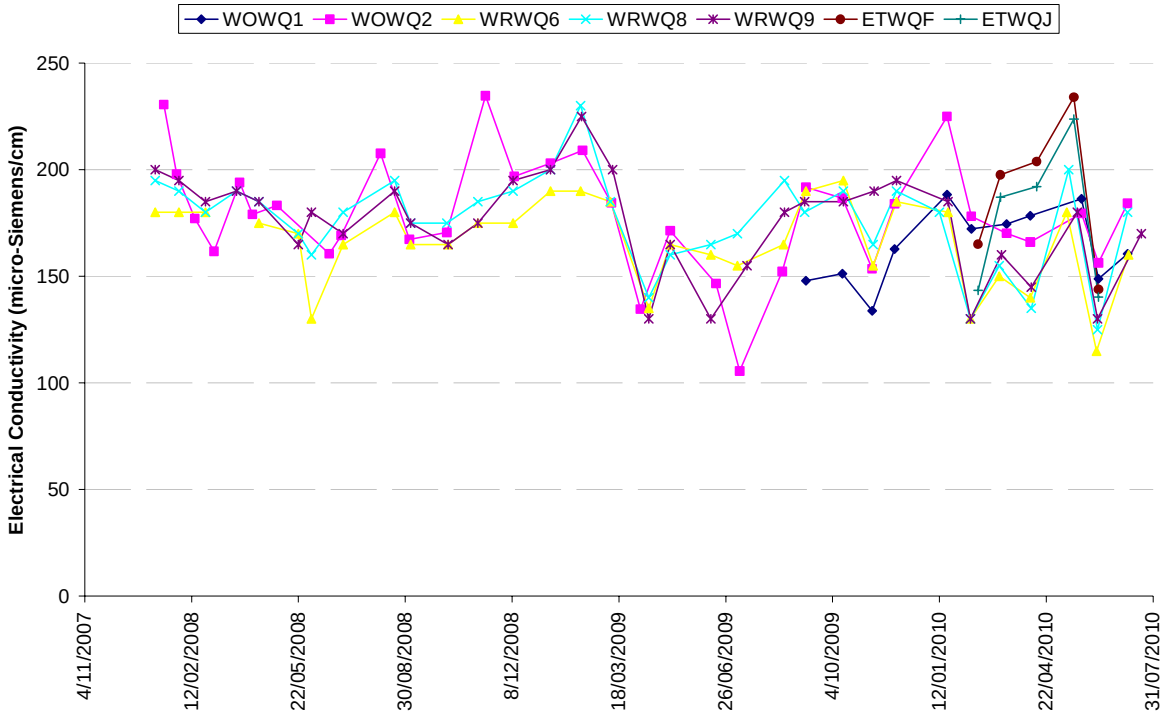


Chart 8 Electrical Conductivity

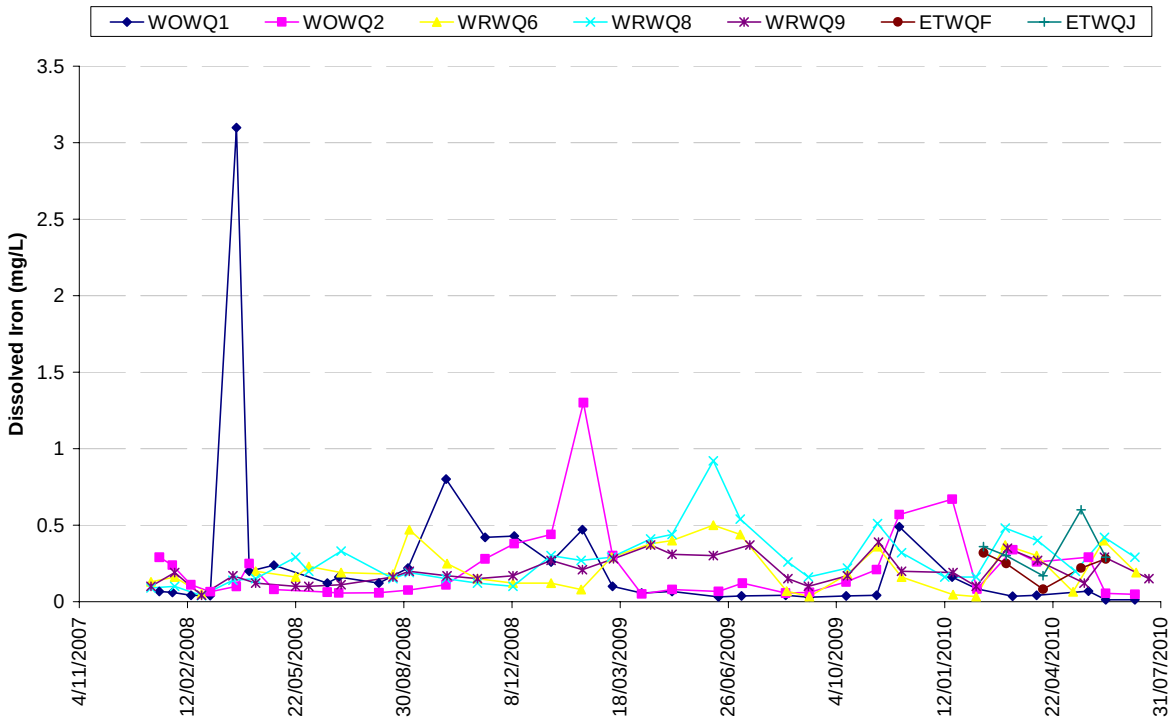


Chart 9 Dissolved Iron Concentrations

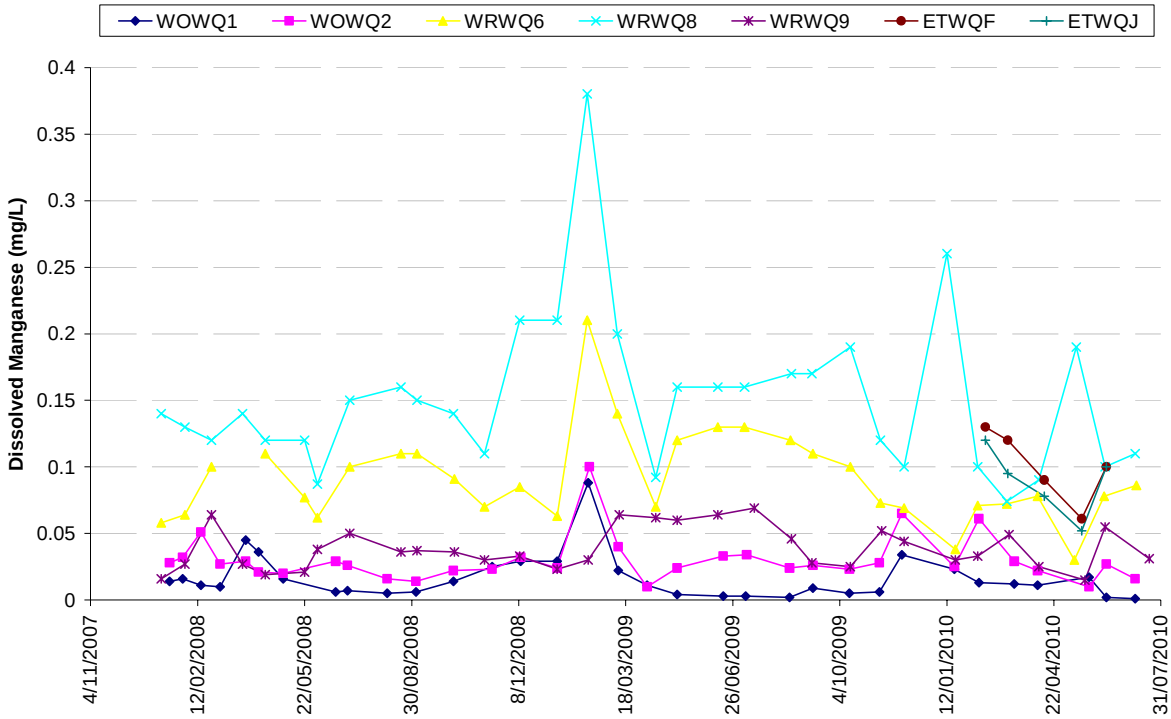


Chart 10 Dissolved Manganese Concentrations

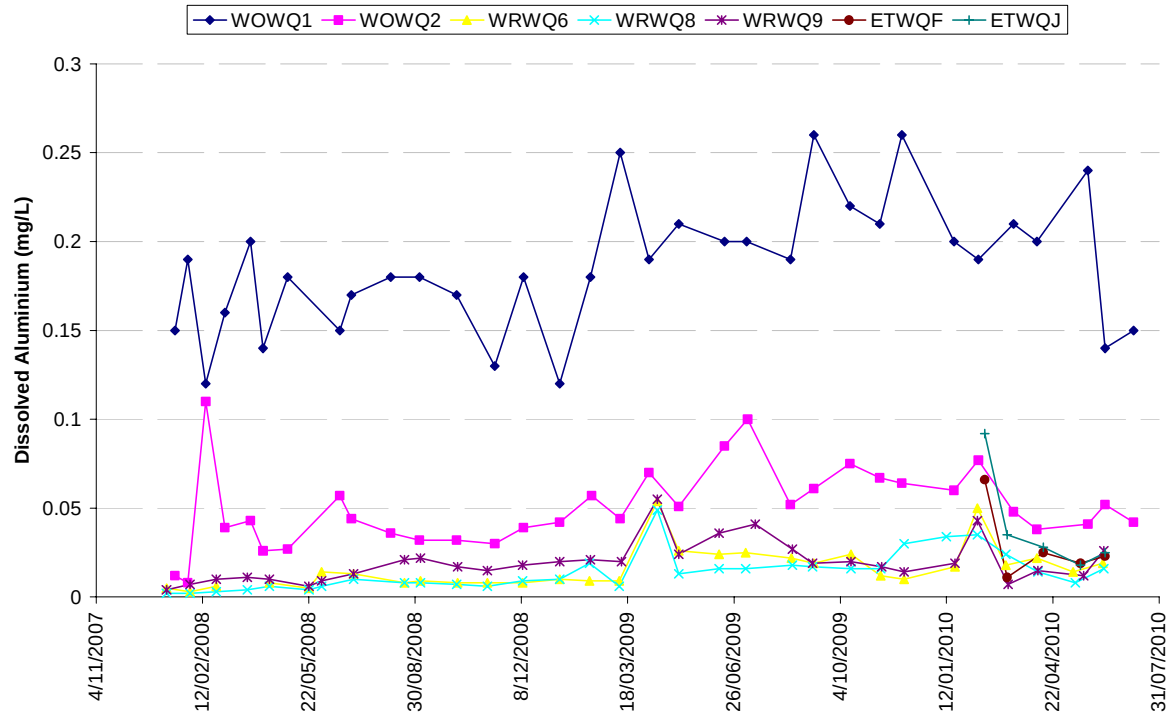


Chart 11 Dissolved Aluminium Concentrations

Woronora and Nepean Reservoir Water Quality

Metropolitan Coal will source water quality data for the Woronora Reservoir, Nepean Reservoir and Cataract Reservoir from the SCA in accordance with a data exchange agreement. Analysis of the results will be included in the 2011 Annual Review.

Swamp Groundwater Levels

Upland swamp groundwater monitoring is described in Section 3.4.2.2 of this Annual Review.

Shallow Groundwater Levels

Continuous water level monitoring of shallow groundwater levels has been conducted at sites WRGW1 and WRGW2 along Waratah Rivulet and site RTGW1A on Tributary B (Figure 9). The installation of monitoring sites WRGW7 and ETGW1 on the Waratah Rivulet and the Eastern Tributary respectively will be completed in the next reporting period. Continuous water level monitoring of these additional two sites will be conducted and the data will be presented and analysed in future Annual Reviews.

Sites WRGW1 and WRGW2 are located on opposite banks of the Waratah Rivulet, to the immediate south of Longwall 20 (Figure 9). The groundwater monitoring results for sites WRGW1 and WRGW2 are shown on Chart 12, and are compared with rainfall events over a period of two years as recorded at the Waratah Rivulet catchment PV1 pluviometer (Figure 6). Sites WRGW1 and WRGW2 show comparable information over the review period.

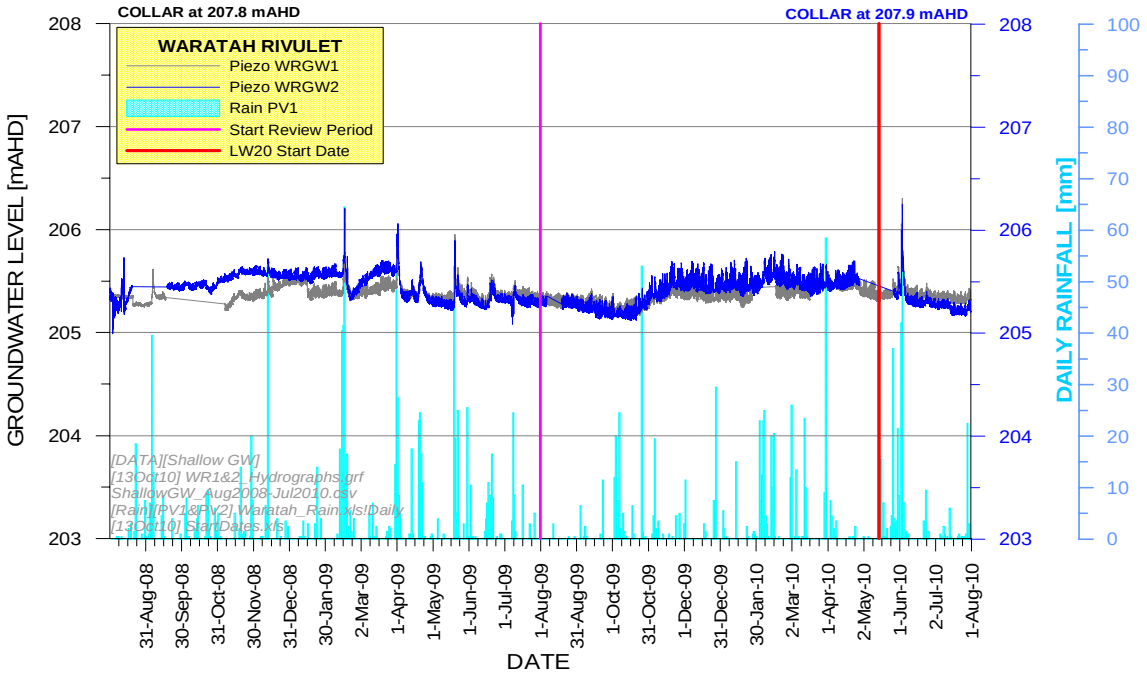


Chart 12 Shallow Groundwater Hydrographs on Waratah Rivulet at WRGW1 and WRGW2

All Waratah Rivulet piezometers (i.e. WRGW1 to WRGW6, refer Figure 9) show the same dynamic responses to stream flow interaction and rainfall, with rapid response to rainfall events. Up-gradient sites (WRGW3 to WRGW6) have the greater response amplitude.

From early May 2010, water levels at sites WRGW1 and WRGW2 gradually declined, apart from recharge during a wet episode in late May 2010. The slight decline is attributed to natural recession, and is consistent with the downwards trend in rainfall residual mass at pluviometer PV1 (Chart 12). There was no sign of irregular behaviour during the distant mining of Longwall 18 (November 2009 to April 2010).

Deep Groundwater Levels/Pressures

Continuous groundwater level/pressure monitoring has been conducted at site 9HGW0 (Longwall 10 Goaf Hole), site 9EGW1B, site 9FGW1B, site 9GGW1B, site 9HGW1B and site PM02 (Figure 9).

The measured vertical hydraulic head profiles for these bores have been compared against the predicted vertical hydraulic head profiles for each bore by Dr Noel Merrick, with the following outcomes:

- Some installations are providing unreliable data.
- Certain vibrating wire piezometers at monitoring sites installed recently are yet to stabilise.
- Sites close to current mining show significant depressurisation with depth, consistent with the Project EA.
- Sites close to old workings at Helensburgh show substantial depressurisation with depth, consistent with the Project EA.
- The pressure reductions with depth agree well with model predictions.

The monitoring sites closest to recent mining include site 9HGW1B (adjacent to Longwall 18), site 9FGW1B (600 m north-west of Longwall 20) and site 9GGW1B (above Longwall 22) (Figure 9). The vertical profiles of the latter two are compared with simulated results in Section 3.3.3.3.

The time-series record for site 9HGW1B is shown on Chart 13. The site 9HGW1B bore terminated in the Stanwell Park Claystone, with the lower Bulgo Sandstone as the deepest monitored lithology. During the mining of Longwall 18 (November 2009 to April 2010), the groundwater heads increased gradually within all formations from the lower Hawkesbury Sandstone down to the mid Bulgo Sandstone, with evidence of declines at the end of panel mining. Rises in head of 10-20 m are evident. As site 9HGW1B is located within the abutment zone of Longwall 18, this response is attributed to vertical stress redistribution and strata compression to the west of the Longwall 18 extraction.

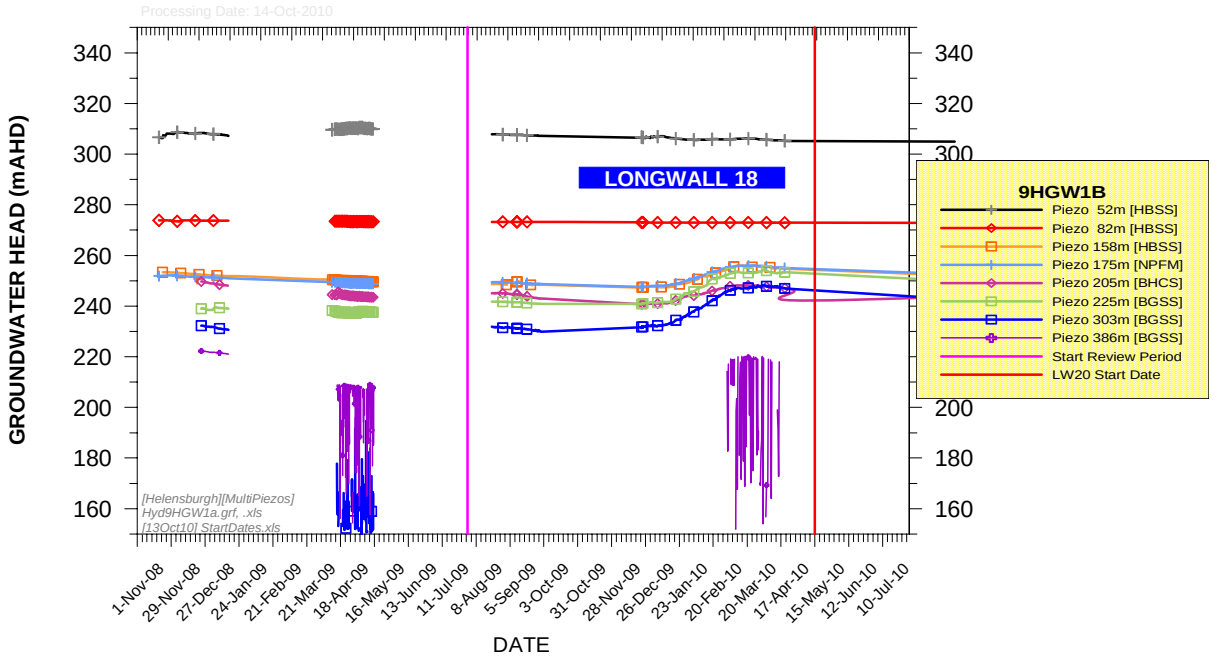


Chart 13 Time Variations in Potentiometric Heads at Site 9HGW1B

The time-series record for site 9GGW1B is shown on Chart 14. Site 9GGW1B shows strong depressurisation below the Bulgo Sandstone, with heads about -20 m Australian Height Datum (AHD) in the Scarborough Sandstone and the Coal Cliff Sandstone. The heads in this hole are stable and are yet to show any effect from Longwall 20 mining.

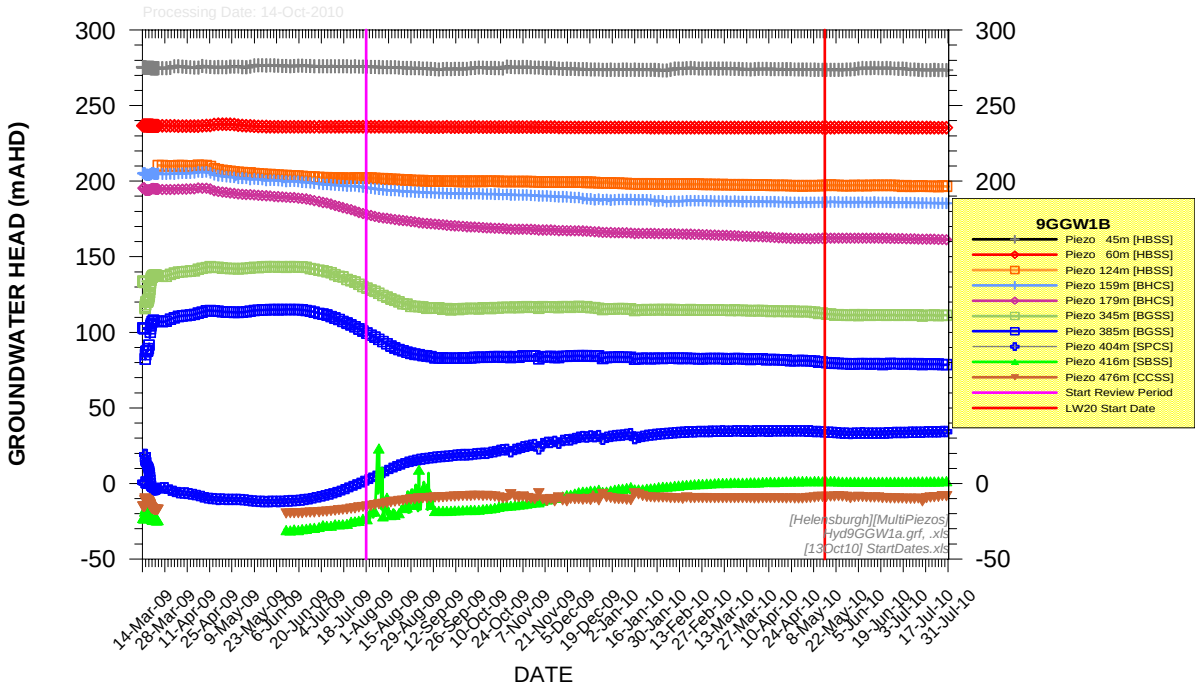


Chart 14 Time Variations in Potentiometric Heads at Site 9GGW1B

Groundwater Quality

Shallow groundwater quality has been sampled monthly at sites WRGW1 and WRGW2 along the Waratah Rivulet and site RTGW1A adjacent to Tributary B (Figure 10). Groundwater quality monitoring at sites WRGW7 and ETGW1 on the Waratah Rivulet and the Eastern Tributary respectively will commence in the next reporting period. Monthly groundwater quality sampling at these two sites will be conducted and the data will be presented and analysed in future Annual Reviews.

Water quality parameters sampled include EC, pH, Eh, Ca, Mg, Na, K, Cl, SO_4, HCO_3, Ba, Sr, Mn, Fe, Zn, Co and Al. The samples collected for the analysis of cations, anions and metals have been field filtered.

Monitoring results for Fe, Mn and pH levels at sites WRGW1 and WRGW2 are provided on Charts 15 to 17. Monitoring results for sites WRGW3 to WRGW6 are also shown on Charts 15 to 17 to show trends over the length of the Waratah Rivulet. Rainfall events over a period of two years, as recorded at the Waratah Rivulet catchment PV1 pluviometer (Figure 6), provide a context for the substantial fluctuations in parameters; however, there is no obvious relationship with rainfall.

The key observations at the Waratah Rivulet groundwater quality monitoring sites (WRGW1 to WRGW6) are:

- Fe concentrations are usually in the 1 - 10 mg/L range, with a peak value of 14 mg/L.
- Mn concentrations are typically less than 1 mg/L.
- Groundwater is generally acidic with pH usually between pH 5.5 and 7.
- Fe and Mn concentrations increase with distance downstream.
- There is no evidence of irregular behaviour during the mining of Longwall 18 (November 2009 to April 2010) or Longwall 20 (from May 2010).

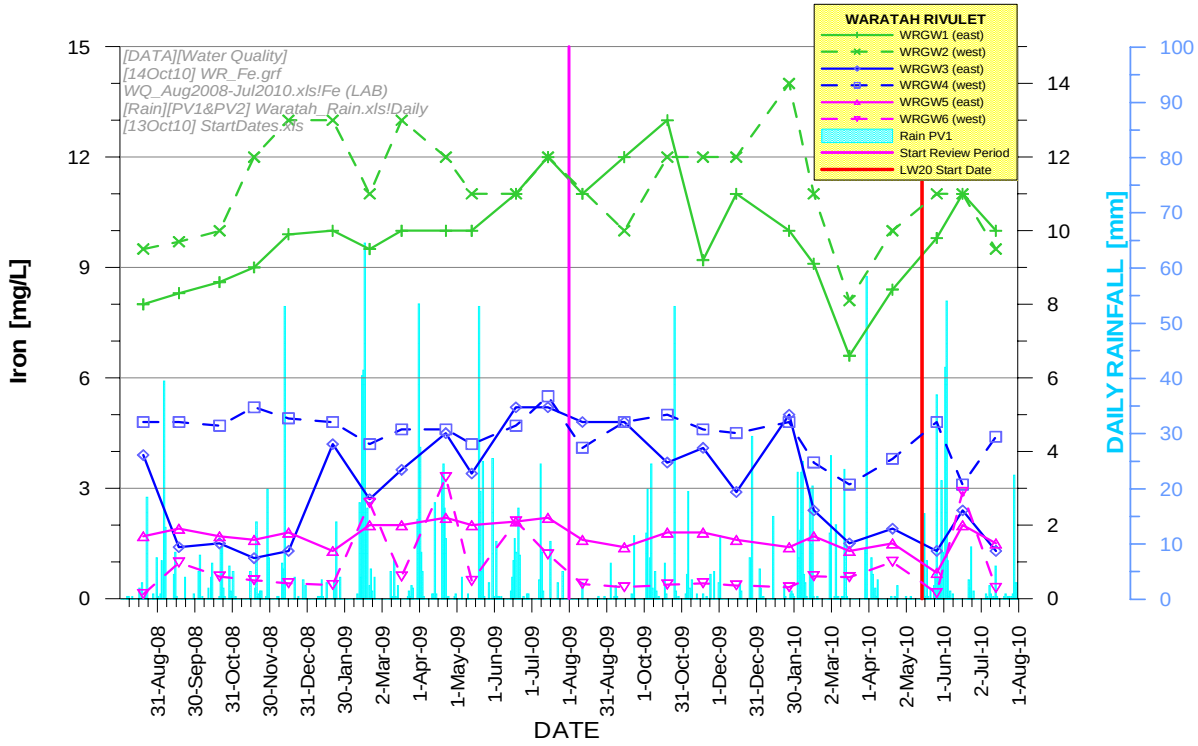


Chart 15 Iron Concentration at Sites WRGW1 to WRGW6

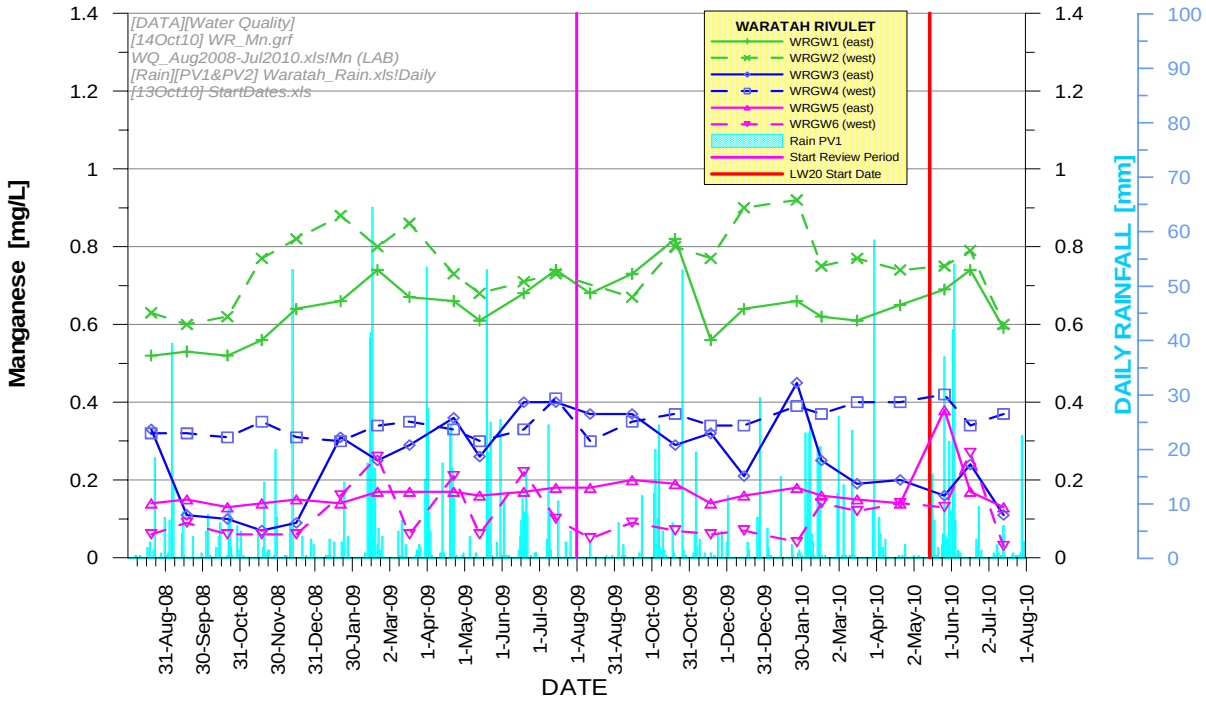


Chart 16 Manganese Concentration at Sites WRGW1 to WRGW6

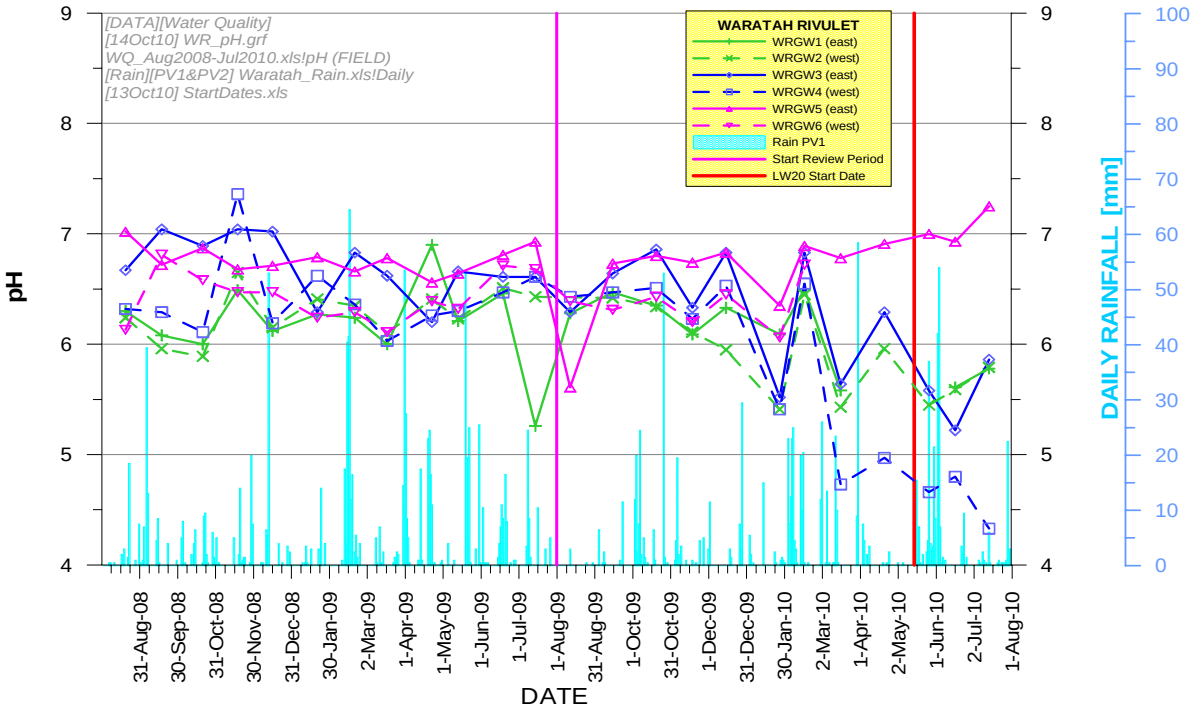


Chart 17 pH Levels at Sites WRGW1 to WRGW6

Site RTGW1A on Tributary B (north of Longwall 20) is sampled monthly for groundwater quality. To provide context for the monitoring results at site RTGW1A, comparison has been made with the upgradient groundwater quality monitoring site SWGW1 (west of Longwall 18) (Figure 10). Groundwater quality at both sites is shown on Charts 18 to 20 for Fe, Mn and pH. Rainfall events over a period of two years, as recorded at the Waratah Rivulet catchment PV1 pluviometer (Figure 6), provide a context for the substantial fluctuations in parameters; however, there is no obvious relationship with rainfall.

Fe concentrations are generally equal to or below 1 mg/L, with one isolated value of 6 mg/L at site RTGW1A. Mn concentrations are low at both sites, being always below 0.4 mg/L. Aluminium was below the detection limit in all samples. The groundwater at site SWGW1 is acidic, generally around pH 5, while the groundwater at site RTGW1A is neutral (pH generally around 7).

There is no systematic temporal pattern for any analyte, and neither site shows any irregularities due to the mining of Longwall 18 (November 2009 to April 2010) or Longwall 20 (from May 2010).

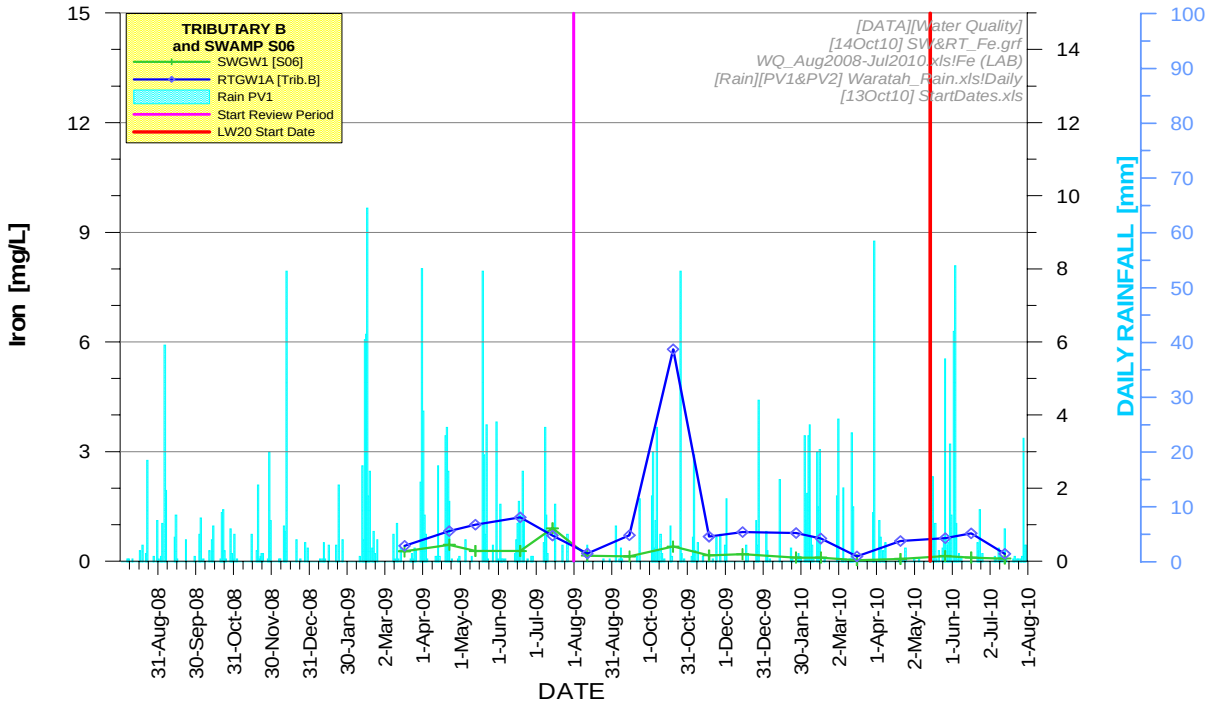


Chart 18 Fe Concentrations at Sites RTGW1A and SWGW1

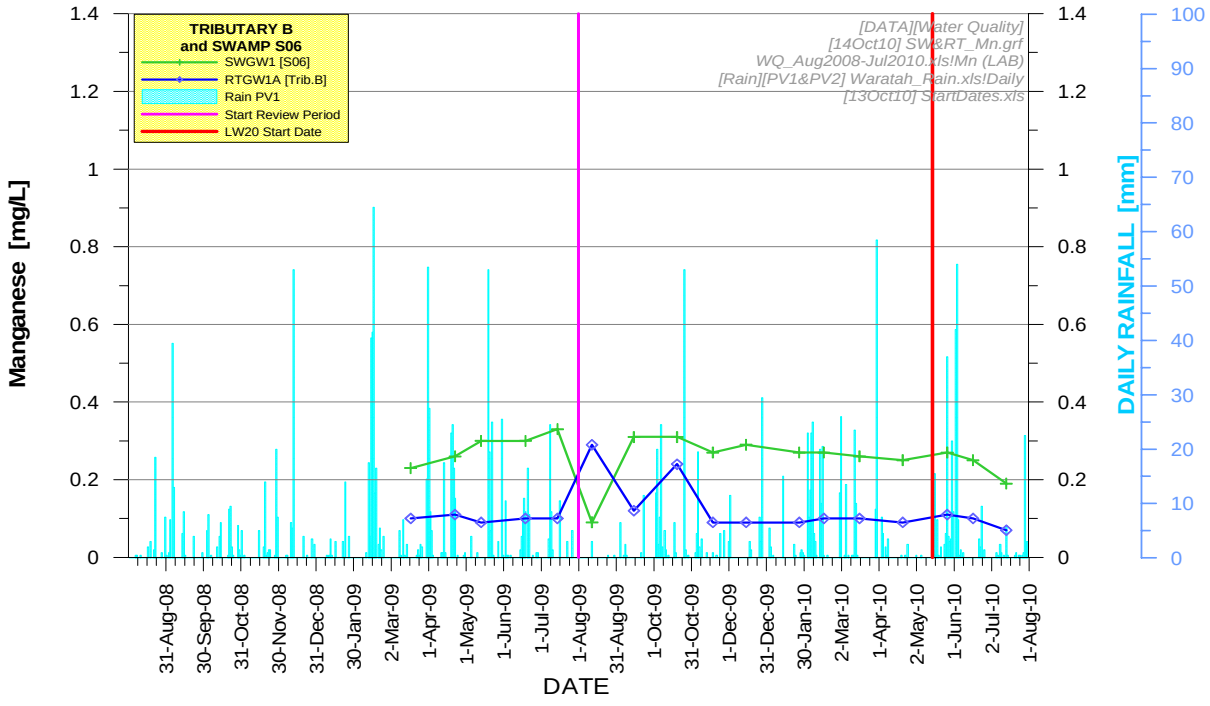


Chart 19 Mn Concentrations at Sites RTGW1A and SWGW1

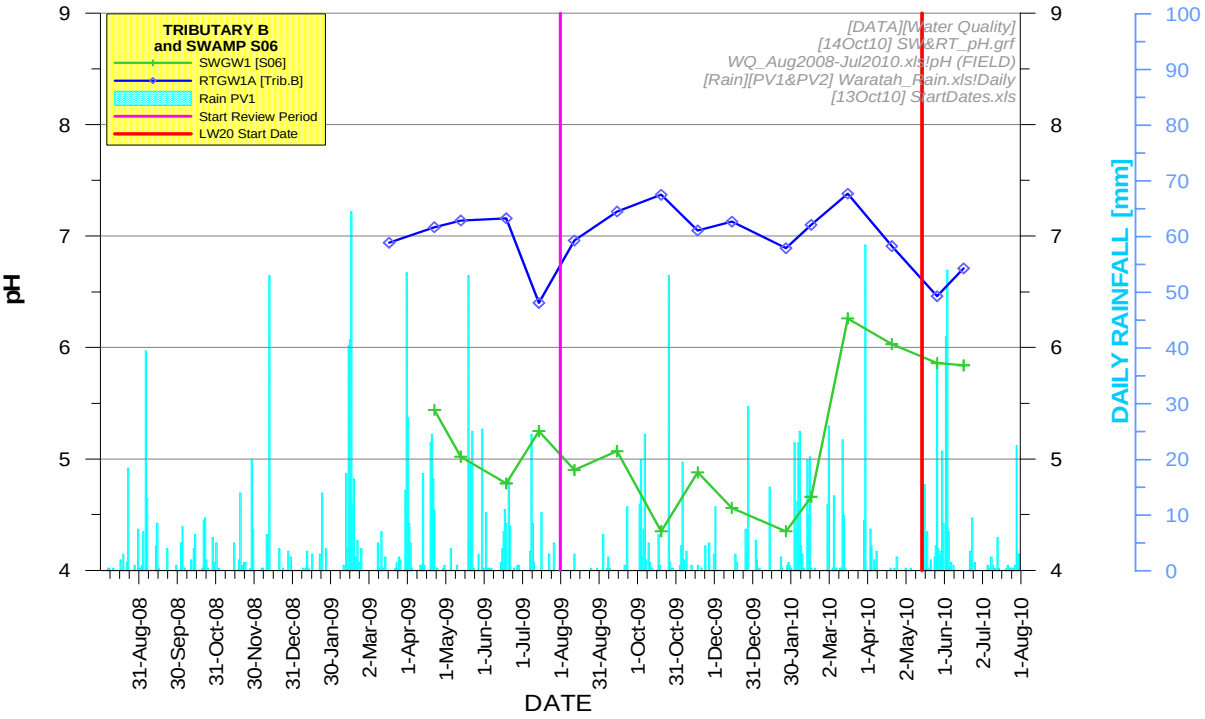


Chart 20 pH Levels at Sites RTGW1A and SWGW1

Inspections of Mine Workings

Metropolitan Coal has developed an In-rush Hazard Management Plan required by the *Coal Mines Health and Safety Regulation, 2006* to manage the potential risk of water in-rush. Shift inspections are conducted by statutory officials to report on any abnormal conditions at the working face and in outbye areas. Metropolitan Coal also conducts statutory weekly inspections of development workings to identify water accumulations and monthly inspections of the bleeder roadway (the roadway behind the longwall for signs of water make or water build-up). A weekly audit of the statutory inspections is conducted by the shift undermanager.

The mine inspections did not identify any abnormal water flows from the goaf, geological structure, or strata generally.

Mine Water Make

In accordance with the Water Management Plan, Metropolitan Coal has also monitored the mine water balance. The inferred water make (i.e. groundwater that has seeped into the mine through the strata) has been calculated from the difference between total mine inflows (reticulated water into the mine, moisture in the downcast ventilation, and the *in-situ* coal moisture content) and total mine outflows (reticulated water out of the mine, moisture in the exhaust ventilation, and moisture in the ROM coal).

Monitoring of the mine water balance comprises:

- Metered water reticulated into the mine (recorded continuously and downloaded monthly).
- Metered water reticulated out of the mine (recorded continuously and downloaded monthly).
- Manual measurement of moisture content into and out of the mine through the mine ventilation system using a digital psychrometer. The frequency of readings is as follows:
  - every hour over a 12 hour period on four occasions during a 12 month period;
  - every day for two weeks on two occasions during a 12 month period; and
  - otherwise once per week.

- Measurement of the *in-situ* moisture content of the coal during routine channel sampling for coal quality. Channel samples are collected every third cut-through in development driveage.
- Measurement of the moisture content of ROM coal conveyed out of the mine at the drift portal using an automated moisture scanner. Readings are continuous and downloaded monthly.

During the reporting period, the mine's data acquisition and recording hardware and software was updated which resulted in intermittent availability of metered data (refer Chart 21). The updated data acquisition system was commissioned in August 2010.

The automated moisture scanner was installed in March 2010, however, as noted above, recording has been limited due to the reconfiguration of the mine's data acquisition system. Since the automated moisture scanner was installed, 59 readings of the ROM coal moisture content have been recorded. The average ROM coal moisture content was 7.24% with a standard deviation of 0.05%. The low standard deviation indicates that the ROM coal moisture content is reasonably consistent. This is to be expected since the ROM coal is usually saturated as a consequence of the water used to manage dust and to cool cutting equipment during longwall mining operations.

Water Make Calculation Assumptions

The inferred water make (i.e. groundwater that has seeped into the mine through the strata) is calculated from the difference between total mine inflows (reticulated water into the mine, moisture in the downcast ventilation, and the *in-situ* coal moisture content) and total mine outflows (reticulated water out of the mine, moisture in the exhaust ventilation, and moisture in the ROM coal).

Given the large fluctuations in daily water usage and the cycle period for water entering the mine, being used by machinery, and draining to sumps for return pumping to the surface, a 20 day average is used to provide a more reliable estimate of water make.

The estimated daily water make during the reporting period is shown in Chart 21. The following assumptions were made in the estimation of water make:

- Where metered data was unavailable, no estimation of daily water make was calculated and the graph shows a gap.
- Where no air moisture measurement for the downcast ventilation was available for a given day, the average of all measured values was used (0.232 ML/day).
- Where no ROM coal moisture content was available for a given day, the average of all measured values was used (7.24%).
- The *in-situ* coal moisture content was assumed to be 1.5%.

The average daily water make during the reporting period was 0.1 ML/day (Chart 21).

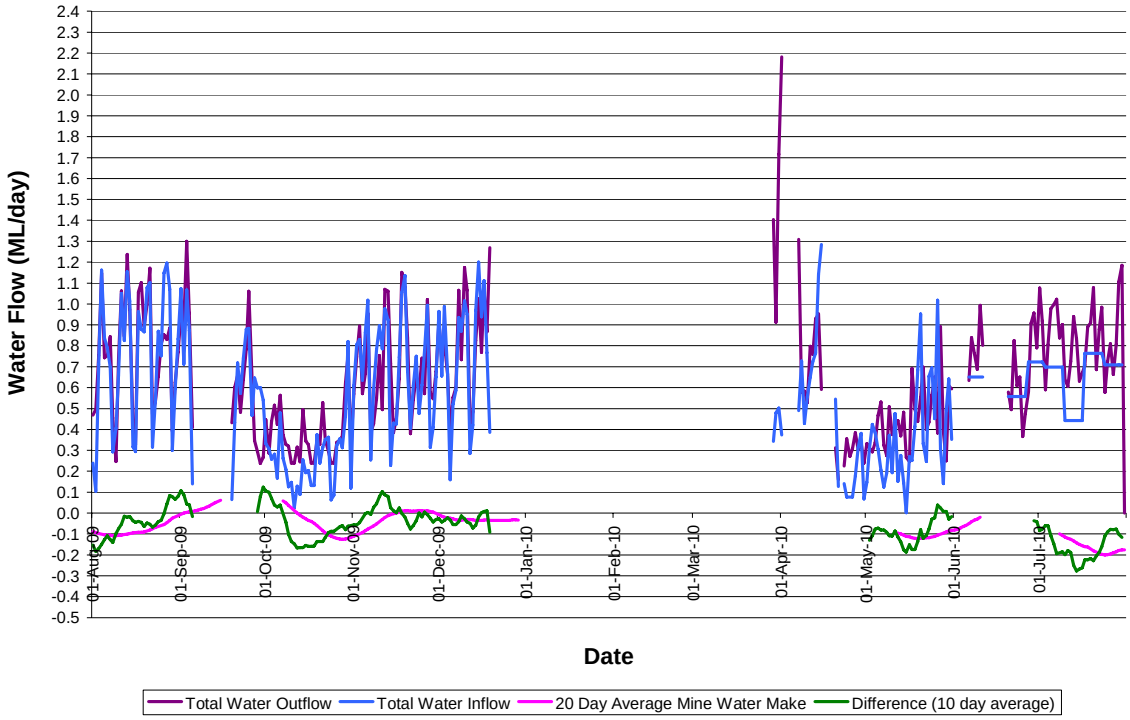


Chart 21 Estimated Daily Mine Water Make

3.3.3 Assessment of Environmental Performance

The performance indicators and subsidence impact performance measures described below have been developed to address the predictions of subsidence impacts and environmental consequences on water resources and water courses included in the EA, PPR and Extraction Plan.

Table 7 provides a summary of the performance of the Project against the water resource and watercourse performance indicators and subsidence impact performance measures.

The results of the assessment are described below.

Table 7
Assessment of Water Resource and Watercourse Performance Indicators and Measures

Subsidence Impact Performance Measure	Performance Indicator(s)	Performance Indicator Exceeded?	Performance Measure Exceeded?
Negligible reduction to the quantity of water resources reaching the Woronora Reservoir.	*Changes in the quantity of water entering Woronora Reservoir is not significantly different post-mining compared to pre-mining, that is not also occurring in the control catchment(s).*	No	No
Negligible reduction to the quality of water resources reaching the Woronora Reservoir.	*Changes in the quality of water entering Woronora Reservoir are not significantly different post-mining compared to pre-mining concentrations that are not also occurring at control site WOWQ2.*	No	No
No connective cracking between the surface and the mine.	*Visual inspection does not identify abnormal water flow from the goaf, geological structure, or the strata generally.*	No	No
	The 20-day average mine water make does not exceed 2 ML/day.	No	No
	Significant departures from the predicted envelope of vertical potentiometric head profiles at Bores 9FGW1B[1] and 9GGW1B do not occur.	No	No
Negligible leakage from the Woronora Reservoir.	*The groundwater head of Bores 9GGW2B and PM02 is higher than the water level of Woronora Reservoir (i.e. a hydraulic gradient exists from the bores to the Woronora Reservoir).*	No	No
Negligible reduction in the water quality of Woronora Reservoir.	*Changes in the quality of water in the Woronora Reservoir are not significantly different post-mining compared to pre-mining concentrations, that are not also occurring in the Nepean Reservoir (control site).*	To be assessed in the 2011 Annual Review following receipt of SCA data	
Negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases) on the Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P).	*Water in Pool P on Waratah Rivulet is observed overflowing the rock bar.*	No	No
	Analysis of pool water level data for Pool P on Waratah Rivulet indicates the pool is overflowing (i.e. the pool water levels are above its cease to flow level).	No	No
	Iron staining to be addressed in future Extraction Plans and revisions to the Water Management Plan.	No	No
	No gas releases observed at Pool P on the Waratah Rivulet.	No	No
Negligible environmental consequences over at least 70% of the stream length (that is no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining and minimal gas releases) of the Eastern Tributary between the full supply level of the Woronora Reservoir and the maingate of Longwall 26.	To be addressed in future Extraction Plans and revisions to the Water Management Plan.	Not applicable to Longwalls 20-22	

[1] The potentiometric head profile of bore 9FGW1 will be used to assess connective cracking once pressures in the bore have equilibrated following bore installation.

3.3.3.1 Quantity of Water Resources Reaching the Woronora Reservoir

Analysis against Performance Indicator

Performance Indicator: *Changes in the quantity of water entering Woronora Reservoir is not significantly different post-mining compared to pre-mining, that is not also occurring in the control catchment(s).*

Measured flow versus modelled flows in Waratah Rivulet and control streams will be analysed using catchment models on a six monthly basis from the commencement of Longwall 20. This analysis is due to commence in November 2010 (i.e. six months from May 2010) following the receipt of data from the SCA and will be presented in the 2011 Annual Review.

Specifically, the monitored flow rates on Waratah Rivulet and the control catchments will be integrated over successive 14 day periods to produce a smoothed set of data for comparison with the corresponding integrated flows (14 day totals) predicted by the AWBM of the same catchments.

The ratio of total monitored flow divided by AWBM predicted flow will be calculated at 14 day intervals commencing at the beginning of the baseline period and advancing beyond the commencement of Longwall 20 secondary extraction. The median of the ratios will be analysed over a sliding window of 1 year.

Analysis against Subsidence Impact Performance Measure

Consistent with the Water Management Plan, if data analysis indicates the performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the following subsidence impact performance measure. As described above, the performance indicator will be analysed on a six monthly basis from the commencement of Longwall 20.

Subsidence Impact Performance Measure:

Negligible reduction to the quantity of water resources reaching the Woronora Reservoir

The subsidence impact performance measure will be considered to have been exceeded if analysis of the monitoring and modelling results confirms that the Project has resulted in a greater than negligible reduction in the quantity of water resources reaching the Woronora Reservoir.

3.3.3.2 Quality of Water Resources Reaching the Woronora Reservoir

Water quality sampling is conducted on the Waratah Rivulet (site WRWQ9), Eastern Tributary (ETWQ2) and Woronora River (WOWQ2), near the inflow points to the Woronora Reservoir (Figure 8).

Monitoring of water quality in areas subject to mining indicates that the effects of subsidence on water quality have been most noticeable in iron, manganese, and to a lesser extent, aluminium (Gilbert and Associates, 2008). The field filtered water quality data for iron, manganese and aluminium has been analysed.

Water quality data from sites WRWQ9 and ETWQ2 collected following the commencement of Longwall 20 has been analysed against monitoring data collected at both sites prior to the commencement of Longwall 20 and against water quality data collected from site WOWQ2 on the Woronora River. Data analysis has been conducted to assess whether the performance indicator has been exceeded.

Analysis against Performance Indicator

Performance Indicator: *Changes in the quality of water entering Woronora Reservoir are not significantly different post-mining compared to pre-mining concentrations that are not also occurring at control site WOWQ2.*

The performance indicator is considered to have been exceeded if data analysis indicates a statistically significant change in the quality of water post mining of Longwall 20. Specifically if:

- any water quality parameter exceed the baseline mean plus two standard deviations for two consecutive months; or
- the sliding 12 month mean for any water quality parameter exceeds the baseline mean plus one standard deviation; and
- there was not a similar increase in the same measure at the control site.

The mean and standard deviation for each water quality parameter has been calculated from the baseline data and is presented in Table 8.

Table 8
Statistical Analysis of Water Quality Data

Site	Dissolved Aluminium (mg/L)	Dissolved Iron (mg/L)	Dissolved Manganese (mg/L)
Waratah Rivulet (WRWQ9)[1]			
Mean for baseline period	0.024	0.177	0.037
Standard deviation for baseline period	0.026	0.095	0.017
Eastern Tributary (ETWQ2)[2]			
Mean for baseline period	0.052	0.363	0.059
Standard deviation for baseline period	0.039	0.177	0.024
Woronora River (WOWQ2)[3]			
Mean for baseline period	0.044	0.11	0.027
Standard deviation for baseline period	0.025	0.24	0.016

[1] Baseline data for WRWQ9 from 27/9/2006 to 7/7/2010.

[2] Baseline data for ETWQ2 from 28/1/2010 to 8/4/2010.

[3] Baseline data for WOWQ2 from 12/10/2007 to 7/7/2010.

Plots showing the post Longwall 20 monitoring data in relation to the baseline mean plus 2 standard deviations are shown on Charts 22 to 30. Charts 22 to 30 indicate that the performance indicator has not been exceeded during the reporting period.

The sliding 12 month mean for the water quality parameter will be calculated once sufficient post Longwall 20 data becomes available.

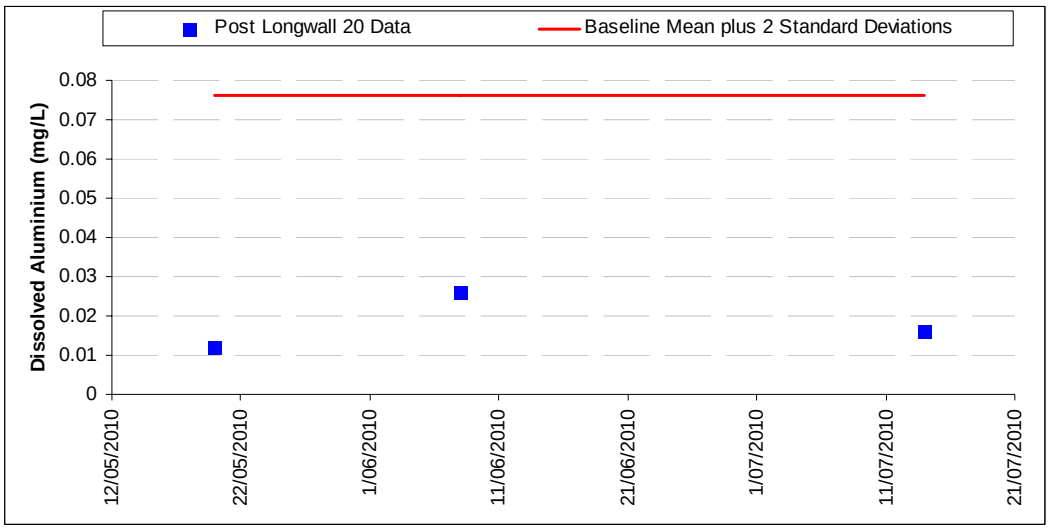


Chart 22 **Comparison of Dissolved Aluminium Concentrations Post Longwall 20 with Baseline Data – Waratah Rivulet (WRWQ9)**

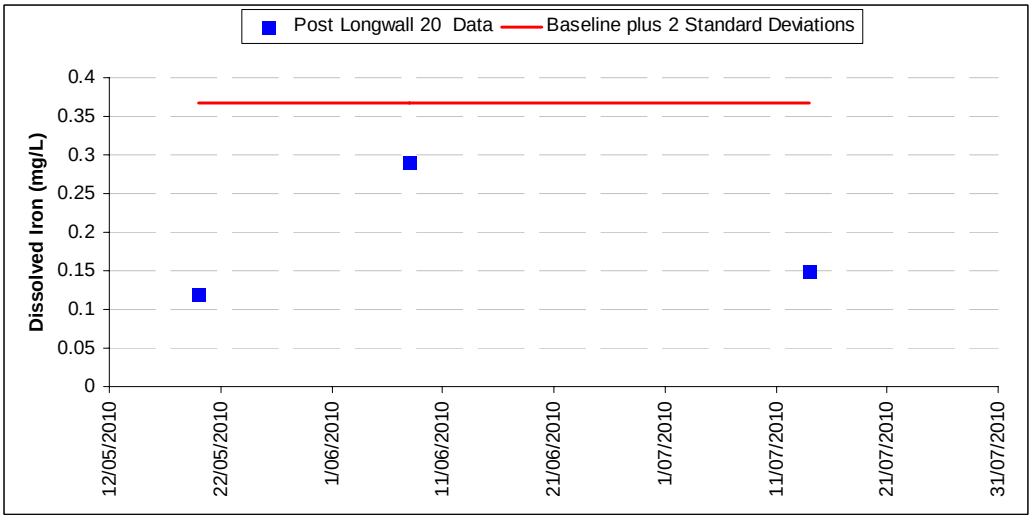


Chart 23 **Comparison of Dissolved Iron Concentrations Post Longwall 20 with Baseline Data – Waratah Rivulet (WRWQ9)**

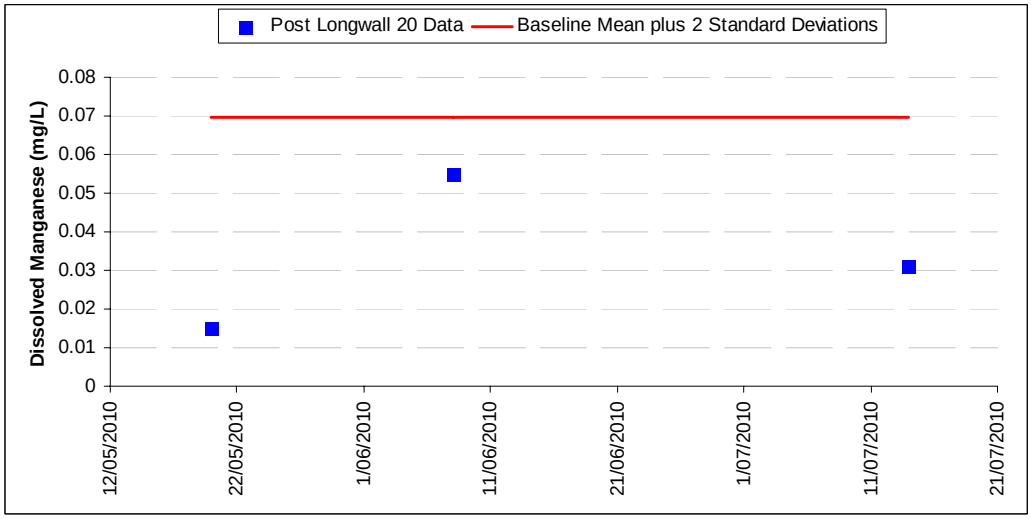


Chart 24 **Comparison of Dissolved Manganese Concentrations Post Longwall 20 with Baseline Data – Waratah Rivulet (WRWQ9)**

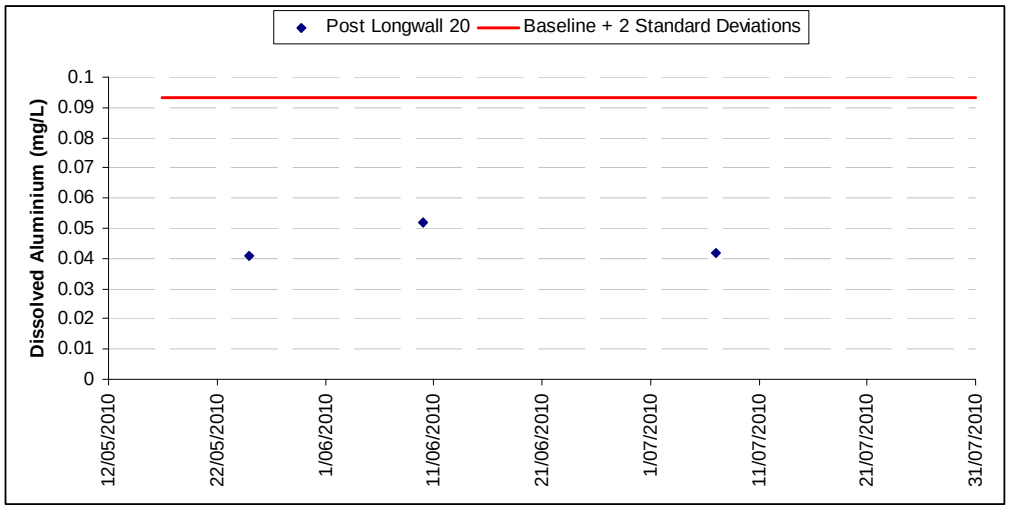


Chart 25 **Comparison of Dissolved Aluminium Concentrations Post Longwall 20 with Baseline Data – Woronora River (WOWQ2)**

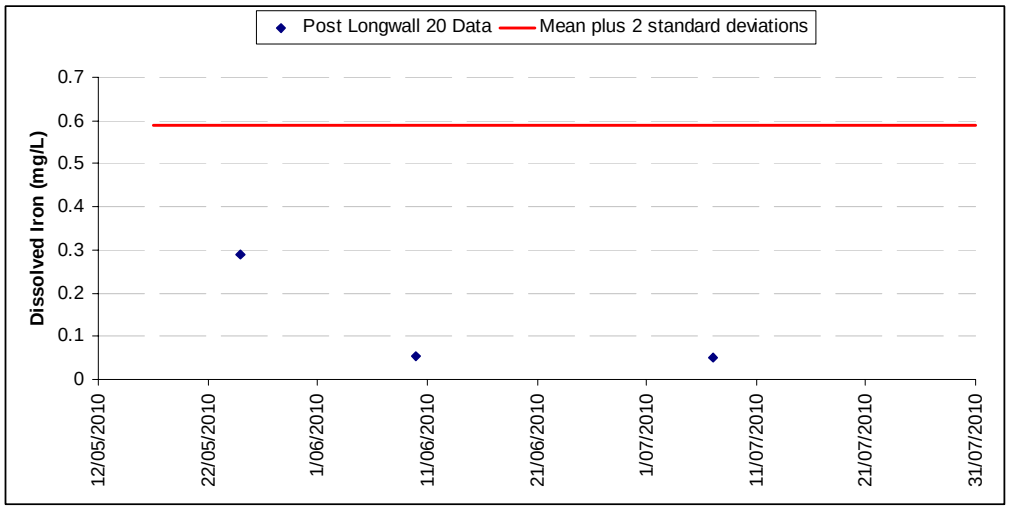


Chart 26 **Comparison of Dissolved Iron Concentrations Post Longwall 20 with Baseline Data – Woronora River (WOWQ2)**

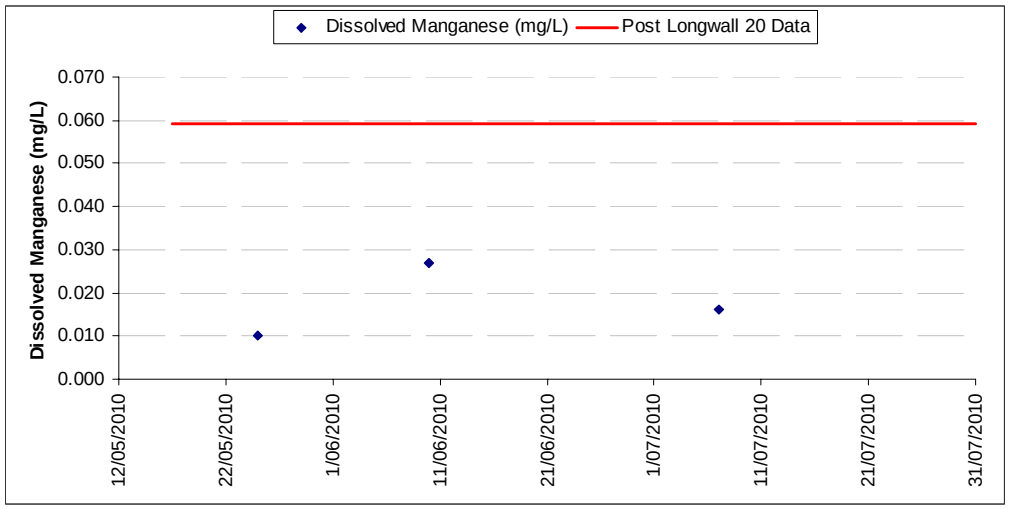


Chart 27 **Comparison of Dissolved Manganese Concentrations Post Longwall 20 with Baseline Data – Woronora River (WOWQ2)**

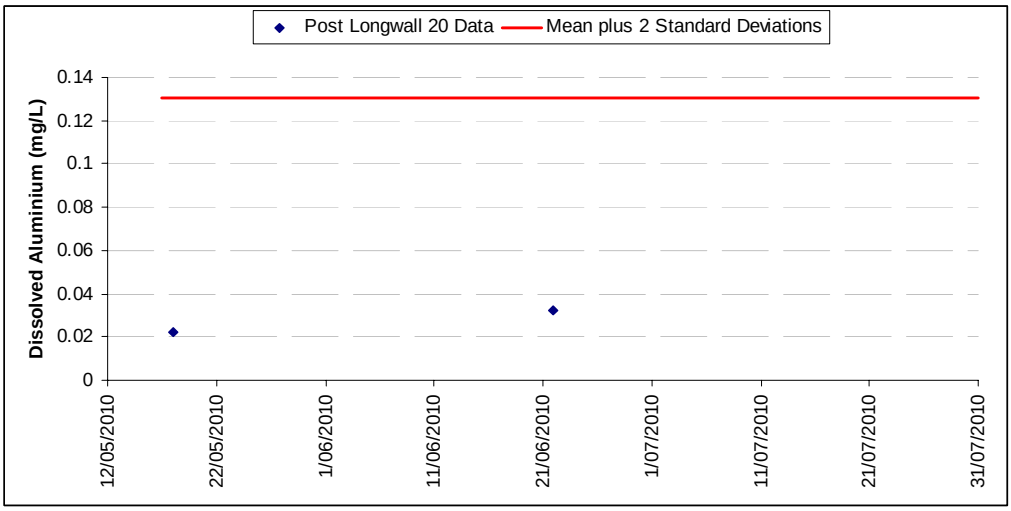


Chart 28 **Comparison of Dissolved Aluminium Concentrations Post Longwall 20 with Baseline Data – Eastern Tributary (ETWQ2)**

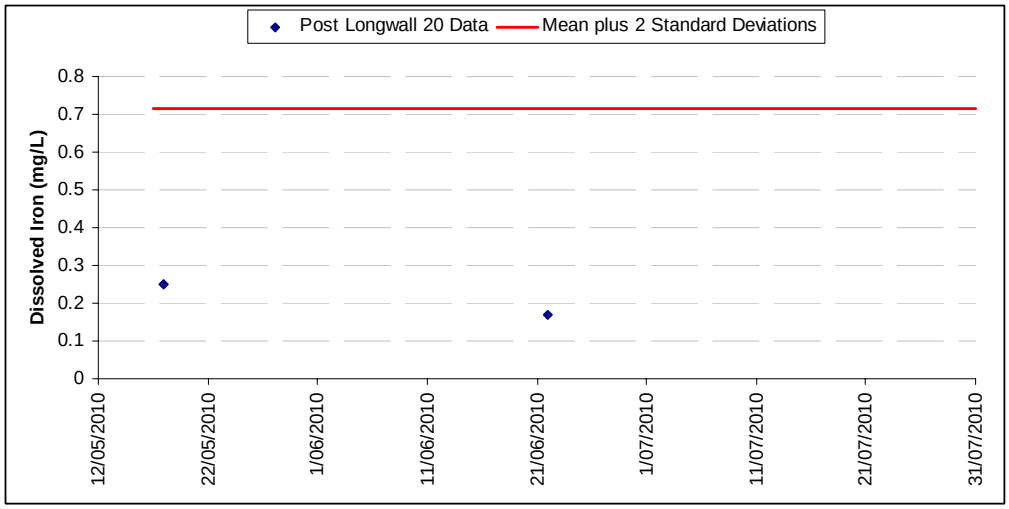


Chart 29 **Comparison of Dissolved Iron Concentrations Post Longwall 20 with Baseline Data – Eastern Tributary (ETWQ2)**

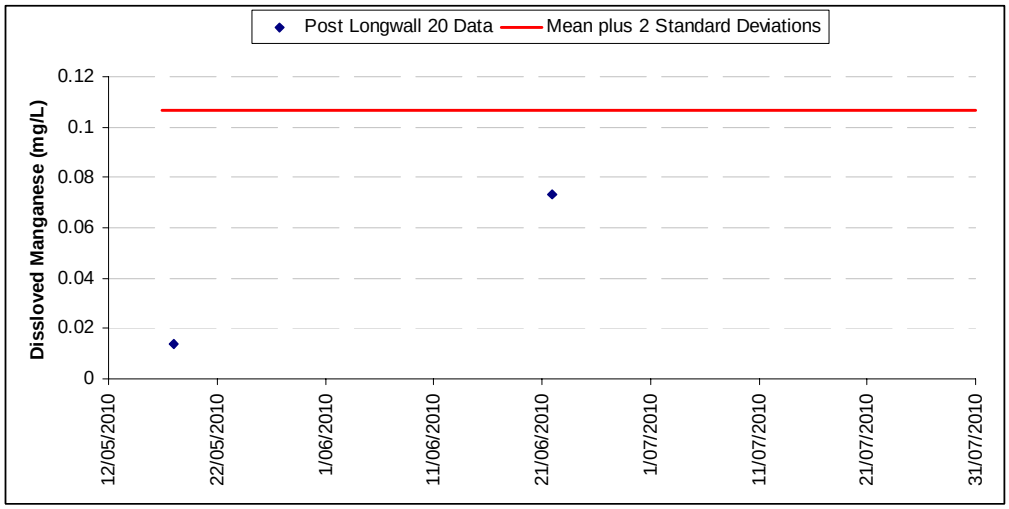


Chart 30 **Comparison of Dissolved Manganese Concentrations Post Longwall 20 with Baseline Data – Eastern Tributary (ETWQ2)**

Analysis against Subsidence Impact Performance Measure

Consistent with the Water Management Plan, if data analysis indicates the performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the following subsidence impact performance measure. The performance indicator was not exceeded during the reporting period.

Subsidence Impact Performance Measure:

Negligible reduction to the quality of water resources reaching the Woronora Reservoir.

3.3.3.3 Connective Cracking between the Surface and the Mine

Analysis against Performance Indicator 1

Performance Indicator 1: *Visual inspection does not identify abnormal water flow from the goaf, geological structure, or the strata generally.*

The performance indicator is considered to have been exceeded if visual inspections identify abnormal water flow from the goaf, geological structure, or the strata generally.

The mine inspections did not identify any abnormal water flows from the goaf, geological structure, or strata.

This performance indicator was not exceeded during the reporting period.

Analysis against Performance Indicator 2

Performance Indicator 2: *The 20-day average mine water make does not exceed 2 ML/day.*

The performance indicator is considered to have been exceeded if data analysis indicates the 20 day average mine water make exceeds 2 ML/day.

The 20 day average daily mine water make was 0.1 ML/day and the maximum 20 day average water make was 0.2 ML/day.

This performance indicator was not exceeded during the reporting period.

Analysis against Performance Indicator 3

Performance Indicator 3: *Significant departures from the predicted envelope of vertical potentiometric head profiles at Bores 9FGW1B and 9GGW1B do not occur.*

The performance indicator is considered to have been exceeded if the measured potentiometric head profile is inconsistent in shape or lies significantly to the left of the predicted high-inflow model curve.

Site 9FGW1B is located approximately 600 m west of Longwall 21 and site 9GGW1B is located over Longwall 22. The measured vertical head profiles are presented in Chart 31 as average heads over the reporting period with variability indicated by one standard deviation either side of the average. The measured profiles are compared with simulated profiles at the end of Longwall 18.

Monitoring data recorded at site 9FGW1B is unreliable as the piezometers in the Stanwell Park Claystone and Bulli Coal seam have not stabilised. Once this piezometer has stabilised, the relevant analysis will be conducted and reported in the next Annual Review.

Site 9GGW1B has stabilised and recorded reliable data. The measured profile agrees well with the simulated profiles except at the higher elevations in the Hawkesbury Sandstone. The higher elevations in the Hawkesbury Sandstone are not considered significant and indicate that the model requires re-calibration within the next reporting period.

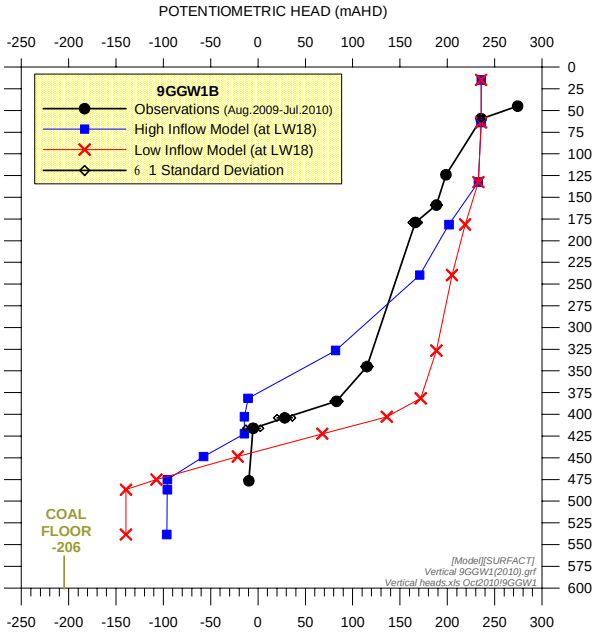


Chart 31 Measured and Simulated Potentiometric Head Profiles at Indicator Site 9GGW1B

The performance indicator was not exceeded during the reporting period.

Analysis against Subsidence Impact Performance Measure

Consistent with the Water Management Plan, if data analysis indicates the performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the following subsidence impact performance measure. The performance indicators were not exceeded during the reporting period.

Subsidence Impact Performance Measure:

No connective cracking between the surface and the mine.

3.3.3.4 Leakage from the Woronora Reservoir

Analysis against Performance Indicator

Performance Indicator: *The groundwater head of Bores 9GGW2B and PM02 is higher than the water level of Woronora Reservoir (i.e. a hydraulic gradient exists from the bores to the Woronora Reservoir).*

The performance indicator is considered to have been exceeded if the 7-day average potentiometric head at the uppermost piezometer is less than the reservoir water level for one week.

The 7-day average groundwater levels in the uppermost piezometers in the Hawkesbury Sandstone at sites 9GGW2B and PM02 are presented in Chart 32. Comparison with the maximum possible Woronora Reservoir water level shows a clearance of more than 15 m at 9GGW2B and more than 65 m at PM02.

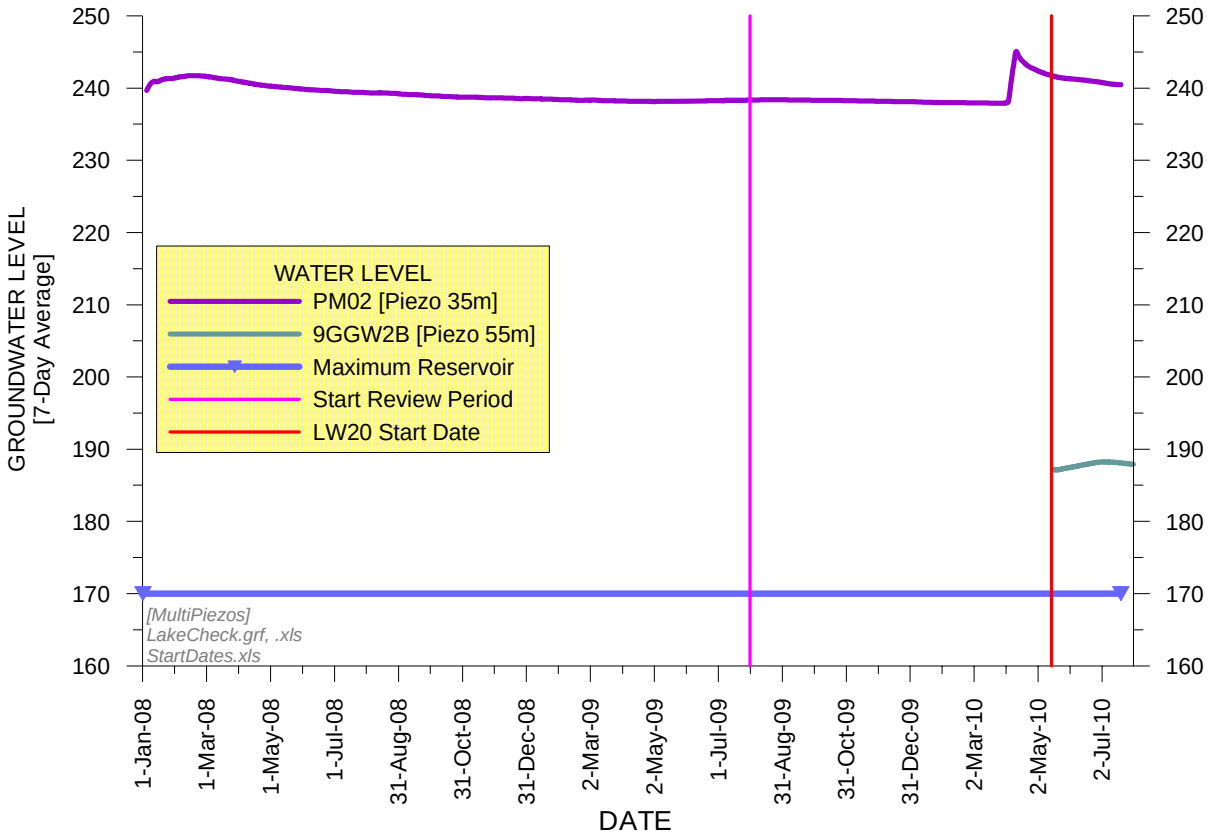


Chart 32 7-day Average Groundwater Levels at Sites 9GGW2B and PM02

This performance indicator was not exceeded during the reporting period.

Analysis against Subsidence Impact Performance Measure

Consistent with the Water Management Plan, if data analysis indicates the performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the following subsidence impact performance measure. The performance indicator was not exceeded during the reporting period.

Subsidence Impact Performance Measure: *Negligible leakage from the Woronora Reservoir.*

3.3.3.5 Woronora Reservoir Water Quality

Metropolitan Coal will source surface water quality data for the Woronora Reservoir (site DW01, measurements taken from 0 to 9 m below the water surface level) and Nepean Reservoir from the SCA in accordance with a data exchange agreement.

Consistent with the monitoring of water reaching the Woronora Reservoir, the water quality data will be analysed for key water quality parameters of relevance to water supply and effects of subsidence, namely, iron, manganese and aluminium.

Water quality data from site DW01 collected following the commencement of Longwall 20 will be analysed against monitoring data collected at site DW01 prior to the commencement of Longwall 20 and against water quality data collected from the Nepean Reservoir. Data analysis will be conducted to assess whether the performance indicator has been exceeded.

Analysis against Performance Indicator

Performance Indicator: *Changes in the quality of water in the Woronora Reservoir are not significantly different post-mining compared to pre-mining concentrations, that are not also occurring in the Nepean Reservoir (control site).*

The performance indicator is considered to have been exceeded if data analysis indicates a statistically significant change in the quality of water post-mining, specifically if:

- any water quality parameter's exceed the baseline mean plus two standard deviations for two consecutive months; or
- the sliding 12 month mean for any water quality parameter exceeds the baseline mean plus one standard deviation; and
- there was not a similar increase in the same measure at the control site.

Metropolitan Coal will source water quality data for the Woronora Reservoir, Nepean Reservoir and Cataract Reservoir from the SCA in accordance with a data exchange agreement. Analysis of the results will be included in the 2011 Annual Review.

Analysis against Subsidence Impact Performance Measure

Consistent with the Water Management Plan, if data analysis indicates the performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the following subsidence impact performance measure. As described above, analysis of the Woronora River water quality performance indicator will be included in the 2011 Annual Review.

Subsidence Impact Performance Measure:

Negligible reduction in the water quality of Woronora Reservoir.

3.3.3.6 Waratah Rivulet Downstream of Maingate 23

Analysis against Performance Indicator 1

Performance Indicator 1: *Water in Pool P on Waratah Rivulet is observed overflowing the rock bar.*

Inspections of Pool P on the Waratah Rivulet will be conducted weekly when mining is within 400 m of this pool. The performance indicator will be considered to have been exceeded if the water level in Pool P has been observed at or below the pool's cease to flow level (i.e. the pool has stopped overflowing).

Mining has not been within 400 m of Pool P during the reporting period.

Analysis against Performance Indicator 2

Performance Indicator 2: *Analysis of pool water level data for Pool P on Waratah Rivulet indicates the pool is overflowing (i.e. the pool water levels are above its cease to flow level).*

Pool P on the Waratah Rivulet and control Pools WRP1, WRP2, WRP3 and WRP4 on the Woronora River has been monitored continuously with a data logger. The performance indicator is considered to have been exceeded if the water level in Pool P has been recorded at or below the pool's cease to flow level (i.e. the pool has stopped overflowing).

Monitored pool water level data for Pool P is shown on Chart 33.

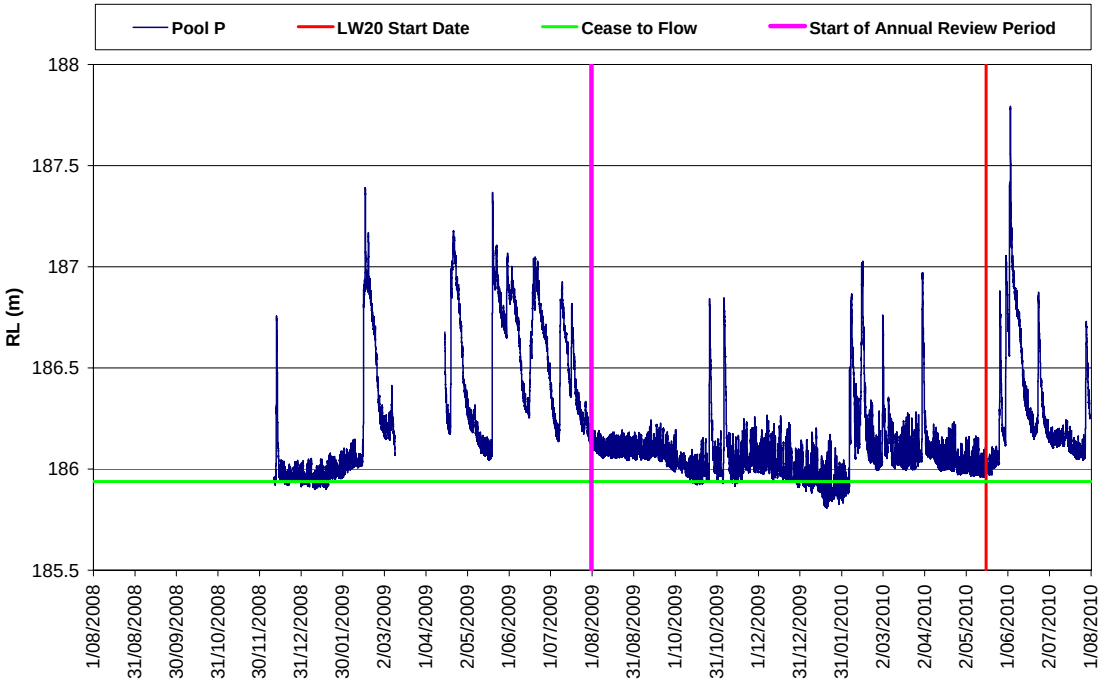


Chart 33 Pool P Water Level

The monitoring data for Pool P shows evidence of daily temperature fluctuations which are superimposed on the recorded water level data. These oscillations have also occurred at other Metropolitan Coal pool water level meters during the reporting period. Metropolitan Coal is in the process of upgrading the pool water level meter instrumentation in order to remove these fluctuations.

It is considered that the water level in Pool P has generally remained above the cease to flow level over the period of available data. The recorded pool water level response is consistent with natural pool behaviour of pools. The oscillations resulting from the temperature fluctuations occur prior to the commencement of Longwall 20.

This performance indicator was not exceeded during the reporting period.

Analysis against Performance Indicator 3

Performance Indicator 3: *No gas releases observed at Pool P on the Waratah Rivulet.*

Pool P will be monitored for gas releases on a monthly basis when valley closure (as measured by ridge to ridge survey points) is greater than 20 mm/month. The performance indicator will be considered to have been exceeded if gas releases are observed at Pool P on the Waratah Rivulet.

Valley closure at Pool P has not been greater than 20 mm/month during the reporting period.

Analysis against Subsidence Impact Performance Measure

Consistent with the Water Management Plan, if data analysis indicates the performance indicator has been exceeded or is likely to be exceeded, an assessment will be made against the following subsidence impact performance measure. The performance indicators were not exceeded during the reporting period.

Subsidence Impact Performance Measure:

Negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases) on the Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P).

The subsidence impact performance measure, *no diversion of flows, no change in the natural drainage behaviour of pools*, is considered to have been exceeded if a performance indicator has been exceeded as a result of the Project and the drop in pool water level cannot be explained by climatic conditions.

The subsidence impact performance measure, *minimal iron staining*, will be assessed as a component of the Longwalls 23-27 Extraction Plan.

The subsidence impact performance measure, *minimal gas releases*, is exceeded if analysis of the monitoring results confirms that the Project has resulted in a greater than minimal gas releases on the Waratah Rivulet downstream of maingate 23.

3.3.4 Management and Mitigation Measures

Waratah Rivulet Stream Remediation

In accordance with Condition 1, Schedule 6 of the Project Approval, Metropolitan Coal is required to achieve the rehabilitation objective, *Restore surface flow and pool holding capacity as soon as reasonably practicable* for Waratah Rivulet, between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir.

Stream remediation activities have commenced at Pools A and F on the Waratah Rivulet in accordance with approvals obtained from the SCA under Part 5 of the EP&A Act. The rock bars at Pools A and F are considered to largely control the pools located upstream of these rockbars. As a result, Metropolitan Coal anticipates that the restoration of surface flow and pool holding capacity at Pools A and F will restore the surface flow and pool holding capacity of pools between Flat Rock Swamp and Pool F. Metropolitan Coal will assess whether stream remediation is required at any additional pools/rock bars between Flat Rock Swamp and Pool F once stream remediation activities at Pools A and F have been completed. Stream remediation activities are described further in Section 3.11.

Stream remediation will be initiated at Pools G, G1, H, I, J, K, L, M, M1, N and O on the Waratah Rivulet if the water level in a pool falls below its cease to flow level (i.e. stops overflowing), except if as a result of climatic conditions. The control pools on Woronora River will be inspected (for a similar response).

Analysis of pool water levels is provided n Section 3.11.

Monitoring of Subsidence at Waratah Rivulet Gauging Station

A subsidence survey line has been installed at the Waratah Rivulet gauging station to monitor conventional and non-conventional subsidence magnitudes at this location. If monitoring identifies subsidence effects at this location, Metropolitan Coal will consult with the SCA and conduct a review of the hydrological performance of the gauging station including analysis of the rating curve and separately an analysis of the recession model. No subsidence effects were recorded at this location during the reporting period.

3.3.5 Further Initiatives

In accordance with the Catchment Monitoring Program and Water Management Plan, Metropolitan Coal has proposed to upgrade the SCA-owned gauging stations on Waratah Rivulet (GS 2132102) and Woronora River (GS 2132101) to increase the accuracy of surface water flow data.

In accordance with Condition 4, Schedule 7 of the Project Approval, Metropolitan Coal will revise the Water Management Plan following the submission of this Annual Review in response to consultation undertaken with regulatory agencies. The Water Management Plan will be revised to the satisfaction of the Director-General of the Department of Planning.

Metropolitan will continue to monitor and assess data quality from the deep piezometer bores, particularly those piezometers exhibiting relatively long equilibration times in low permeability strata.

3.4 BIODIVERSITY MANAGEMENT PLAN

3.4.1 Background

A Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan has been prepared to manage the potential environmental consequences of the Extraction Plan on aquatic and terrestrial flora and fauna, with a specific focus on swamps, in accordance with Condition 6, Schedule 3 of the Project Approval.

3.4.2 Monitoring

3.4.2.1 Upland Swamp Vegetation Monitoring

Eight upland swamps, *viz*. Swamps 16, 17, 18, 20, 23, 24, 25 and 26 have been mapped above or immediately adjacent to Longwalls 20-22 (Figure 12). A swamp substrate characterisation study has also been conducted to contribute to Metropolitan Coal's understanding of the ecological, hydrological and geomorphic processes of swamps over Longwalls 20-22.

With the exception of in-valley Swamp 20, which supports tea tree thicket, all swamps over Longwalls 20-22 are small valley-side swamps and comprise restioid heath, with intergrades with banksia thicket. Transitions between restioid heath and banksia thicket are thought to be driven by fire frequency.

Three swamps (Swamps 16, 17 and 23), although showing seepage are more akin to sandstone heath woodland with low tree densities. The vegetation contains species found in upland swamps, mixed with a range of non-swamp species.

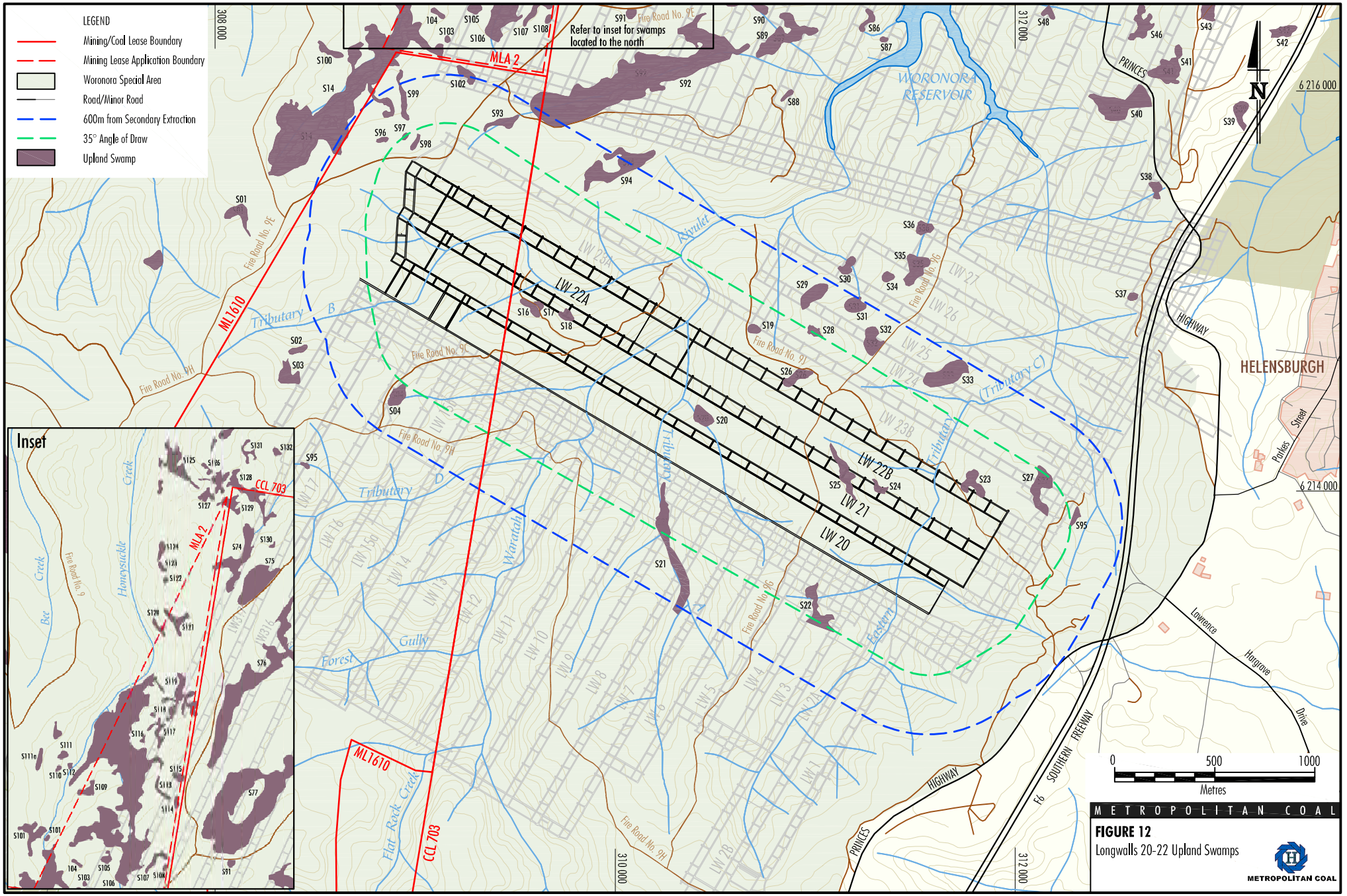
Swamps 101, 111a and 125 have been selected as control sites for the restioid heath/banksia thicket valley-side swamps (Figure 12) and Swamps Woronora River 1, Woronora River South Arm and Dahlia Swamp have been selected as control sites for the tea tree thicket vegetation of Swamp 20 (Figure 13).

The upland swamp vegetation monitoring program includes visual monitoring, transect/quadrat monitoring and monitoring of indicator species, as described below.

Visual Inspections

Baseline visual inspections of the swamps overlying and immediately adjacent to Longwalls 20-22 and at the control swamps have been conducted in spring 2009 and autumn 2010 at the same time as the vegetation surveys.

Visual inspections will also be conducted monthly for the period of time that Longwall 20 is within 400 m of a swamp to record evidence of potential subsidence impacts.



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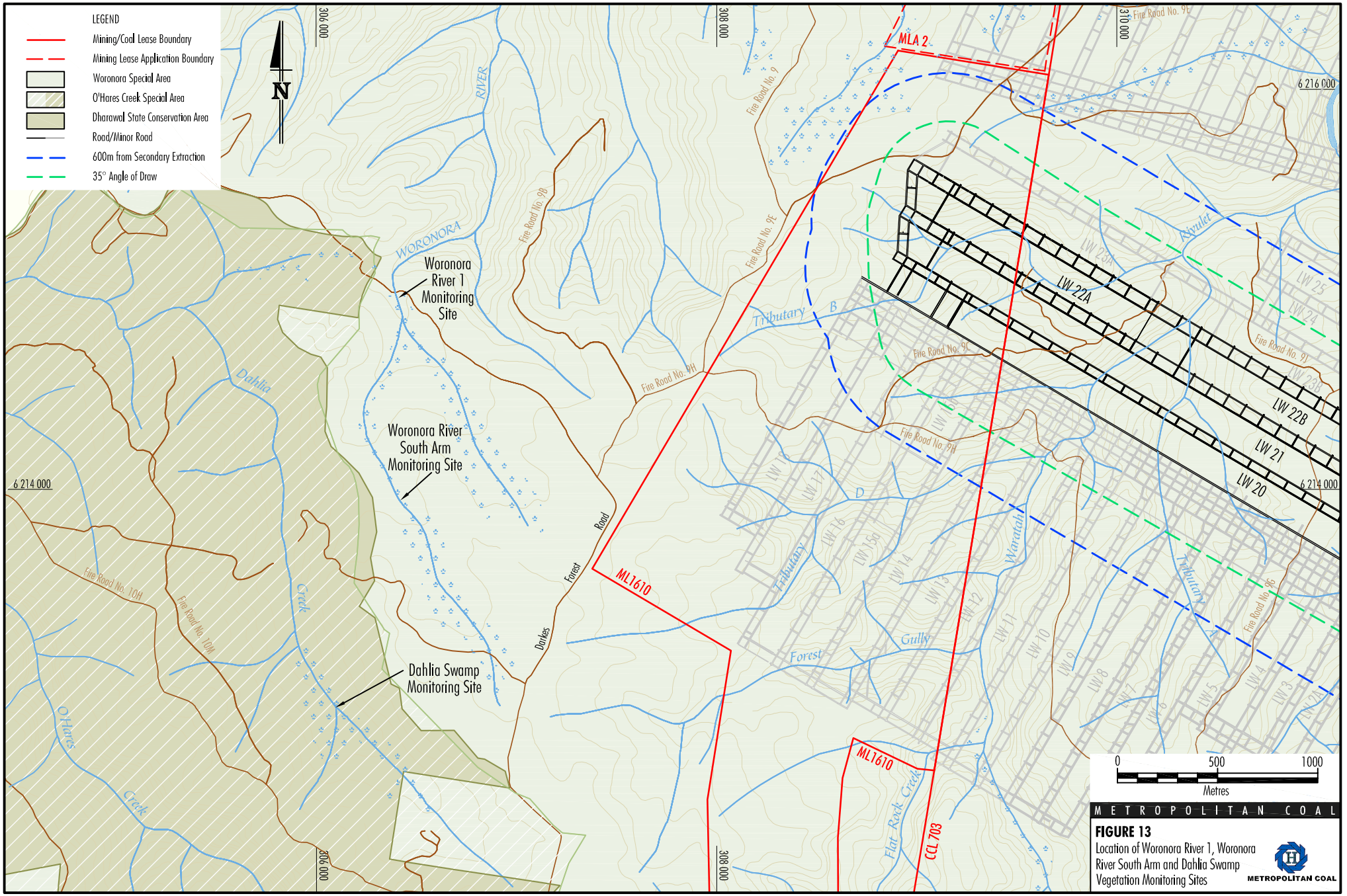

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Traverses covering the majority of the extent of the swamp are conducted to record:

- cracking of exposed bedrock areas and/or swamp sediments;
- areas of increased erosion, particularly along any existing drainage line;
- any changes in water colour;
- changes in vegetation condition, including areas of senescing vegetation that appear unusual; and
- the amount of seepage at the time of inspection, relative to recent rainfall events.

Photographs of any cracking, erosion, water colour changes and vegetation senescence are taken, concurrently with a description of the magnitude and extent of the observations, and appropriate global positioning system (GPS) readings. Seepage is documented by photographs of flow over exposed surfaces.

No major cracking of exposed bedrock areas or swamp sediments, areas of increased erosion, changes in water colour or vegetation condition were observed during the visual inspections. Minor surface cracking of exposed sandstone outcrops was observed in several swamps where vegetation has opportunistically grown, for example Swamps 17 and 23; and rock displacement has been recorded in the lower end of Swamp 24 within a drainage channel. Such features have been included in the photographic record.

Transect/Quadrat Monitoring

Baseline transect and quadrat monitoring has been conducted in spring 2009 and autumn 2010 of:

- restioid heath vegetation – Swamps 18, 24 and 25 overlying Longwalls 20-22, and in control swamps 101, 111a and 125 (Figure 12); and
- tea tree thicket vegetation – Swamp 20 overlying Longwalls 20-22, and in control swamps Woronora River 1, Woronora River South Arm and Dahlia Swamp (Figures 12 and 13).

Swamps 16 and 17 (restioid heath/sandstone heath woodland) were also added to the vegetation monitoring program in autumn 2010 (Figure 12).

Each swamp has been monitored with three transects, with the exception of the control swamps for Swamp 20 where only a single transect has been established owing to the much larger size of the control swamps.

For the restioid heath swamps, assessments have been made on 1 square metre (m^2) quadrats centred on the transect line every 5 m starting from 0 m. For the tea tree thicket swamps, assessments have been made on 1 m^2 quadrats located upslope of the transect line with one quadrat edge located on the line every 5 m starting from 0 m as a means of avoiding the impacts of vegetation trampling as a result of access into these thickly vegetated swamps.

The data collected for each quadrat includes:

- vegetation structure;
- dominant species;
- estimated cover and height for each stratum;
- full floristics;
- estimated cover abundance for each species using seven point Braun-Blanquet scale; and
- condition/health rating for each species in the quadrat.

Permanent photo points have been established along each transect.

In summary, the results of the baseline surveys indicate the following:

- Generally, vegetation at all sites was in a healthy condition throughout the survey period.
- Fluctuations in species cover and vegetation condition were recorded across all sites.
- Fluctuations in species richness were similar between longwall sites and control sites over the survey period.
- At several longwall and control sites there was a general trend in growth recorded over the survey period through increases in vegetation height and cover, particularly for species in the mid and/or lower stratum, for example *Banksia ericifolia* subsp. *ericifolia, Hakea teretifolia* and *Epacris obtusifolia.*
- Minor dieback (rating 4) to some dead branches (rating 3) was noted in random individuals at all longwall and control sites irrespective of survey season. Such species include *Banksia ericifolia* subsp. *ericifolia, Saropsis fastigiatus, Petrophile pulchella, Leptopsermum squarrosum* and *Xanthorrhoea resinosa*.
- Patches of senescent vegetation were also recorded in several swamps, for example at the end of Transect 3 in Swamp 25 (longwalls) where a patch of dead *Banksia ericifolia* subsp. *ericifolia* was observed, and between Transects 1 and 2 in Swamp 125 (control) where a patch of dead *Banksia ericifolia* subsp. *ericifolia* and *Banksia marginata* was found.
- A number of longwall and control sites recorded fluctuating cover values.
- No weeds were recorded within any of the sites.

The changes in species composition, cover and condition reflect normal population variation and cycles in response to seasonal variations and plant growth.

The baseline monitoring data provides a benchmark against which changes or trends in vegetation structure, species composition and vegetation condition can be measured during and after the mining of Longwalls 20-22.

Transect and quadrat monitoring will be conducted bi-annually in autumn and spring.

Indicator Species

Baseline population monitoring of indicator species has been conducted in spring 2009 and autumn 2010.

Twenty tagged individuals of *Epacris obtusifolia*, *Sprengelia incarnata* and *Pultenaea aristata* have been monitored in each of the following valley side swamps:

- *Epacris obtusifolia* – Swamps 18, 24 and 25 above Longwalls 20-22 and at control sites 101, 111a and 125.
- *Sprengelia incarnata* – Swamp 24 above Longwalls 20-22 and at control sites 101 and 125.
- *Pultenaea aristata* – Swamps 18, 24 and 25 above Longwalls 20-22 and at control sites 101 and 111a. Note, survey of *Pultenaea aristata* in Swamp 24 commenced in autumn 2010.

Twenty tagged individuals of *Banksia robor, Callistemon citrinus* and *Leptospermum juniperinum* have also been monitored in Swamp 20 and at the associated control sites (Woronora River 1, Woronora River South Arm and Dahlia Swamp).

Population monitoring data collected includes a condition/health rating and a reproductive rating for each plant.

The baseline monitoring data provides a benchmark against which the health and reproductive rating of the indicator species can be measured during and after the mining of Longwalls 20-22.

Monitoring of indicator species will be conducted bi-annually in autumn and spring.

3.4.2.2 Upland Swamp Groundwater Monitoring

Groundwater monitoring of upland swamps has involved the use, where practicable, of paired (shallow and deep) piezometers. Where a shallow piezometer has not been practicable to install due to the depth of the swamp sediments, deeper piezometers have been installed. Piezometers were installed in the following upland swamps during July 2010 (Figures 9, 12 and 13):

- Valley side Swamps 16/17 overlying Longwalls 20-22 (sandstone piezometer to a depth of 10 m).
- Valley side Swamp 25 overlying Longwalls 20-22 (swamp substrate piezometer to a depth of 0.9 m and sandstone piezometer to a depth of 10 m).
- Valley side Swamp 101 (control - swamp substrate piezometer to a depth of 0.9 m and sandstone piezometer to a depth of 10 m).
- In-valley Swamp 20 overlying Longwalls 20-22 (swamp substrate piezometer to a depth of 0.9 m and sandstone piezometers to depths of 3 and 10 m).
- Headwater Swamp Woronora River 1 (control - swamp substrate piezometer to a depth of 0.9 m and sandstone piezometers to depths of 3 and 10 m).

The upland swamp groundwater monitoring results for the above sites will be described in the next Annual Review.

3.4.2.3 Riparian Vegetation Monitoring

The riparian vegetation monitoring program includes visual, quadrat, transect and indicator species monitoring of riparian vegetation on the Waratah Rivulet and Eastern Tributary, as described below.

Visual Inspections

Baseline visual inspections of riparian areas have been conducted in spring 2008, autumn 2009, spring 2009 and autumn 2010 in locations adjacent to riparian vegetation monitoring sites (sites MRIP01 to MRIP10, Figure 14), and areas traversed whilst accessing the monitoring sites, to record:

- areas of new water ponding;
- any cracking or rock displacement; and
- changes in vegetation condition, including areas of senescing vegetation that appear unusual.

Photographs of any new water ponding, cracking/rock displacement and vegetation senescence are taken, concurrently with a description of the magnitude and extent of the observations, and appropriate GPS readings.

No cracking or rock displacement or senescing vegetation that appears unusual were observed during the visual inspections.

Visual inspections of riparian vegetation will be conducted bi-annually in autumn and spring at the time of the vegetation surveys.

Quadrat/Transect Monitoring

Baseline quadrat and transect monitoring has been conducted in spring 2008, autumn 2009, spring 2009 and autumn 2010.

A permanent quadrat (20 m x 2 m) has been used to monitor riparian vegetation on the Waratah Rivulet and Eastern Tributary at sites MRIP01, MRIP02, MRIP05 and MRIP06 (overlying Longwalls 20-22) and at sites MRIP03, MRIP04, MRIP07 and MRIP08 (downstream of Longwalls 20-22) (Figure 14).

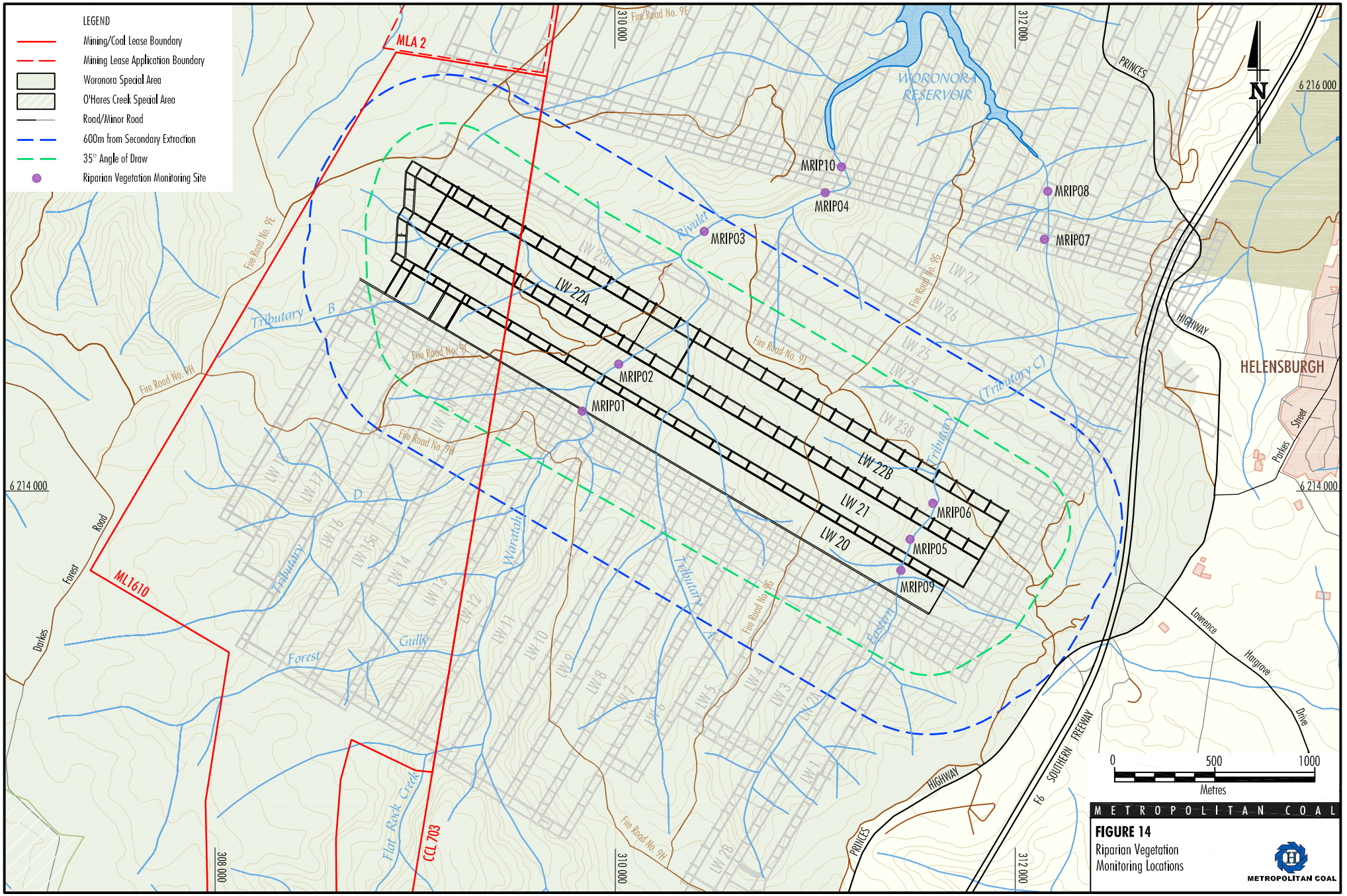

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FIGURE 14

Riparian Vegetation Monitoring Locations

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The data collected for each quadrat includes:

- vegetation structure;
- dominant species;
- estimated cover and height for each stratum;
- full floristics;
- estimated cover abundance for each species using seven point Braun-Blanquet scale; and
- condition/health rating for each species in the quadrat:

A permanent transect (50 m x 2 m, i.e. a 30 m extension of each quadrat) has also been used to monitor riparian vegetation at sites MRIP01 to MRIP08. The data collected along each transect includes the occurrence of weed species (species and location) and a condition/health rating for each plant along the transect.

Permanent photo points have been established for each quadrat and along each transect.

In summary, the results of the baseline surveys indicate the following:

- Generally, the vegetation at all sites was in a healthy condition throughout the survey period.
- Fluctuations in species cover and vegetation condition were recorded across all sites.
- Fluctuations in species richness were similar between longwall sites and control sites over the survey period.
- Minor dieback (rating 4) to some dead branches (rating 3) was noted in random individuals of species at all longwall and control sites irrespective of survey season.
- Long-senescent shrubs and stags were recorded within sites, in adjacent vegetation and across the streams, for example at sites MRIP01, MRIP02, and MRIP03.
- Areas of senescent vegetation were also recorded along the riparian areas most likely attributed to changes in water level over the summer period, and expressed in dieback of sedge species at the water line. Scattered shrub species were also noted to be senescing on the opposite bank to site MRIP02 as recorded at the time of initial survey. Such features are also included in the photographic record and notes made as part of visual observations of the area.
- A number of longwall and control sites recorded fluctuating cover values.
- Weeds were recorded in low abundance at the following sites:

  MRIP01 – *Cyperus eragrostis* at the 20 m interval along the transect.

  MRIP03 – *Cyperus eragrostis,* and *Conyza* sp. seedlings.

  Other weed species were observed infrequently along the banks of Waratah Rivulet downstream of Flat Rock Crossing and at site MRIP10 at the interface with the inundation zone of Woronora Reservoir. The occurrence of weed species along the riparian zones is likely due to the spread of weed propagules from the upper catchment by flooding events.

  No weeds were recorded at or adjacent to the monitoring sites along the Eastern Tributary.

The changes in species composition, cover and condition reflect normal population variation and cycles in response to seasonal variations and plant growth.

The baseline monitoring data provides a benchmark against which changes or trends in vegetation structure, species composition and vegetation condition can be measured during and after the mining of Longwalls 20-22.

Quadrat and transect monitoring will be conducted bi-annually, in autumn and spring.

Indicator Species

Baseline population monitoring of indicator species has been conducted in spring 2009 and autumn 2010.

Twenty tagged individuals of *Prostanthera linearis*, *Schoenis melanostachys* and *Lomatia myricioides* have been monitored at sites MRIP01, MRIP02, MRIP05, MRIP06 and MRIP09 (overlying Longwalls 20-22) and at sites MRIP03, MRIP04, MRIP07, MRIP08[1] and MRIP10 (downstream of Longwalls 20-22) (Figure 14).

Population monitoring data collected includes a condition/health rating and a reproductive rating for each plant.

The baseline monitoring data provides a benchmark against which the health and reproductive rating of the indicator species can be measured during and after the mining of Longwalls 20-22.

Monitoring of indicator species will be conducted bi-annually in autumn and spring.

3.4.2.4 Aquatic Biota and their Habitats

Metropolitan Coal assess subsidence impacts and environmental consequences on aquatic habitats in accordance with the Water Management Plan (Section 3.3 of the Annual Review). Surface water monitoring includes monitoring of surface water flow, pool water levels, surface water quality, iron staining and gas release. Observations of surface cracking, iron staining and gas release are also made during the conduct of the aquatic ecology surveys.

The aquatic ecology monitoring program for Longwalls 20-22 has been designed to:

- monitor subsidence-induced impacts on aquatic ecology (referred to as stream monitoring); and
- monitor the response of aquatic ecosystems to the implementation of stream remediation works (referred to as pool monitoring).

The design of the monitoring programs uses a “Beyond BACI” experimental design and focuses on representative sampling within streams and pools in the Longwalls 20-22 mining area and in suitable control streams and pools not subject to mine subsidence.

Stream Monitoring

The stream monitoring program includes the monitoring of aquatic habitat characteristics, water quality, aquatic macroinvertebrates and aquatic macrophytes.

Baseline monitoring has been conducted in spring 2008, autumn 2009, spring 2009 and autumn 2010.

Monitoring has been conducted at two sampling sites (approximately 100 m long) at the following stream sampling locations:

- Locations WT3 on Waratah Rivulet, ET1 and ET3 on the Eastern Tributary and B1 on Tributary B, overlying Longwalls 20-22.
- Locations WT4 and WT5 on Waratah Rivulet and ET2 on the Eastern Tributary, downstream of Longwalls 20-22.
- Control locations: WR1 on Woronora River; OC on O’Hares Creek; BC on Bee Creek; and WOT on Woronora Tributary.

The approximate locations of the sampling sites are shown on Figure 15.

[1] Note: Only 10 individuals of *Prostanthera linearis* were available for tagging at site MRIP08.

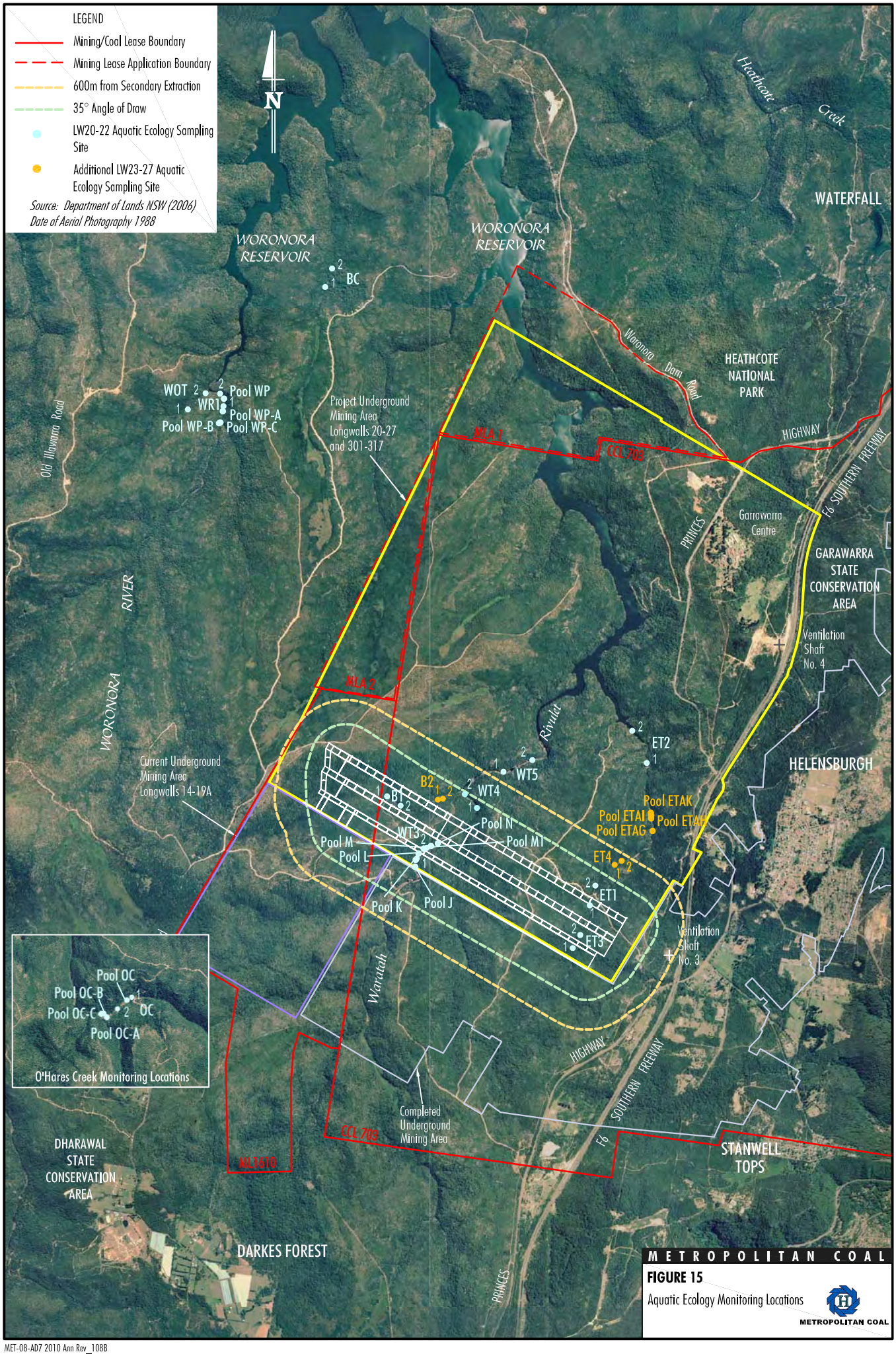

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FIGURE 15

Aquatic Ecology Monitoring Locations

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The methods used to survey aquatic biota and their habitats at each site are:

- Stream characteristics are recorded in accordance with the Australian River Assessment System (AUSRIVAS) protocol (visual assessment of stream width and depth, riparian conditions, signs of disturbance, water quality and percentage cover of the substratum by algae).
- Water quality sampling is conducted for electrical conductivity, dissolved oxygen, pH, temperature, turbidity, oxygen reduction potential, alkalinity, total phosphorous and total nitrogen to provide information relevant to water quality at the time of sampling.
- Aquatic macroinvertebrate sampling is conducted using the AUSRIVAS protocol, as well as quantitative sampling where three replicate macroinvertebrate samples are collected within each site using timed sweeps.
- The distribution of submerged and emergent (occurring in-stream and in the riparian zone) aquatic macrophytes are estimated along each sampling location by assigning a cover class to each species. The cover classes are: (1) one plant or small patch (i.e. few), (2) not common, growing in a few places (i.e. scattered), and (3) widespread (i.e. common). In addition, an assessment of the in-stream (i.e. submerged and emergent) aquatic vegetation is made within each site by estimating the relative abundance (i.e. percentage cover) of aquatic macrophytes within five haphazardly placed 0.25 m^2 quadrats, using a stratified sampling technique.

Table 9 presents the AUSRIVAS Band results for each site prior to the commencement of Longwall 20.

Table 9
AUSRIVAS Band Results

Stream	Site	AUSRIVAS Band			
		Spring 2008	Autumn 2009	Spring 2009	Autumn 2010
Waratah Rivulet	WT3-1	B	B	B	B
	WT3-2	B	B	B	C
	WT4-1	D	C	C	C
	WT4-2	B	C	C	B
	WT5-1	B	C	C	C
	WT5-2	D	C	C	C
Eastern Tributary	ET1-1	D	C	B	B
	ET1-2	D	C	C	B
	ET2-1	D	B	B	C
	ET2-2	D	C	B	C
	ET3-1	#	#	B	C
	ET3-2	#	#	D	C
Tributary B	B1	B	C	C	C
	B2	C	B	C	B
Bee Creek	BC1	D	C	C	B
	BC2	C	B	D	B
Woronora Tributary	WOT1	C	B	-	B
	WOT2	C	C	D	C
Woronora River	WR1	D	B	C	B
	WR2	C	C	C	B
O'Hares Creek	OC1-1	B	B	B	A
	OC1-2	D	B	B	B

Survey of Sites ET3-1 and ET3-2 commenced in spring 2009 for Longwalls 23-27.

- Insufficient water habitat available to sample.

Charts 34 to 37 present the mean abundance of macroinvertebrates, mean diversity of macroinvertebrates, mean percentage cover of macrophytes and mean diversity of macrophytes at each sampling location, respectively, using the quantitative sampling data.

The baseline monitoring data provides a benchmark against which aquatic biota and their habitats can be measured during and after the mining of Longwalls 20-22.

Monitoring of the sampling sites will be conducted bi-annually, in autumn and spring.

Pool Monitoring

Baseline monitoring of pools on Waratah Rivulet has been conducted since spring 2008 or spring 2009[2] to assess the response of aquatic ecosystems to the implementation of future stream remediation works, namely:

- Larger pools, J, M1 and N on Waratah Rivulet overlying Longwalls 20-22.
- Smaller pools K, L and M on Waratah Rivulet overlying Longwalls 20-22.
- One larger control pool on Woronora River (Pool WP) and one larger control pool on O'Hares Creek (Pool OC).
- Three smaller control pools on Woronora River (Pool WP-A, WP-B and WP-C) and three smaller control pools on O'Hares Creek (Pool OC-A, OC-B and OC-C).

The approximate locations of the sampling sites are shown on Figure 15.

Sampling is conducted at two random sites within the larger pools and at one site within the smaller pools.

Within each site in each pool, aquatic macroinvertebrates and macrophytes are sampled using the same quantitative techniques described for stream monitoring above. The AUSRIVAS sampling technique is not used for macroinvertebrate sampling in the pool monitoring.

Quantitative estimates of aquatic macrophytes (i.e. emergent, floating attached and/or submerged species of aquatic plants) are collected at one site at each small pool and at two sites at each large pool. In addition, the spatial distribution of floating attached and/or submerged macrophytes (e.g. *Myriophyllum penduculatum* and *Triglochin procerum*) is also mapped in each pool, to provide a visual comparison of their distribution through time.

Charts 38 to 41 present the mean abundance of macroinvertebrates, mean diversity of macroinvertebrates, mean percentage cover of macrophytes and mean diversity of macrophytes at the larger pools, respectively, using the quantitative sampling data.

Charts 42 to 45 present the mean abundance of macroinvertebrates, mean diversity of macroinvertebrates, mean percentage cover of macrophytes and mean diversity of macrophytes at the smaller pools, respectively, using the quantitative sampling data.

The baseline monitoring data provides a benchmark against which aquatic biota and their habitats can be measured before and after stream remediation works.

Monitoring of the sampling sites will be conducted bi-annually, in autumn and spring.

[2] Pools monitored since spring 2008: larger pools - Pool N on Waratah Rivulet, Pool WP on Woronora River and Pool OC on O'Hares Creek.

Pools monitored since spring 2009: larger pools - Pools J and M1 on Waratah Rivulet; smaller pools: Pools K, L and M on Waratah Rivulet, Pools WP-A, WP-B, WP-C on Woronora River and Pools OC-A, OC-B, OC-C on O'Hares Creek.

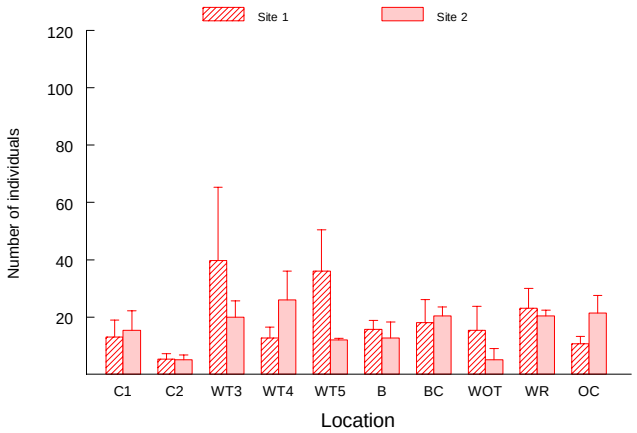

Chart 34a Mean (+SE) Macroinvertebrate Abundance, Stream Monitoring, Spring 2008

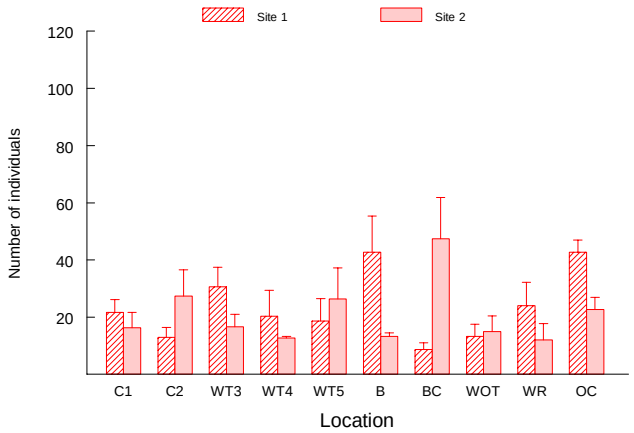

Chart 34b Mean (+SE) Macroinvertebrate Abundance, Stream Monitoring, Autumn 2009

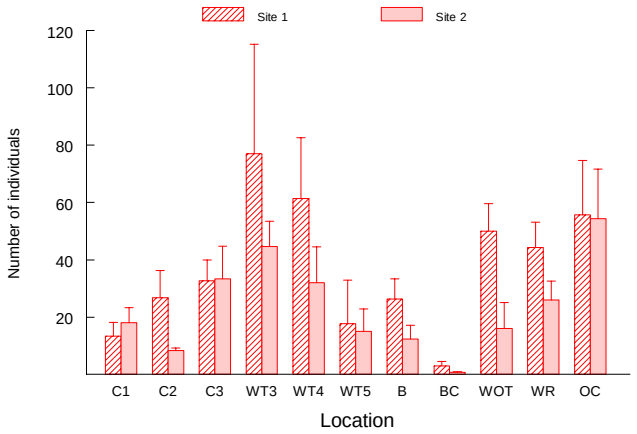

Chart 34c Mean (+SE) Macroinvertebrate Abundance, Stream Monitoring, Spring 2009

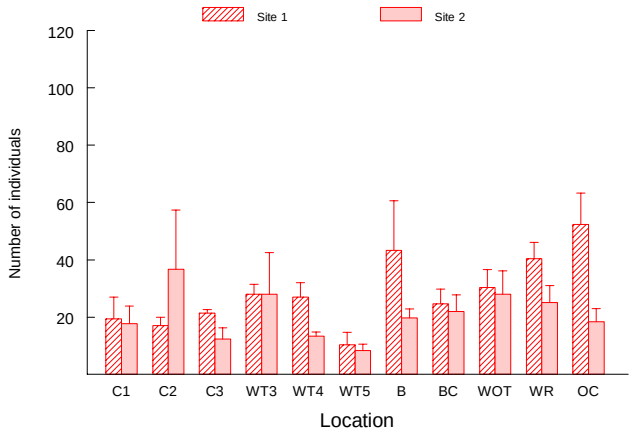

Chart 34d Mean (+SE) Macroinvertebrate Abundance, Stream Monitoring, Autumn 2010

Key: C – Tributary C/Eastern Tributary [C1 – Location 1 etc], WT – Waratah Rivulet [WT3 - Location 3 etc], B – Tributary B, BC – Bee Creek, WOT – Woronora Tributary, WR – Woronora River, OC – O'Hares Creek. (n = 3)

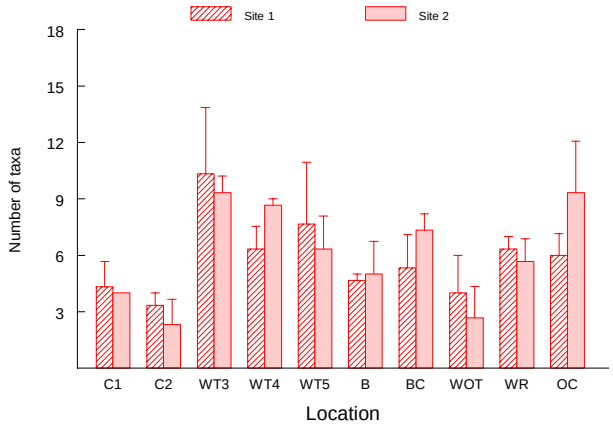

Chart 35a Mean (+SE) Macroinvertebrate Diversity, Stream Monitoring, Spring 2008

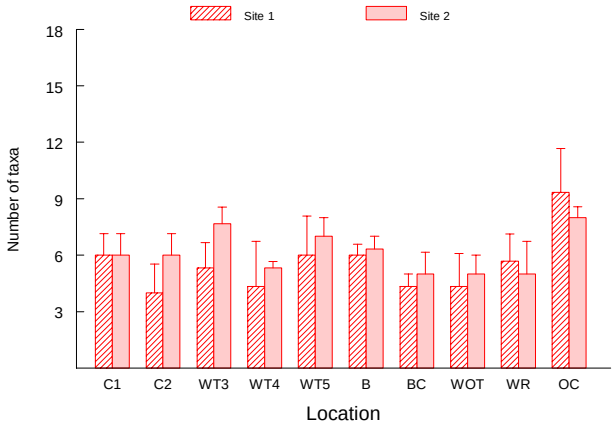

Chart 35b Mean (+SE) Macroinvertebrate Diversity, Stream Monitoring, Autumn 2009

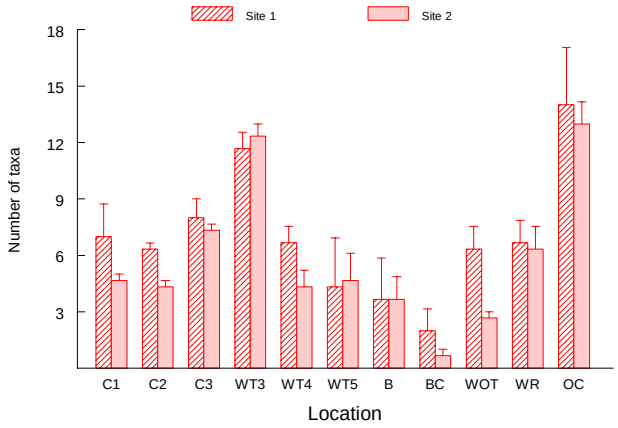

Chart 35c Mean (+SE) Macroinvertebrates Diversity, Stream Monitoring, Spring 2009

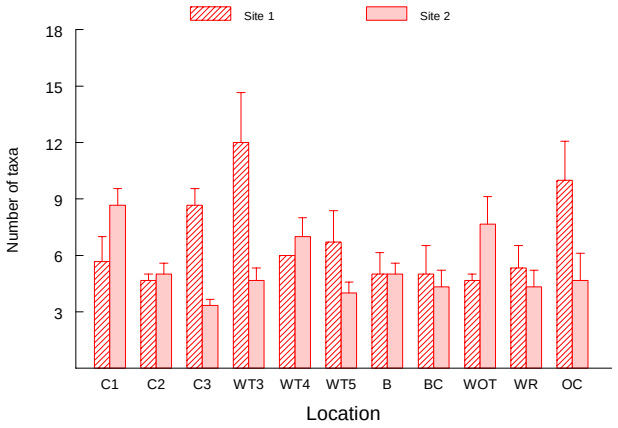

Chart 35d Mean (+SE) Macroinvertebrate Diversity, Stream Monitoring, Autumn 2010

Key: C – Tributary C/Eastern Tributary [C1 – Location 1 etc], WT – Waratah Rivulet [WT3 - Location 3 etc], B – Tributary B, BC – Bee Creek, WOT – Woronora Tributary, WR – Woronora River, OC – O'Hares Creek. (n=3)

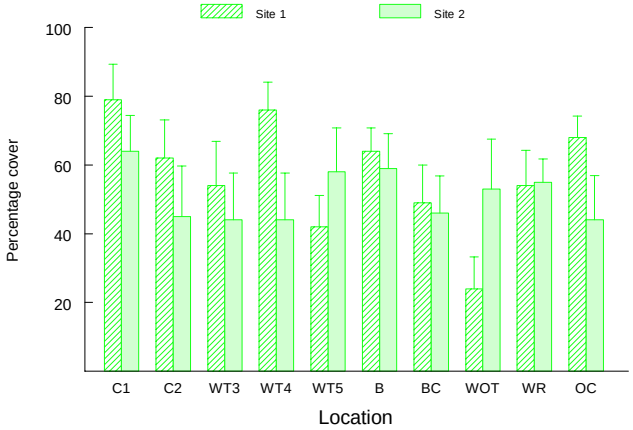

Chart 36a Mean (+SE) Macrophyte Percentage Cover, Stream Monitoring, Spring 2008

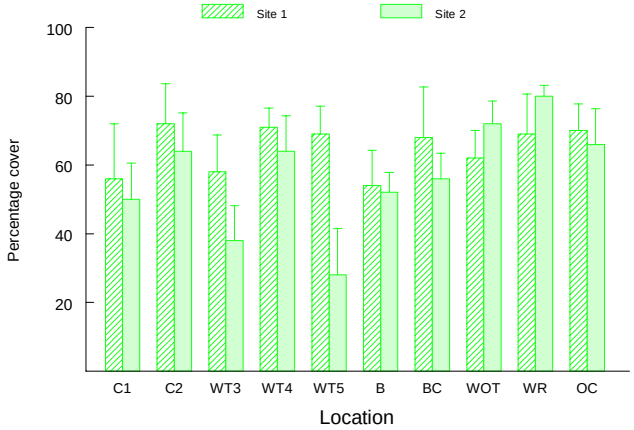

Chart 36b Mean (+SE) Macrophyte Percentage Cover, Stream Monitoring, Autumn 2009

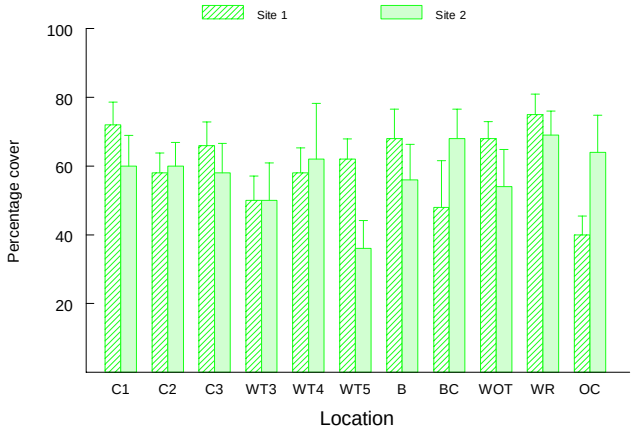

Chart 36c Mean (+SE) Macrophyte Percentage Cover, Steam Monitoring, Spring 2009

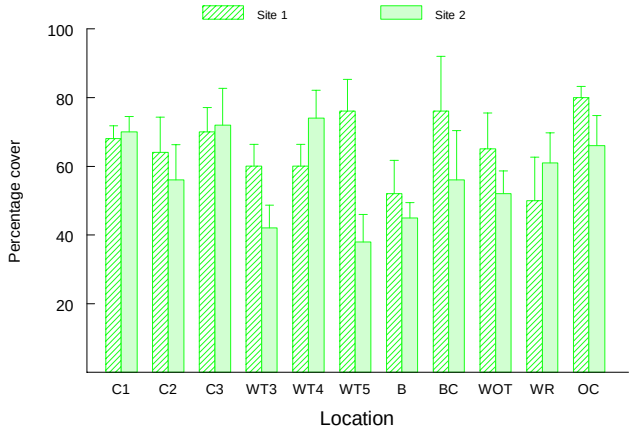

Chart 36d Mean (+SE) Macrophyte Percentage Cover, Stream Monitoring, Autumn 2010

Key: C – Tributary C/Eastern Tributary [C1 – Location 1 etc], WT – Waratah Rivulet [WT3 - Location 3 etc], B – Tributary B, BC – Bee Creek, WOT – Woronora Tributary, WR – Woronora River, OC – O'Hares Creek. (n=3)

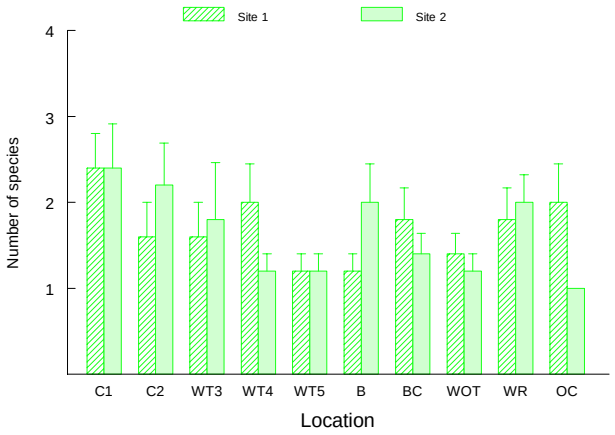

Chart 37a Mean (+SE) Macrophyte Diversity, Stream Monitoring, Spring 2008

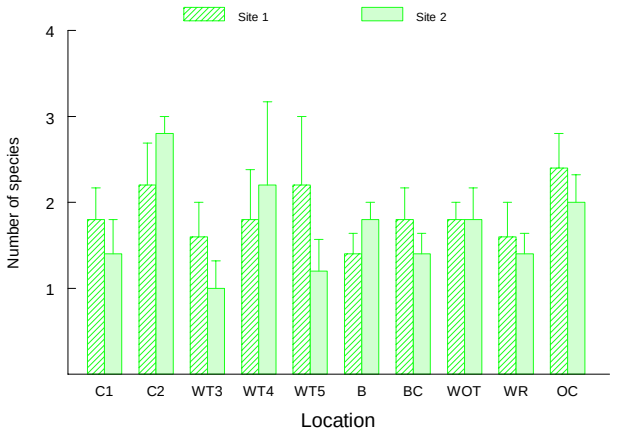

Chart 37b Mean (+SE) Macrophyte Diversity, Stream Monitoring, Autumn 2009

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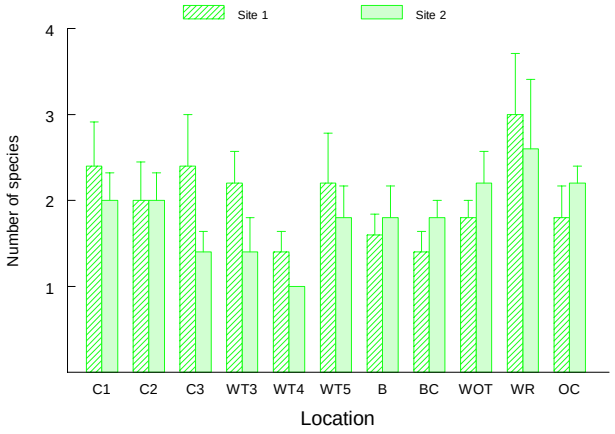


Chart 37c Mean (+SE) Macrophyte Diversity, Stream Monitoring, Spring 2009

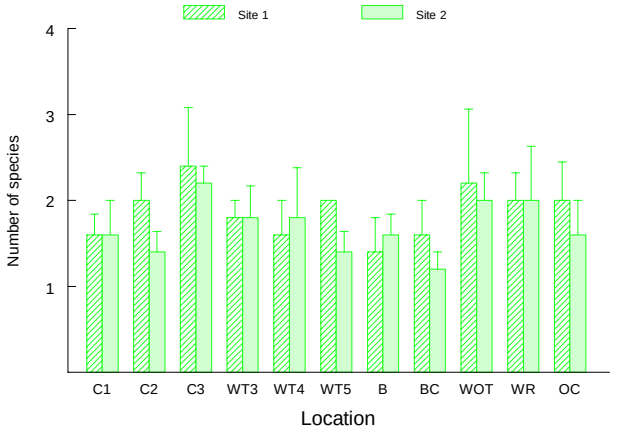


Chart 37d Mean (+SE) Macrophyte Diversity, Stream Monitoring, Autumn 2010

Key: C – Tributary C/Eastern Tributary [C1 – Location 1 etc], WT – Waratah Rivulet [WT3 - Location 3 etc], B – Tributary B, BC – Bee Creek, WOT – Woronora Tributary, WR – Woronora River, OC – O'Hares Creek. (n=3)

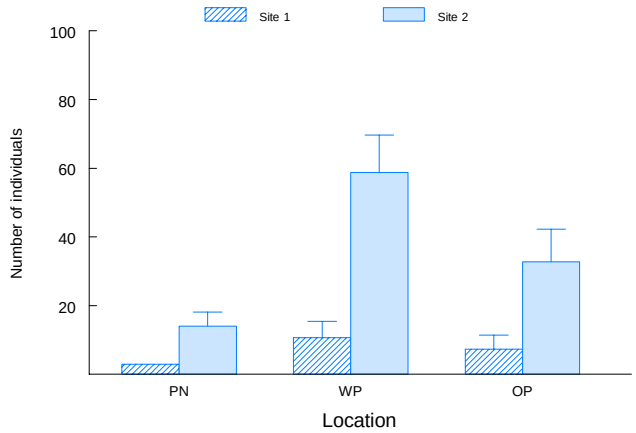


Chart 38a Mean (+SE) Macroinvertebrate Abundance, Larger Pools, Spring 2008

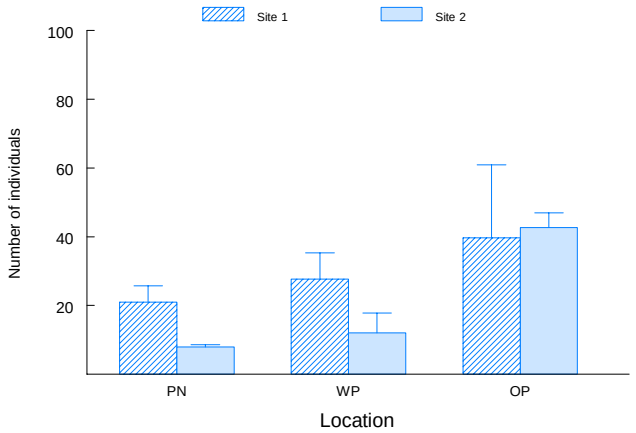


Chart 38b Mean (+SE) Macroinvertebrate Abundance, Larger Pools, Autumn 2009

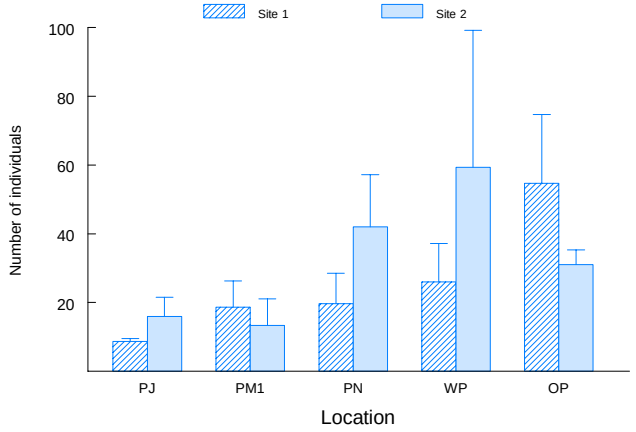


Chart 38c Mean (+SE) Macroinvertebrate Abundance, Larger Pools, Spring 2009

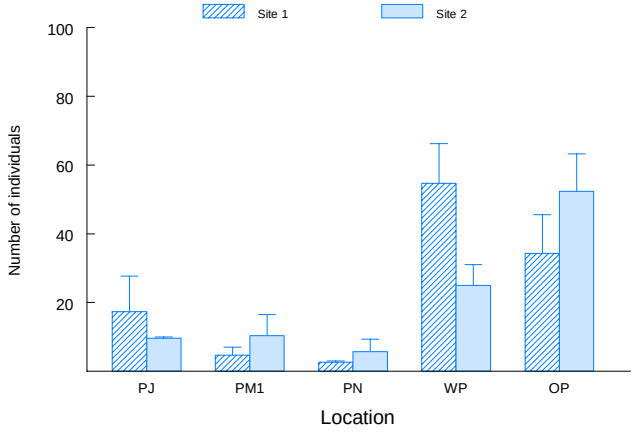


Chart 38d Mean (+SE) Macroinvertebrate Abundance, Larger Pools, Autumn 2010

Larger Pools Key: PJ – Pool J, PM1 – Pool M1, PN – Pool N, WP – Woronora Pool, OP - O'Hares Creek Pool (n = 3).

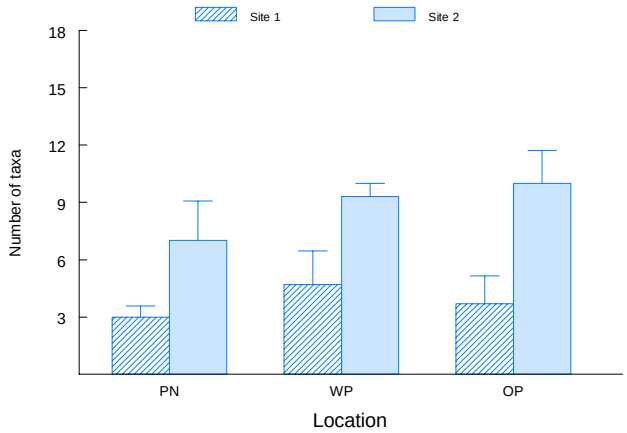


Chart 39a Mean (+SE) Macroinvertebrate Diversity, Larger Pools, Spring 2008

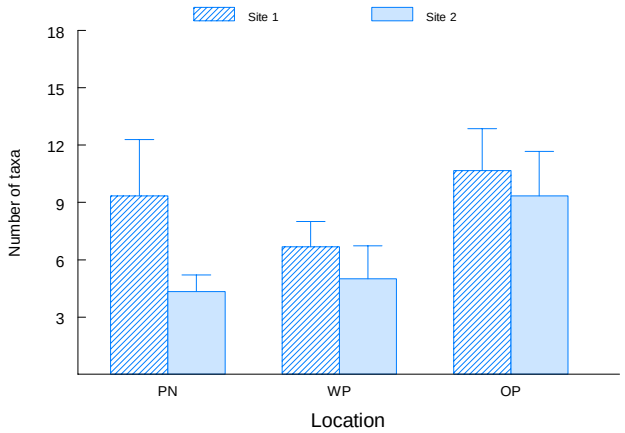


Chart 39b Mean (+SE) Macroinvertebrate Diversity, Larger Pools, Autumn 2009

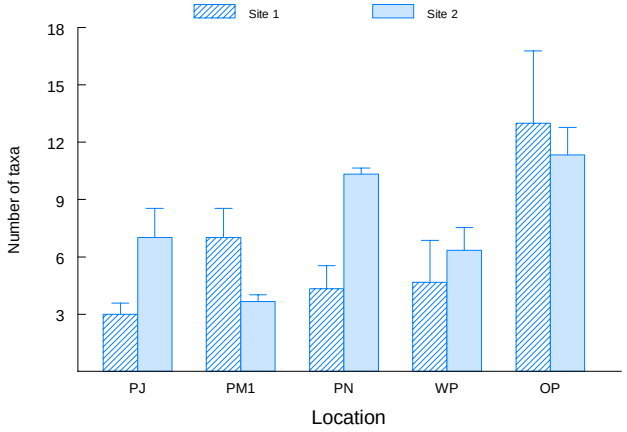


Chart 39c Mean (+SE) Macroinvertebrate Diversity, Larger Pools, Spring 2009

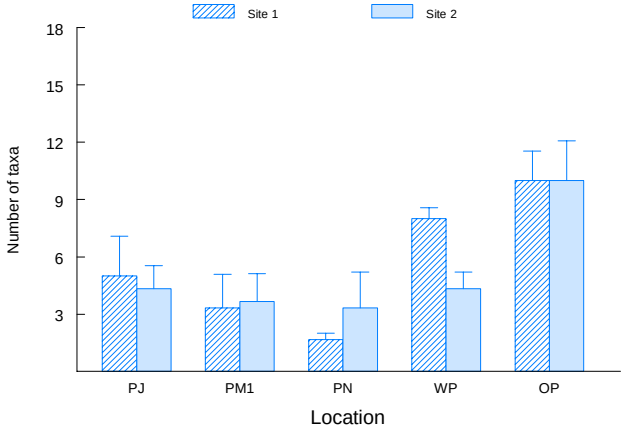


Chart 39d Mean (+SE) Macroinvertebrate Diversity, Larger Pools, Autumn 2010

Larger Pools Key: PJ – Pool J, PM1 – Pool M1, PN – Pool N, WP – Woronora Pool, OP - O'Hares Creek Pool (n = 3).

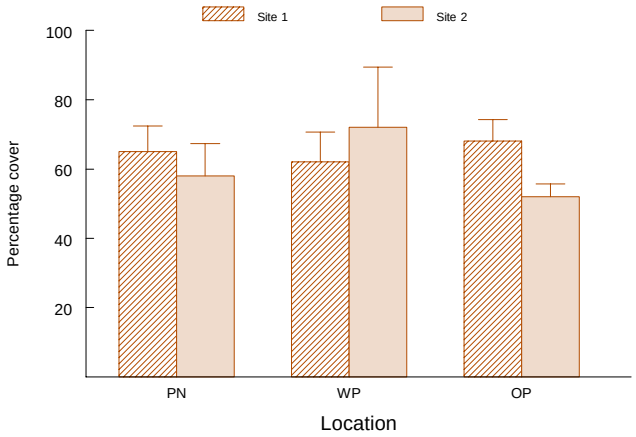


Chart 40a Mean (+SE) Macrophyte Percentage Cover, Larger Pools, Spring 2008

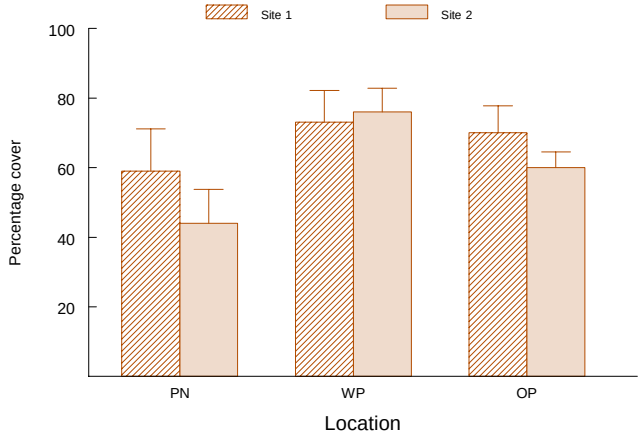


Chart 40b Mean (+SE) Macrophyte Percentage Cover, Larger Pools, Autumn 2009

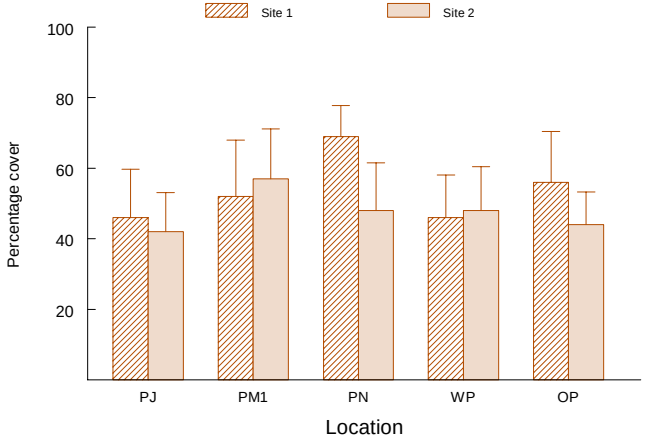


Chart 40c Mean (+SE) Macrophyte Percentage Cover, Larger Pools, Spring 2009

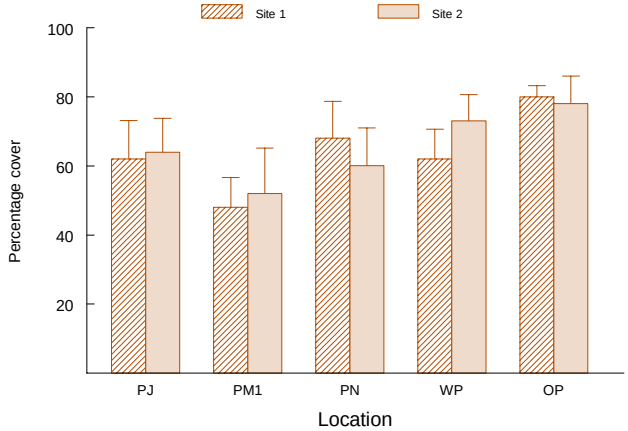


Chart 40d Mean (+SE) Macrophytes Percentage Cover, Larger Pools, Autumn 2010

Larger Pools Key: PJ – Pool J, PM1 – Pool M1, PN – Pool N, WP – Woronora Pool, OP - O'Hares Creek Pool (*n* = 5)

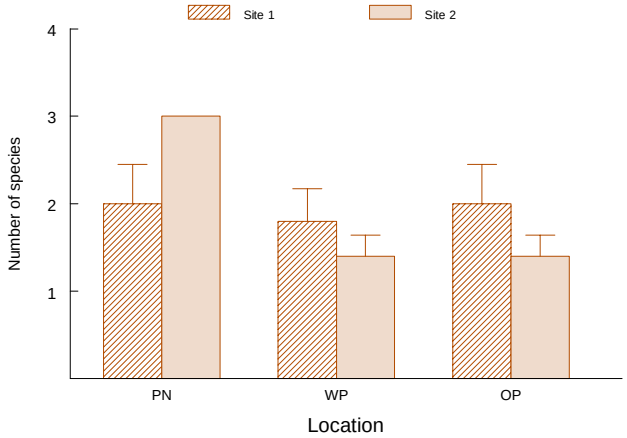


Chart 41a Mean (+SE) Macrophyte Diversity, Larger Pools, Spring 2008

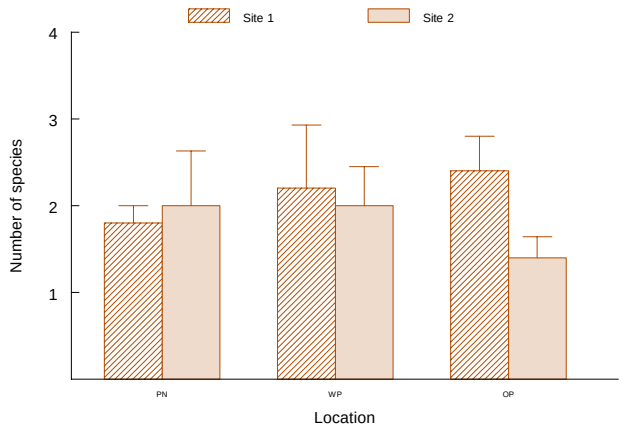


Chart 41b Mean (+SE) Macrophyte Diversity, Larger Pools, Autumn 2009

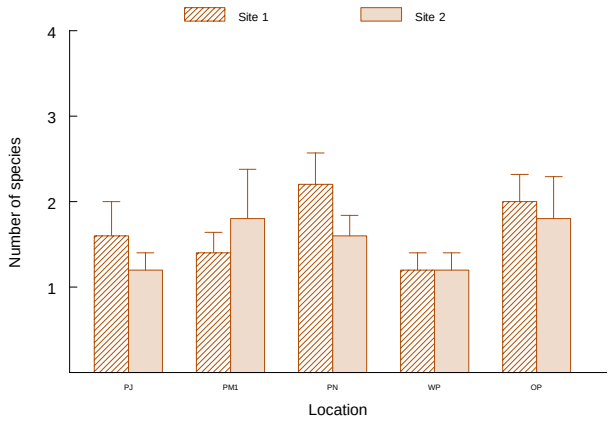


Chart 41c Mean (+SE) Macrophyte Diversity, Larger Pools, Spring 2009

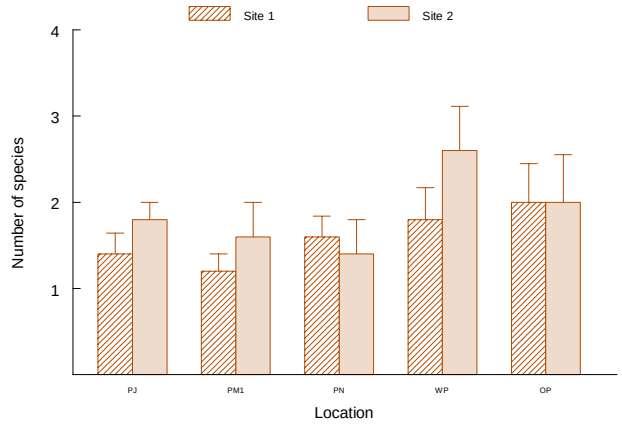


Chart 41d Mean (+SE) Macrophyte Diversity, Larger Pools, Autumn 2010

Larger Pools Key: PJ – Pool J, PM1 – Pool M1, PN – Pool N, WP – Woronora Pool, OP - O'Hares Creek Pool (*n* = 5)

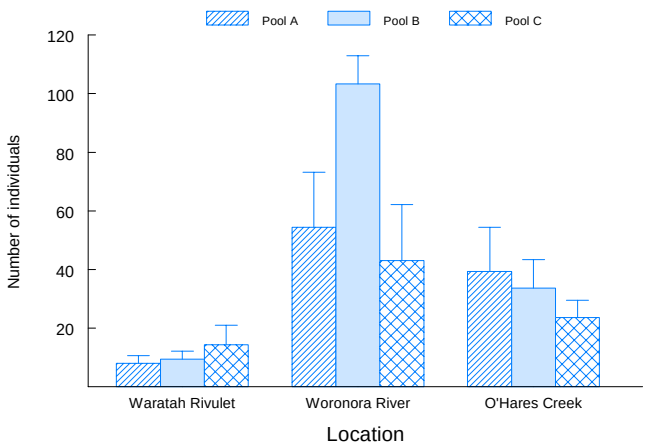


Chart 42a Mean (+SE) Macroinvertebrate Abundance, Smaller Pools, Spring 2009

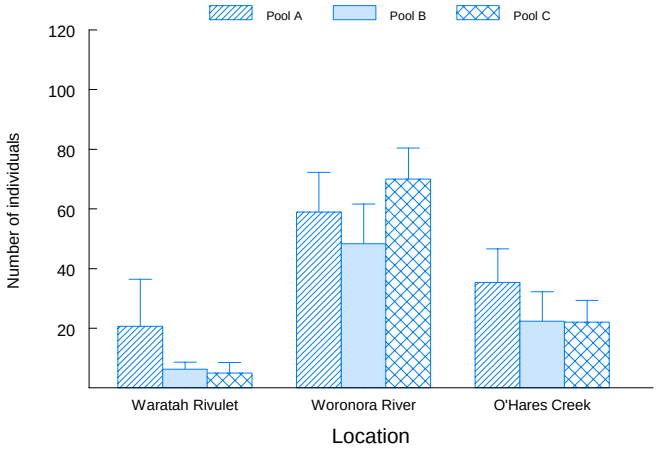


Chart 42b Mean (+SE) Macroinvertebrate Abundance, Smaller Pools, Autumn 2010

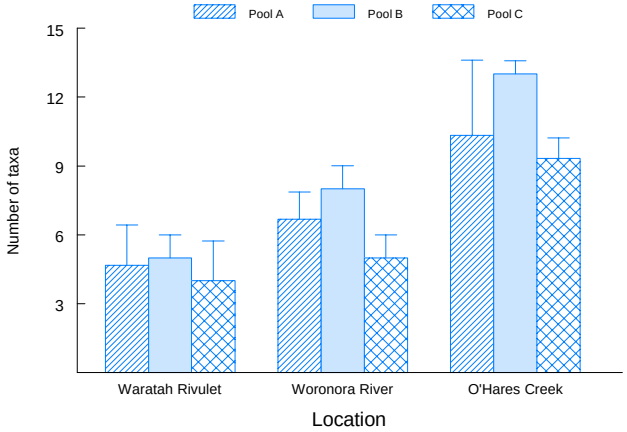


Chart 43a Mean (+SE) Macroinvertebrate Diversity, Smaller Pools, Spring 2009

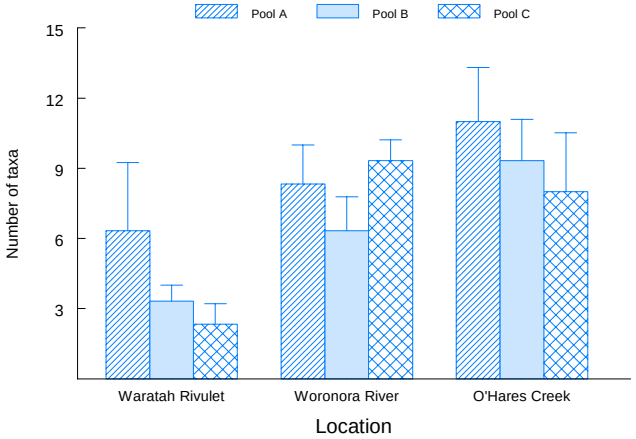


Chart 43b Mean (+SE) Macroinvertebrate Diversity, Smaller Pools, Autumn 2010

Note: Pools A, B and C on Waratah Rivulet represent Pools K, L and M, respectively (n = 3).

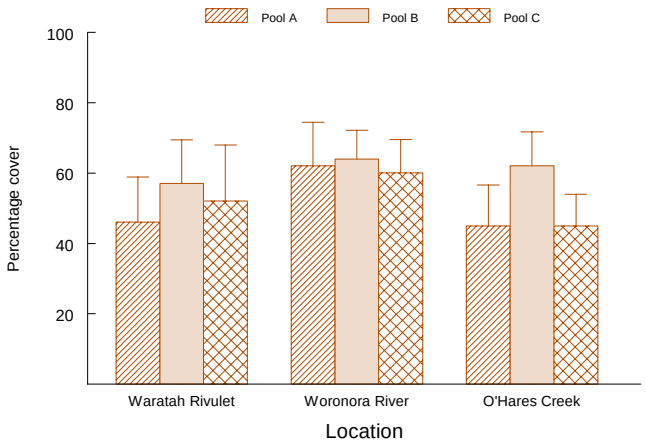


Chart 44a Mean (+SE) Macrophyte Percentage Cover, Smaller Pools, Spring 2009

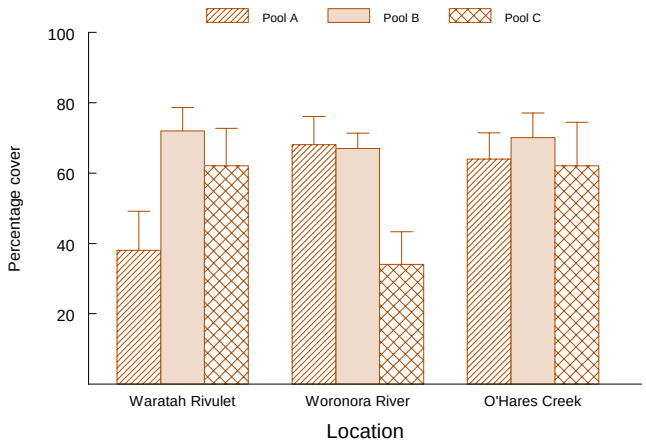


Chart 44b Mean (+SE) Macrophyte Percentage Cover, Smaller Pools, Autumn 2010

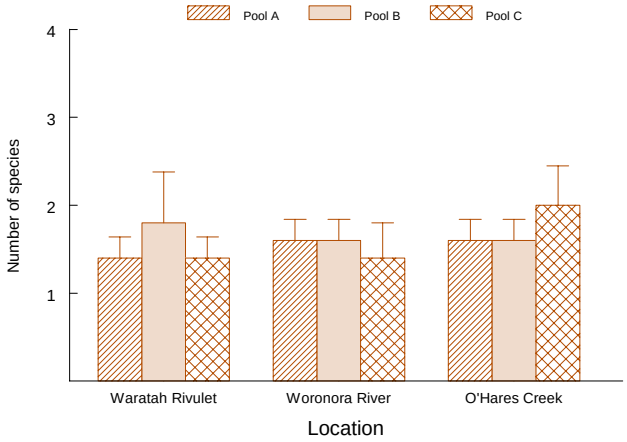


Chart 45a Mean (+SE) Macrophyte Diversity, Smaller Pools, Spring 2009

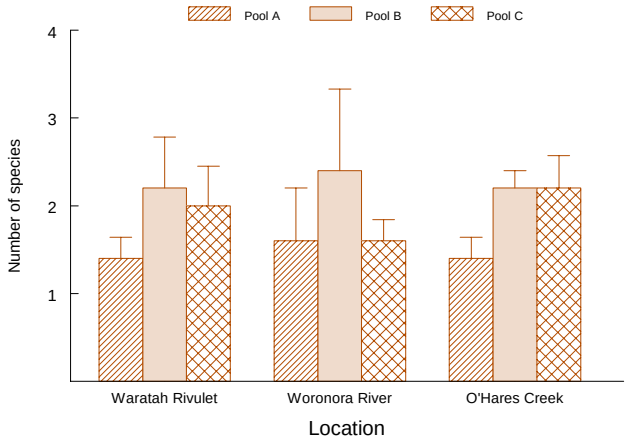


Chart 45b Mean (+SE) Macrophyte Diversity, Smaller Pools, Autumn 2010

Note: Pools A, B and C on Waratah Rivulet represent Pools K, L and M, respectively (n = 3).

3.4.2.5 Amphibian Surveys

A monitoring program has been developed for Longwalls 20-22 to monitor amphibian species, with a focus on the habitats of the Giant Burrowing Frog (*Heleiporus australiiacus*) and Red-crowned Toadlet (*Pseudophryne australis*) associated with tributaries. Baseline monitoring has been conducted in spring/summer 2009.

Six sites overlying Longwalls 20-22 and six control sites will be surveyed annually in spring/summer (i.e. October to February) during suitable weather conditions. The approximate locations of the sampling sites are shown on Figure 16.

Each site is surveyed once during a standard one hour general area day search (early morning and late afternoon) supplemented by an evening 60 minute search/playback session using hand held spotlights and head lamps.

Species are assigned to the following relative abundance categories for tadpole and adult stages:

- 0 = no sightings;
- 1 = one sighting of adult or tadpole stage;
- UC = uncommon (i.e. 2 to 10 individuals), adult or tadpole stage;
- MC = moderately common (i.e. 11 to 20 individuals), adult or tadpole stage;
- C = common (i.e. 21 to 40 individuals), adult or tadpole stage; and
- A = abundant (>40 individuals), adult or tadpole stage.

The results of the survey are presented in Table 10. In summary, the results of the baseline surveys indicate:

- A total of eleven species were recorded, nine in sites above Longwalls 20-22 and eight in control sites, being representatives from the two families Myobatrachidae and Hylidae.
- Species diversity varied across sites from 0 to 7. No amphibians were recorded at control Sites 8, 11 and 12. The most species diverse site was Site 10 (control) with seven species, followed by Sites 4 and 5 (Longwalls 20-22), with six species each.
- Two threatened species, the Giant Burrowing Frog and Red-crowned Toadlet were recorded during the survey.
- There was no significant difference between amphibian species diversity in the Longwalls 20-22 sites and control sites.

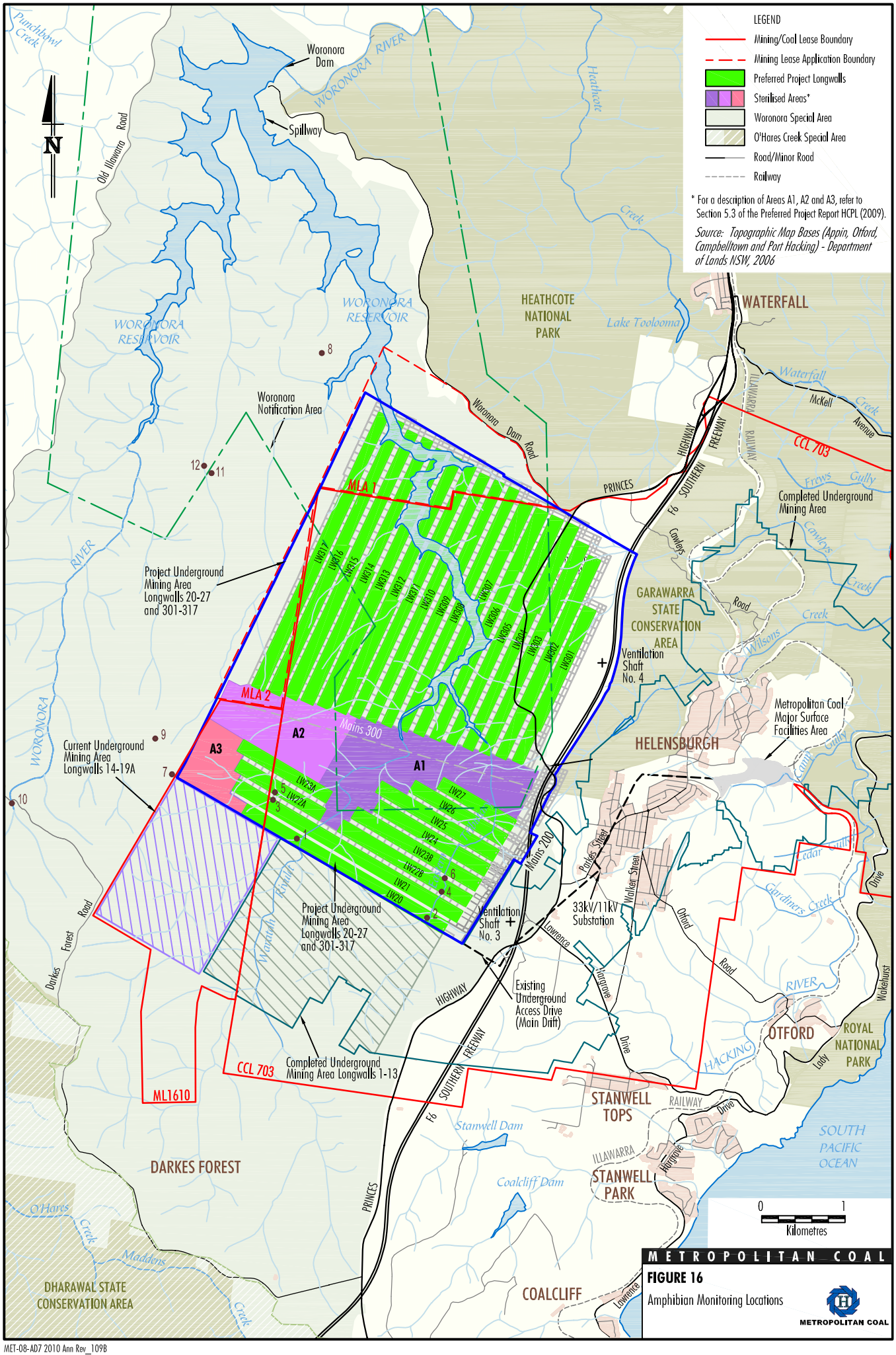
The baseline monitoring data provides a benchmark against which amphibians can be monitored during and after the mining of Longwalls 20-22.

Monitoring of the survey sites will be conducted annually in spring/summer.

3.4.3 Assessment of Environmental Performance

The performance indicators and subsidence impact performance measures described below have been developed to address the predictions of subsidence impacts and environmental consequences on biodiversity included in the EA, PPR and Extraction Plan.

The results of the assessment of the performance of the Project against the biodiversity performance indicators and subsidence impact performance measures is described below.



METROPOLITAN COAL

FIGURE 16

Amphibian Monitoring Locations

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MET-08-AD7 2010 Ann Rev_109B

Table 10
Amphibian Species Diversity and Abundance, Spring/Summer 2009

Scientific Name	Common Name	Sites Above Longwalls 20-22						Control Sites						Total		Relative Abundance[2]	
		1	2	3	4	5	6	7	8	9	10	11	12	Test	Control	Test	Control
Myobatrachidae																	
Crinia signifera	Common Eastern Froglet	1[1] 0	1 0	1 0	>10 0	2 0	1 0	1 0	0 0	0 0	5 >10	0 0	0 0	>16 0	6 >10	MC	MC
Heleiporus australiiacus	Giant Burrowing Frog[V, v]	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 1	0 0	0 0	0 0	0 1	0	1
Limnodynastes peronii	Brown-striped Frog	0 0	0 0	0 0	1 0	1 0	1 0	0 0	0 0	0 0	2 0	0 0	0 0	3 0	2 0	UC	UC
Limnodynastes tasmaniensis	Spotted Grass Frog	0 0	0 0	0 0	0 0	0 0	0 0	1 0	0 0	0 0	0 0	0 0	0 0	0 0	1 0	0	1
Pseudophryne australis	Red-crowned Toadlet[V]	0 0	1 0	2 0	2 0	0 0	0 0	1 0	0 0	1 0	1 0	0 0	0 0	5 0	3 0	UC	UC
Uperoleia laevigata	Smooth Toadlet	0 0	0 0	0 0	1 0	0 0	0 0	0 0	0 0	0 0	1 0	0 0	0 0	1 0	1 0	1	1
Hylidae																	
Litoria citropa	Blue Mountains Tree Frog	0 0	1 0	0 0	1 0	0 0	1 0	0 0	0 0	0 0	0 0	0 0	0 0	3 0	0 0	UC	0
Litoria freycineti	Southern Rocket Frog	0 0	0 0	0 0	0 0	5 0	1 0	0 0	0 0	0 0	2 0	0 0	0 0	6 0	2 0	UC	UC
Litoria wilcoxii	Stony Creek Frog	0 0	10 0	0 0	0 0	3 0	0 0	0 0	0 0	0 0	4 2	0 0	0 0	13 0	4 2	MC	UC
Litoria peronii	Peron's Tree Frog	0 0	1 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	0 0	1 0	0 0	1	0
Litoria phyllochroa	Leaf-green Tree Frog	0 0	0 0	0 0	2 0	1 0	>5 0	0 0	0 0	0 0	0 0	0 0	0 0	>8 0	0 0	UC	0
	Number of Species	**1**	**5**	**2**	**6**	**5**	**5**	**3**	**0**	**1**	**7**	**0**	**0**	**9**	**8**	**-**	**-**

[1] First line of data refers to the presence or absence of adults, while the second line of data refers to absence or presence of tadpoles.

[2] Relative Abundance: 0 – no sightings, 1 – One sighting of adult or tadpole stage, UC – Uncommon, 2 to 10 individuals (adult or tadpole stage), MC – Moderately common, 11 to 20 individuals (adult or tadpole stage), C – Common, 21 to 40 individuals (adult or tadpole stage), A – Abundant, >40 individuals (adult or tadpole stage).

[V, v] Listed as vulnerable under the NSW *Threatened Species Conservation Act, 1995* and Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999*.

[V] Listed as vulnerable under the NSW *Threatened Species Conservation Act, 1995*.

3.4.3.1 Threatened Species, Populations and Ecological Communities

Analysis against Performance Indicator 1

Performance Indicator 1: *The vegetation in upland swamps is not expected to experience changes significantly different to vegetation in control swamps.*

This indicator is considered to have been exceeded if:

- data indicates a declining trend in the condition of swamp vegetation; or
- data analysis indicates statistically significant changes in vegetation between the mined and control swamps.

To date, only baseline data has been obtained for upland swamps (to autumn 2010). This performance indicator will be assessed following the completion of the spring 2010 survey and reported in the 2011 Annual Review.

Analysis against Performance Indicator 2

Performance Indicator 2: *Surface cracking within upland swamps resulting from mine subsidence is not expected to result in measurable changes to swamp groundwater levels when compared to seasonal variations in water levels experienced by upland swamps prior to mining or control swamps.*

This indicator is considered to have been exceeded if data analysis indicates statistically significant changes in groundwater levels (i.e. if the seven day moving average data lie outside two standard deviations from the mean established for the preceding six months of data).

This performance indicator will be assessed once six months of data following the commencement of Longwall 20 has been obtained and will be reported in the 2011 Annual Review.

Analysis against Performance Indicator 3

Performance Indicator 3: *Impacts to riparian vegetation are expected to be localised and limited in extent, similar to the impacts previously experienced at the Metropolitan Colliery.*

This indicator is considered to have been exceeded if:

- visual inspections identify vegetation dieback greater than 50 cm from the stream; or
- data analysis indicates the riparian vegetation has not recovered after one year of the completion of stream remediation on Waratah Rivulet.

To date, only baseline data has been obtained for riparian vegetation (to autumn 2010). This performance indicator will be assessed following the completion of the spring 2010 survey and reported in the 2011 Annual Review.

Analysis against Performance Indicator 4

Performance Indicator 4: *Subsidence effects at the occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion EEC situated approximately 400 m to the east of Longwalls 20-22 are expected to be negligible.*

This indicator is considered to have been exceeded if the assessment of subsidence parameters indicates the subsidence effects at the occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion Endangered Ecological Community (EEC) situated to the east of Longwalls 20-22 are an order of magnitude above those predicted.

Nil subsidence effects have occurred as a result of Longwall 20 extraction at the occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion EEC situated approximately 400 m to the east of Longwalls 20-22.

Analysis against Performance Indicator 5

Performance Indicator 5: *The aquatic macroinvertebrate and macrophyte assemblages in streams and pools are not expected to experience long-term impacts as a result of mine subsidence.*

This indicator is considered to have been exceeded if data analysis indicates significant changes in relation to reference places before (i.e. pre-mining) to after (i.e. post-mining) mining of Longwalls 20-22:

- occur in the aquatic macroinvertebrate and macrophyte assemblages in streams at locations WT3, ET1, ET3 and B1 after the completion of Longwall 26; and
- occur in the aquatic macroinvertebrate and macrophyte assemblages at pools J, K, L, M1, M and N after one year of the completion of stream remediation on Waratah Rivulet.

This performance indicator will be assessed and reported on in future Annual Reviews.

Analysis against Performance Indicator 6

Performance Indicator 6: *The amphibian assemblage is not expected to experience changes significantly different to the amphibian assemblage at control sites.*

This indicator is considered to have been exceeded if data analysis identifies a significant decline in the amphibian population.

To date, only baseline data has been obtained for the amphibian assemblage (to spring/summer 2009). This performance indicator will be assessed following the completion of the spring/summer 2010 survey and reported in the 2011 Annual Review.

Subsidence Impact Performance Measures included in the Land Management Plan and Water Management Plan

Subsidence impact performance measures of relevance to the Biodiversity Management Plan are also contained in the Land Management Plan and Water Management Plan. In the event the subsidence impacts observed exceed the land subsidence impact performance measure or an applicable water resource/water course subsidence impact performance measure, Metropolitan Coal will conduct a review of potential impacts on flora, fauna, and their habitats in accordance with the Biodiversity Management Plan.

Subsidence impact performance measures of relevance to the Biodiversity Management Plan are outlined in Table 11.

Table 11
Other Subsidence Impact Performance Measures of Relevance to the Biodiversity Management Plan

Water Resources	
Catchment yield to the Woronora Reservoir	*Negligible reduction to the quality or quantity of water resources reaching the Woronora Reservoir* *No connective cracking between the surface and the mine*
Woronora Reservoir	*Negligible leakage from the Woronora Reservoir* *Negligible reduction in the water quality of Woronora Reservoir*
Watercourses	
Waratah Rivulet between the full supply level of the Woronora Reservoir and the maingate of Longwall 23 (upstream of Pool P)	*Negligible environmental consequences (that is, no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining, and minimal gas releases)*
Eastern Tributary between the full supply level of the Woronora Reservoir and the maingate of Longwall 26	*Negligible environmental consequences over at least 70% of the stream length (that is no diversion of flows, no change in the natural drainage behaviour of pools, minimal iron staining and minimal gas releases)*
Land	
Cliffs	*Less than 3% of the total length of cliffs (and associated overhangs) within the mining area experience mining induced rock fall*

None of the subsidence impact performance measures of relevance to the Biodiversity Management Plan have been exceeded during the reporting period.

Analysis against Subsidence Impact Performance Measure for Threatened Species, Populations and Ecological Communities

If data analysis indicates a biodiversity performance indicator has been exceeded or is likely to be exceeded, Metropolitan Coal will implement suitable management measures and an assessment will be made against biodiversity subsidence impact performance measure.

Subsidence Impact Performance Measure:

Negligible impact on threatened species, populations, or ecological communities

Negligible Impact on Threatened Species - Key Assessment Considerations

In relation to threatened species, a number of threatened flora and fauna species listed under the NSW *Threatened Species Conservation Act, 1995* or Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* are known to occur, or have the potential to occur within 600 m of Longwalls 20-22 secondary extraction or in the surrounding area.

The key assessment considerations that will be taken into account to assess whether there has been a greater than negligible impact on threatened species are:

1. What is the nature of the environmental consequence (e.g. the potential for adverse impacts on upland swamps, riparian vegetation, slopes and ridgetops or aquatic habitats)?
2. What are the potential factors that may have contributed to the environmental consequence (e.g. the degree of subsidence effects, ineffective management measures or prevailing climatic conditions)?
3. Which threatened species have the potential to be impacted?
4. What are the potential impacts on the lifecycle of the potential threatened species (e.g. foraging, breeding/reproduction, nesting, shelter and movement/dispersal)?
5. What are the potential impacts on the habitat of the potential threatened species (e.g. area affected)?
6. Has the habitat connectivity of the threatened species been affected (e.g. loss of stream pool habitat connectivity)?
7. What actions, if any, are most appropriate to mitigate the impacts and/or to minimise future impacts?

Neither the performance indicators, nor the biodiversity subsidence impact performance measure were exceeded during the reporting period.

Negligible Impact on Populations - Key Assessment Considerations

No endangered flora or fauna populations listed under the NSW *Threatened Species Conservation Act, 1995* are known to occur within 600 m of Longwalls 20-22 secondary extraction or in the surrounding area.

The key assessment considerations that will be taken into account to assess whether there has been a greater than negligible impact on threatened populations (in the event a threatened population is listed that is applicable to the study area) are:

1. What is the nature of the environmental consequence (e.g. the potential for adverse impacts on upland swamps, riparian vegetation, slopes and ridgetops or aquatic habitats)?
2. What are the potential factors that may have contributed to the environmental consequence (e.g. the degree of subsidence effects, ineffective management measures or prevailing climatic conditions)?
3. Are there any threatened populations have the potential to be impacted?
4. What are the potential impacts on the lifecycle of the threatened population?
5. What are the potential impacts on the habitat of the threatened population (e.g. area affected)?
6. Has the habitat connectivity of the threatened population been affected?
7. What actions, if any, are most appropriate to mitigate the impacts and/or to minimise future impacts?

Neither the performance indicators, nor the biodiversity subsidence impact performance measure were exceeded during the reporting period.

Negligible Impact on Ecological Communities - Key Assessment Considerations

Occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion EEC listed under the NSW *Threatened Species Conservation Act, 1995* are situated some 400 m to the east of Longwalls 20-22, near the 600 m boundary.

The key assessment considerations that will be taken into account to assess whether there has been a greater than negligible impact on threatened ecological communities are:

1. Can any subsidence impacts (e.g. surface cracking, subsidence-induced erosion) be observed within the occurrences of the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion EEC situated to the east of Longwalls 20-22?
2. If yes, over what area has been affected?
3. What are the potential environmental consequences of the change in subsidence effects?
4. What actions, if any, are most appropriate to mitigate the impacts and/or to minimise future impacts?

Neither the performance indicator that relates to the Southern Sydney Sheltered Forest on Transitional Sandstone Soils in the Sydney Basin Bioregion EEC, nor the biodiversity subsidence impact performance measure was exceeded during the reporting period.

3.4.3.2 Swamps 76, 77 and 92

Subsidence Impact Performance Measure:

Swamps 76, 77 and 92 - Set through condition 4

Metropolitan Coal is not permitted to undermine Swamps 76, 77 and 92 without the written approval of the Director-General. Swamps 76, 77 and 92 will not be undermined by Longwalls 20-22.

Swamps 76, 77 and 92 will be subject to assessment in future Extraction Plan(s) and revisions of the Biodiversity Management Plan.

3.4.4 Management and Mitigation Measures

At this stage the implementation of the Biodiversity Management Plan and associated management processes are considered to be adequate.

3.4.5 Further Initiatives

In accordance with Condition 4, Schedule 7 of the Project Approval, Metropolitan Coal will review and revise the Biodiversity Management Plan following the submission of this Annual Review in response to consultation undertaken with regulatory agencies. The Biodiversity Management Plan will be revised to the satisfaction of the Director-General of the Department of Planning.

Baseline data will be obtained for Longwalls 23-27 upland swamp vegetation, riparian vegetation and amphibians in the next reporting period.

Baseline collection of aquatic habitat data for Longwalls 23-27 has commenced in accordance with the Water Management Plan. The collection of baseline aquatic ecology data for Longwalls 23-27 commenced in spring 2009.

3.5 LAND MANAGEMENT PLAN

3.5.1 Background

A Metropolitan Coal Longwalls 20-22 Land Management Plan has been prepared to manage the potential environmental consequences of the Extraction Plan on cliffs, overhangs, steep slopes and land in general, in accordance with Condition 6, Schedule 3 of the Project Approval.

3.5.2 Monitoring

Cliffs and Overhangs

Visual inspections are conducted monthly for the period of time that longwall extraction takes place within 400 m of sites COH1, COH2, COH3, COH4 and COH14 (Figure 17) to record evidence of potential subsidence impacts.

Specific details that are noted and/or photographed during the inspections include:

- the date of the inspection;
- the location of longwall extraction (i.e. the longwall chainage);
- the location of the cliff instability (i.e. freshly exposed rock face and debris scattered around the base of the cliff or overhang) relative to the cliff face or overhang;
- the nature and extent of the cliff instability (including an estimate of volume);
- the length of the cliff instability;
- other relevant aspects such as water seepage (which can indicate weaknesses in the rock);
- whether any actions are required (e.g. implementation of management measures, initiation of the Contingency Plan, incident notification, implementation of appropriate safety controls, review of public safety, etc.); and
- any other relevant information.

Additional opportunistic observations of subsidence impacts are also conducted during routine works and sampling by Metropolitan Coal and its contractors.

Inspections of sites COH1 and COH2 were conducted in July 2010. No cliff instabilities (i.e. freshly exposed rock face and debris scattered around the base of the cliff or overhang) or areas of water seepage were evident.

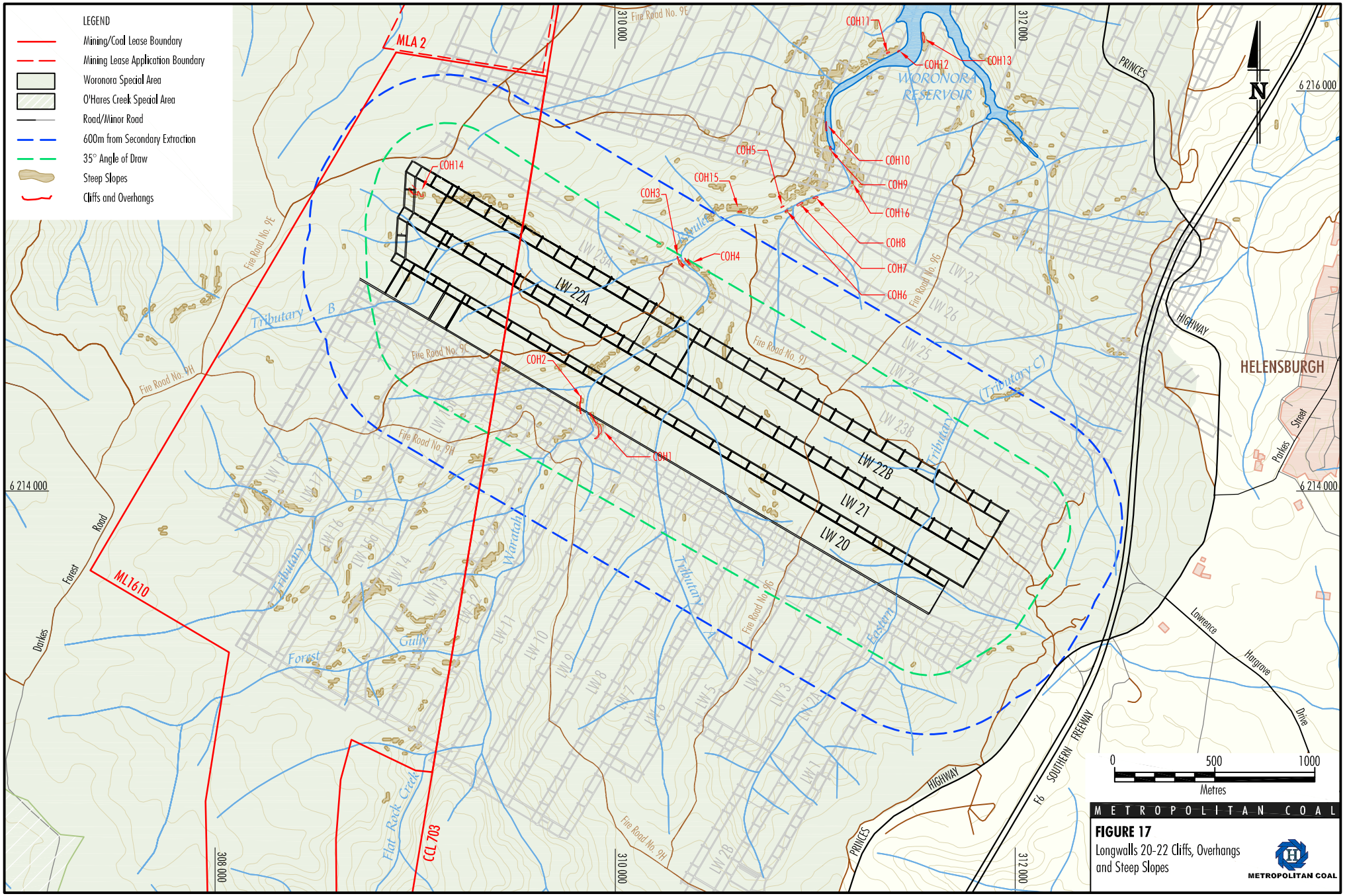

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FIGURE 17

Longwalls 20-22 Cliffs, Overhangs and Steep Slopes

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Steep Slopes and Land in General

Opportunistic visual inspections for subsidence impacts on steep slopes and land in general are conducted by Metropolitan Coal and its contractors as part of routine works conducted in the catchment.

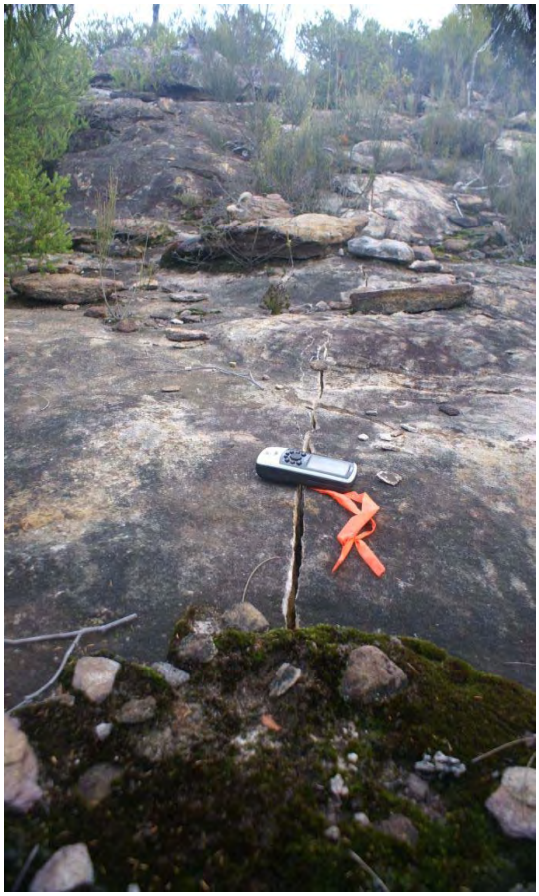
Specific details that are noted and/or photographed during the inspections include:

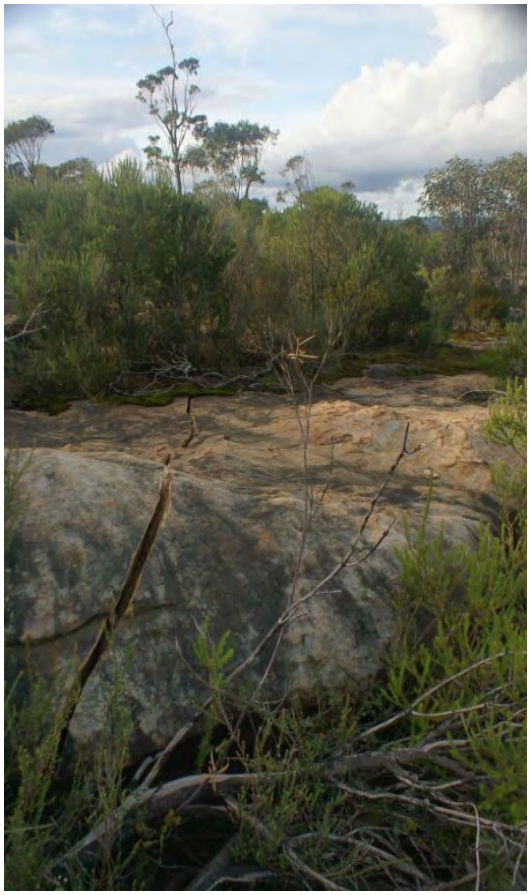
- the location, approximate dimensions (length, width and depth), and orientation of surface tension cracks;
- the location of the surface tension crack in relation to fire trails;
- the location and approximate dimensions of rock falls (e.g. rock ledges that occur along the Waratah Rivulet);
- whether any actions are required (for example – implementation of management measures, initiation of the Contingency Plan, incident notification, implementation of appropriate safety controls, review of public safety, etc.); and
- any other relevant information.

The date of the observation, details of the observer and the location of longwall extraction are also documented.

No subsidence impacts (e.g. surface tension cracks or rock falls) have been observed within the Longwalls 20-22 area during the reporting period.

A surface tension crack has however recently been recorded above Longwall 18 (Plates 1 and 2). The tension crack is located sub-parallel to the gate roads, directly above mining and at a distance of approximately 50 m from the goaf edge. The tension crack extends semi-continuously over a length of approximately 200 m. The width of the tension crack is typically less than 10 mm, with a maximum width of 40 mm.





Plates 1 and 2: Surface Tension Crack above Longwall 18

The potential for impacts on public safety, as well as the potential environmental consequences of the surface cracking were assessed. The surface tension crack was not considered to represent a safety or environmental hazard and no remedial action was considered necessary.

3.5.3 Assessment of Environmental Performance

The performance indicators and subsidence impact performance measure described below have been developed to address the predictions of subsidence impacts and environmental consequences on land included in the EA, PPR and Extraction Plan.

The results of the assessment are described below.

Analysis against Performance Indicator

Performance Indicator: *Steep slopes and land in general are expected to experience surface tension cracking no greater than 0.1 m wide and 25 m in length.*

The subsidence impact assessment in the Land Management Plan indicates that the size and extent of surface cracking at the steep slopes is expected to be similar to that observed during the extraction of previous longwalls at the Colliery (i.e. where surface cracking up to approximately 25 m long and 0.1 m wide has been observed).

As described above, a surface tension crack has recently been observed above Longwall 18 (Plates 1 and 2) that extends semi-continuously over a length of approximately 200 m. The width of the tension crack was typically less than 10 mm, with a maximum width of 40 mm. Due to the narrow dimension of the crack (i.e. typically less than 10 mm) manual remediation was not considered warranted.

Analysis against Subsidence Impact Performance Measure

Subsidence Impact Performance Measure:

Less than 3% of the total length of cliffs (and associated overhangs) within the mining area experience mining-induced rock fall.

The subsidence impact performance measure was not exceeded during the reporting period.

3.5.4 Management and Mitigation Measures

At this stage the implementation of the Land Management Plan and associated management processes are considered to be adequate.

3.5.5 Further Initiatives

In accordance with Condition 4, Schedule 7 of the Project Approval, Metropolitan Coal will review and revise the Land Management Plan following the submission of this Annual Review to the satisfaction of the Director-General of the Department of Planning. The Land Management Plan will be updated to reflect the identification of the surface tension crack above Longwall 18.

3.6 HERITAGE MANAGEMENT PLAN

3.6.1 Background

A Metropolitan Coal Longwalls 20-22 Heritage Management Plan has been prepared to manage the potential environmental consequences of the Extraction Plan on Aboriginal heritage sites or values in accordance with Condition 6, Schedule 3 of the Project Approval.

3.6.2 Monitoring

A monitoring program will be implemented to monitor the impacts and consequences of Project related subsidence on Aboriginal heritage sites.

The first round of monitoring (Round 1) will include all Aboriginal heritage sites located within the 35º Angle of Draw for Longwall 20 (Figure 18). Round 1 monitoring will be conducted between three and six months following the completion of Longwall 20.

The monitoring team will include an archaeologist (with experience in rock art recording and management) and Aboriginal stakeholder representatives. A summary of the information collected during monitoring will be recorded in the Heritage Management Plan – Subsidence Impact Register.

3.6.3 Assessment of Environmental Performance

The subsidence impact performance measure described below has been developed to address the predictions of subsidence impacts and environmental consequences on Aboriginal heritage included in the EA, PPR and Extraction Plan.

The monitoring results will be used to assess the Project against the Aboriginal heritage subsidence impact performance measure:

Less than 10% of Aboriginal heritage sites within the mining area are affected by subsidence impacts.

For the purpose of measuring performance against the Aboriginal heritage subsidence impact performance measure, sites are considered to be "affected by subsidence impacts" if they exhibit one or more of the following consequences that cannot be attributed to natural weathering or deterioration:

- overhang collapse;
- cracking of sandstone that coincides with Aboriginal art or grinding grooves; and
- rock fall that damages Aboriginal art.

The Heritage Management Plan – Subsidence Impact Register will be used to progressively monitor the cumulative number and percentage of Aboriginal heritage sites affected by subsidence impacts.

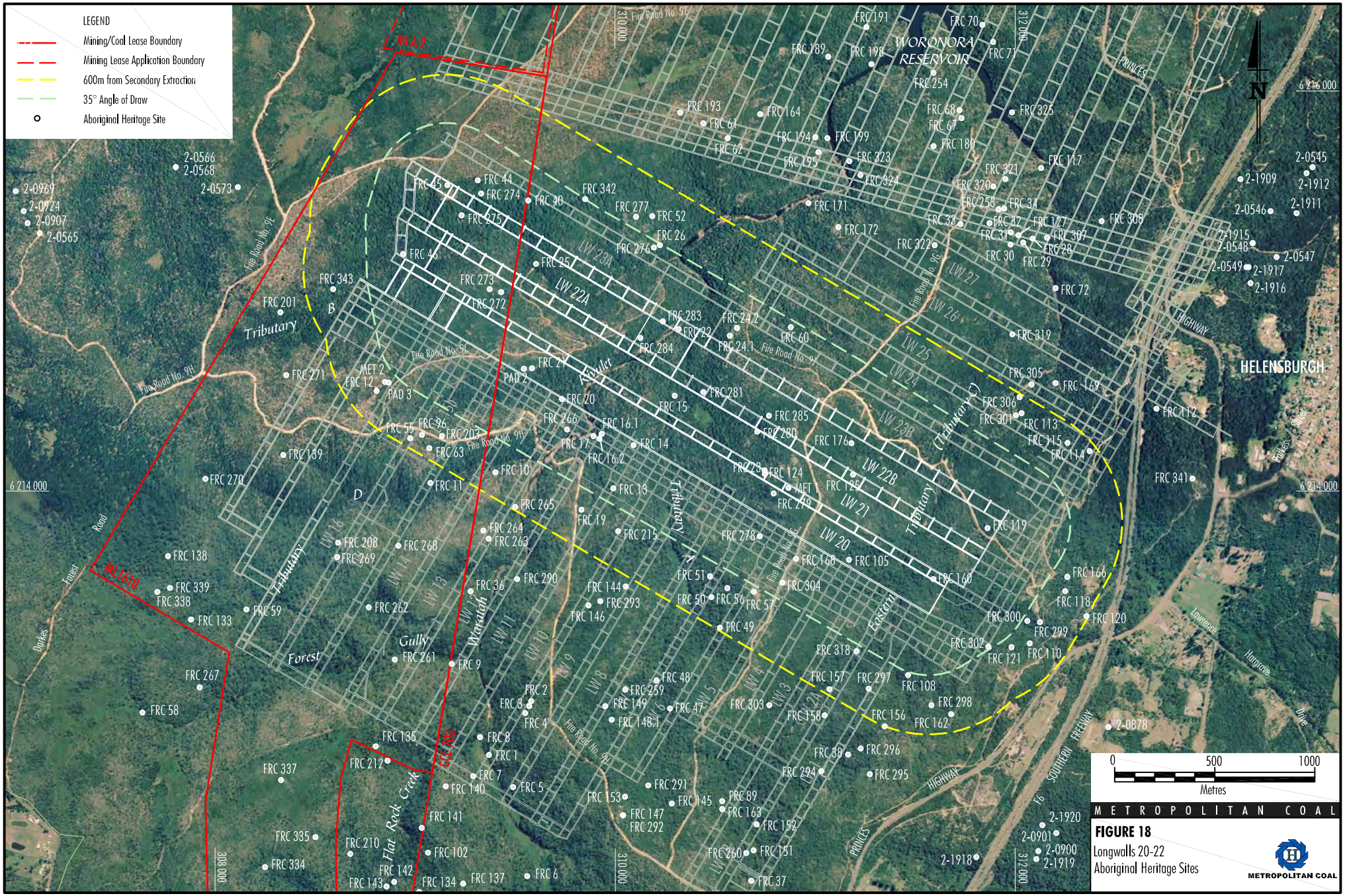
3.6.4 Management and Mitigation Measures

In the event that any subsidence impact is recorded during monitoring, consideration will be given to implementing appropriate management, remediation and/or mitigation measures in consultation with the DECCW and Aboriginal stakeholders.

The development of management and/or remediation measures will be determined in consultation with the DECCW and the Aboriginal stakeholders and with regard to the specific circumstances of the subsidence impact (e.g. the location, nature and extent of the impact) and the assessment of consequences. It is acknowledged that whilst measures may reduce the risk of impact and consequence, they may also have the potential to cause substantial damage to Aboriginal heritage sites and their settings.

3.6.5 Further Initiatives

In accordance with Condition 4, Schedule 7 of the Project Approval, Metropolitan Coal will review and revise the Heritage Management Plan following the submission of this Annual Review in response to consultation undertaken with regulatory agencies. The Heritage Management Plan will be revised to the satisfaction of the Director-General of the Department of Planning.



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During field surveys undertaken as part of the Project EA, a tree located near site FRC 279 was identified by the Northern Illawarra Aboriginal Collective as bearing *likely birth-marks*. Prior to secondary extraction of Longwall 20 within 600 m, Metropolitan Coal will undertake further investigation of the tree (via site inspection and consultation with Aboriginal stakeholders) to determine if the markings are likely to be of Aboriginal origin. These investigations will be undertaken by an archaeologist, a suitably qualified arborist and Aboriginal stakeholders.

Surveys undertaken as part of the Project EA also identified a number of sites for which the Aboriginal Heritage Information Management System (AHIMS) registered site cards were inconsistent with the current condition of the site. Within 600 m of Longwalls 20-22 secondary extraction, these sites include FRC 57, FRC 63 and FRC 276. Each of these sites was observed during surveys to have been subject to natural deterioration since their initial recording. Site cards for these sites will be revised to incorporate updated information (in the form of attachments to the original site card). The amended attachments will indicate the date the site was visited, who visited the site, recorded location (if different), site condition, any additional photographs, plans, site monitoring forms and any other relevant information.

3.7 BUILT FEATURES MANAGEMENT PLAN

3.7.1 Background

A Metropolitan Coal Longwalls 20-22 Built Features Management Plan has been prepared to manage the potential environmental consequences of the Extraction Plan on built features in accordance with Condition 6, Schedule 3 of the Project Approval. Each plan has been developed in consultation with the relevant asset owner.

3.7.2 Monitoring

Site inspections have been conducted prior to the commencement of secondary extraction of Longwall 20 to establish the condition of the infrastructure items.

A monitoring program will be implemented to monitor subsidence impacts on the following infrastructure at the various frequencies described in the Built Features Management Plan:

- Integral Energy infrastructure;
- Nextgen infrastructure;
- TransGrid infrastructure;
- Optus infrastructure;
- Telstra infrastructure;
- Roads and Traffic Authority infrastructure;
- RailCorp infrastructure;
- Sydney Water infrastructure; and
- Wollongong City Council.

Due to the distance of current extraction of Longwall 20 from all built features to date, no infrastructure monitoring beyond baseline surveys has been conducted.

3.7.3 Assessment of Environmental Performance

Metropolitan Coal and the infrastructure owners will compare the results of the subsidence impact monitoring against the built features performance indicators and built features subsidence impact performance measure.

Specific performance indicators have been developed for the various infrastructure items and are outlined in the Built Features Management Plan.

Built Features Subsidence Impact Performance Measure

The Project Approval requires Metropolitan Coal not to exceed the following built features subsidence impact performance measure:

> *Safe, serviceable and repairable, unless the owner and the MSB agree otherwise in writing.*

Neither the performance indicators, nor the built features subsidence impact performance measure was exceeded during the reporting period.

Heritage Subsidence Impact Performance Measure – Garrawarra Centre Historical or Heritage Significance Items

The Project Approval also requires Metropolitan Coal not to exceed the following heritage subsidence impact performance measure for items of heritage or historical significance at the Garrawarra Centre:

> *Negligible damage (fine or hairline cracks that do not require repair), unless the owner of the item and the appropriate heritage authority agree otherwise in writing.*

The Garrawarra Complex is located more than 3 km from Longwalls 20-22 and at this distance no measurable systematic or non-systematic subsidence movements are anticipated. The subsidence impact performance measure will be assessed as a component of future Extraction Plans.

3.7.4 Management and Mitigation Measures

At this stage the implementation of the Built Features Management Plan and associated management processes are considered to be adequate.

Over the reporting period, Metropolitan Coal held meetings with infrastructure owners, as well as the RTA Technical Committee which was established to facilitate consultation in regard to the Built Features Management Plan – RTA in relation to the F6 South Freeway and associated bridges.

3.7.5 Further Initiatives

Monitoring of subsidence impacts on infrastructure items will commence in the next reporting period.

In accordance with Condition 4, Schedule 7 of the Project Approval, Metropolitan Coal will revise the Built Features Management Plan-RTA within three months following the submission of this Annual Review in response to consultation undertaken with the RTA Technical Committee. The Built Features Management Plan-RTA will be amended to indicate that a survey of Line 9G, the Princes Highway Line and the Freeway Line will be conducted when Longwall 20 is approximately 200 m from the finish line. This provides an additional round of monitoring prior to the completion of Longwall 20.

A monthly subsidence status report will also be developed in relation to the Built Features Management Plan – RTA to inform the RTA of mining progress and the subsidence recorded.

3.8 PUBLIC SAFETY MANAGEMENT PLAN

3.8.1 Background

A Metropolitan Coal Longwalls 20-22 Public Safety Management Plan has been prepared to manage the potential consequences of the Extraction Plan on public safety within the underground mining area in accordance with Condition 6, Schedule 3 of the Project Approval.

3.8.2 Monitoring

Hazards identified in relation to public access to the underground mining area that may arise as a result of the Extraction Plan include:

- damage to fire trails (e.g. cracks);
- dislodgement of rocks onto fire trails or roads;
- dislodgement of rocks from cliffs and overhangs;
- entrapment by fire caused by locked gates;
- vehicle collision with monitoring equipment located near fire trails;
- slips, trips and falls by visitors to the tributaries; and
- snake bite, spider bite or other animal encounter.

Monitoring of cliffs and overhangs, steep slopes and land in general has been conducted for subsidence impacts in accordance with the Land Management Plan, and of infrastructure items in accordance with the Built Features Management Plan. No subsidence impacts were identified during the reporting period that were considered to pose a risk to public safety.

Further, no safety incidents were reported by visitors, personnel or contractors to Metropolitan Coal in the underground mining area during the reporting period.

3.8.3 Assessment of Environmental Performance

The monitoring results have been used to assess the Project against the performance indicator and the built features subsidence impact performance measure.

Analysis against Performance Indicator

Performance Indicator: *Public safety will be ensured in the event that any hazard to the general public arising from subsidence effects becomes evident.*

No subsidence impacts were identified during the reporting period that were considered to pose a risk to public safety.

Analysis against Subsidence Impact Performance Measure

Subsidence Impact Performance Measure:

Safe, serviceable and repairable, unless the owner and the MSB agree otherwise in writing.

Neither the performance indicator, nor the built features subsidence impact performance measure was exceeded during the reporting period.

3.8.4 Management and Mitigation Measures

The monitoring information has been used to assess whether any management measures are required in response to subsidence impacts in relation to public safety. No management measures relating to subsidence impacts have been required over the reporting period in relation to public safety.

The following safety management measures are applicable to persons accessing the Woronora Special Area:

- The *SCA Standard Conditions of Entry,* which outline specific safety controls for authorised personnel accessing the Woronora Special Area.

- The Metropolitan Coal *SCA Catchment Area Induction*, which addresses the safety of personnel accessing the Woronora Special Area including awareness of SCA Standard Conditions of Entry, suitable Personal Protective Equipment, emergency procedures, and includes the Metropolitan Coal Bushfire Preparedness Plan.
- The Metropolitan Coal *Surface Emergency Management Plan* has been prepared in accordance with the NSW *Coal Mine Health and Safety Act, 2002*, and operates in conjunction with the *First Aid Management Plan* and *Firefighting Capability Management Plan.*

The general public is not permitted to access the Woronora Special Area for any recreational or other purpose.

3.8.5 Further Initiatives

Monitoring of subsidence impacts in relation to public safety will continue in the next reporting period.

3.9 RESEARCH PROGRAM

3.9.1 Background

In accordance with Condition 9, Schedule 3 of the Project Approval, a Metropolitan Coal Research Program will be developed in consultation with the NSW Office of Water, SCA, DECCW and Industry & Investment NSW and submitted to the Director-General of the Department of Planning for approval by the end of 2010.

The Approval Condition states:

> *The Proponent shall prepare and implement a Research Program for the Project to the satisfaction of the Director General, and allocate $320,000, towards the implementation of the program. This program must:*
>
> *a) be prepared in consultation with DWE, SCA, DECC and DPI*
>
> *b) be submitted to the Director-General for approval by the end of 2010;*
>
> *c) be targeted at genuine research, as opposed to implementing the matters required by this approval; and*
>
> *d) be directed at encouraging research into improving:*
>
> - *the prediction of valley closure and upsidence, and the resultant subsidence impacts;*
> - *the assessment of the environmental consequences of subsidence impacts on natural features;*
> - *the remediation of subsidence impacts on watercourses;*
> - *the understanding of subsidence impacts and their environmental consequences on swamps;*
> - *the conservation of the Eastern Ground Parrot on the Woronora Plateau; or*
> - *the environmental management of underground mining operations in the Southern Coalfield.*

Metropolitan Coal has generally followed the Australian Coal Association Research Program process for the selection of research projects. The selection process included:

- invitation for selected candidates to submit short proposals;
- short listing of projects following an evaluation process;
- invitation to submit full proposals;
- final selection of projects; and
- submission of recommendations to the Department of Planning for final approval.

The process schedule is outlined in Table 12.

Table 12
Research Project Selection Process Schedule

Process Stage	Date
Closing date for submission of short proposals	9 July 2010
Evaluation of short listed projects	30 July 2010
Submission of full proposals	27 August 2010
Final approval by Department of Planning	End 2010

A total of eight short proposals were received from candidates, seeking a total funding of over $1.5 million. A description of the eight short proposals received is provided in Table 13.

Table 13
Research Project Proposals

Research Topic	Funding Requested
Evaluation of fundamental geotechnical mechanisms contributing to valley closure subsidence effects in severe topographic conditions.	$320,000 ($210,000 if funded through Australian Research Council [ARC] linkage scheme).
Development of an innovative, integrated remote sensing capability for long term assessment of the health of swamps and their response to mining subsidence effects.	$210,000 ($165,000 if funded through ARC linkage scheme).
Understanding of subsidence impacts and their environmental consequences on swamps.	$250,000.
Conservation of the Eastern Ground Parrot on the Woronora Plateau.	$70,600.
Significance of chain pillars on simulated groundwater pressures.	$64,000 1 study area. $96,500 2 study areas.
Sensitivity of swamp water loss to surface cracking.	$35,000.
No specific title. Addresses: prediction of valley closure and resultant subsidence impacts; the assessment of the environmental consequences of subsidence impacts on natural features including archaeological sites; and the understanding of subsidence impacts and their environmental consequences on swamps.	$250,000.
No specific title. Proposal to select, configure, calibrate and verify an integrated software package to model rainfall runoff, surface water – groundwater interaction, and groundwater system in a catchment impacted by mining activities in the Southern Coalfield.	$300,000.

Metropolitan Coal has ranked the short proposals according to the following five criteria:

1. Relevance to the topics described in Schedule 3, Condition 9 of the Project Approval.
2. The extent to which the work was genuine research (i.e. the proposed research project should exclude work required by the Project Approval conditions and the research project should include technical risk).
3. The extent to which the stated outcomes were well defined and achievable.
4. Safety implications.
5. Value of the research.

Four of the eight short proposals have been short listed, and full proposals for these projects have been obtained.

Metropolitan Coal is currently considering the full proposals and will submit its recommendations to the Department of Planning in late 2010.

3.9.2 Monitoring

The progress of the selected research program(s) will be monitored and reported in the 2011 Annual Review.

3.10 CONSTRUCTION MANAGEMENT PLAN

3.10.1 Background

A draft Metropolitan Coal Construction Management Plan has been prepared for surface construction works (excluding remediation or rehabilitation works) in the Woronora Special Area in accordance with Condition 11, Schedule 3 of the Project Approval.

3.10.2 Monitoring

The draft Construction Management Plan currently includes:

- the proposed construction of two new gauging stations, one on the Eastern Tributary and another on Honeysuckle Creek; and
- the proposed upgrade of the existing SCA gauging stations on the Waratah Rivulet and Woronora River.

Construction activities would commence following the approval of the Construction Management Plan.

A Construction Management Plan – Performance Indicator Assessment Form will be used to monitor and assess the performance of construction works. The results of the monitoring will be reported in the 2011 Annual Review.

3.10.3 Assessment of Environmental Performance

The performance of the construction activities are proposed to be assessed against the performance indicators outlined below.

Performance Indicator 1: *The construction works are/have been conducted as described for the construction site in the Construction Management Plan – Surface Works Assessment Form.*

Performance Indicator 2: *Inspection of the construction works indicates appropriate erosion and sediment controls are/have been installed and are effective.*

Performance Indicator 3: *Inspection of the construction works indicates appropriate fuel and spill management measures are/have been implemented and are effective.*

Performance Indicator 4: *The construction works are/have been conducted in accordance with other management measures described in the Construction Management Plan.*

3.10.4 Management and Mitigation Measures

Management measures will be implemented to minimise potential impacts associated with surface construction works in the Woronora Special Area, including measures relevant to:

- vegetation management;
- Aboriginal heritage management;
- erosion and sediment management;
- fuel and spill management;
- transport management;

- waste management;
- bushfire preparedness and management;
- pest management; and
- site clean up.

The Construction Management Plan – Surface Works Register and Assessment Form will be used to manage the surface construction works.

3.10.5 Further Initiatives

In the next reporting period, Metropolitan Coal will revise the draft Construction Management Plan in response to consultation undertaken with regulatory agencies and re-submit the Construction Management Plan to the Department of Planning for approval.

3.11 REHABILITATION MANAGEMENT PLAN

3.11.1 Background

A Metropolitan Coal Rehabilitation Management Plan has been prepared for the underground mining area for areas requiring rehabilitation or remediation measures including surface disturbance areas and stream pool/rock bar remediation in accordance with Condition 4, Schedule 6 of the Project Approval.

3.11.2 Rehabilitation and Remediation Measures

3.11.2.1 Surface Disturbance Areas

A Rehabilitation Management Plan – Surface Disturbance Register will be used to manage the implementation of rehabilitation measures.

No surface disturbance areas were rehabilitated during the reporting period.

3.11.2.2 Stream Pool/Rock Bar Remediation

Stream remediation activities have commenced at Pools A and F along the Waratah Rivulet in accordance with approvals obtained from the SCA under Part 5 of the EP&A Act.

In the reporting period, stream remediation activities have been conducted at Pool A on the Waratah Rivulet. Stream remediation activities at Pool A have included the drilling of holes and the injection of grout (polyurethane resin) into sub-surface fractures. Associated activities have included the mobilisation, placement and operation of equipment and the implementation of a variety of environmental management measures.

3.11.3 Monitoring

3.11.3.1 Surface Disturbance Areas

Some surface disturbance areas will be able to be rehabilitated during the life of the Project (e.g. monitoring sites no longer required), while other surface disturbance areas will likely remain until after the completion of mining operations.

Once a surface disturbance area is no longer being utilised, monitoring is conducted to assess:

- where appropriate, whether equipment/infrastructure items have been removed;
- whether the area is tidy or rubbish removal is required;
- whether erosion and sediment controls are required and if so, the effectiveness of those installed;

- the presence of weeds and the need for the implementation of weed control measures;
- where appropriate, whether vegetation is re-establishing naturally or whether active revegetation is required; and
- if active revegetation is conducted, whether vegetation is establishing.

No surface disturbance areas were rehabilitated during the reporting period.

In accordance with the Rehabilitation Management Plan, the Rehabilitation Management Plan – Surface Disturbance Register will be used to monitor the performance of the measures implemented to rehabilitate surface disturbance areas.

3.11.3.2 Stream Pool/Rock Bar Remediation

Monitoring of Pool Water Levels

Water levels in pools on the Waratah Rivulet and Eastern Tributary are monitored in accordance with the Catchment Monitoring Program and Water Management Plan.

Stream remediation will be initiated:

- at pools/rock bars on Waratah Rivulet between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir; or
- at pools/rock bars on the Eastern Tributary between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir;

if the water level in a pool falls below its cease to flow level (i.e. stops overflowing), except if as a result of climatic conditions.

An assessment of the monitored pool water levels on Waratah Rivulet between Flat Rock Swamp and the full supply level of the Woronora Reservoir has been conducted, as described below.

Pools A, B, C, E, F, G, G1, H and I on the Waratah Rivulet are situated in the completed mining area (i.e. overlying Longwalls 1 to 13) between Flat Rock Swamp and the tailgate of Longwall 20 (Figure 7).

Pool water level monitoring of Pools A, B, C, E, F, G and G1 are shown on Chart 46 below.

As a result of previous mining, the water levels in pools upstream of Flat Rock Crossing (i.e. Pools A to G) have been impacted by mine subsidence as described in the Water Management Plan and Rehabilitation Management Plan.

As described in Section 3.11.2, stream remediation activities have commenced at Pools A and F on the Waratah Rivulet. The rock bars at Pools A and F are considered to largely control the pools located upstream of these rockbars. As a result, Metropolitan Coal anticipates that the restoration of surface flow and pool holding capacity at Pools A and F will restore the surface flow and pool holding capacity of pools between Flat Rock Swamp and Pool F. Metropolitan Coal will assess whether stream remediation is required at any additional pools/rock bars between Flat Rock Swamp and Pool F once stream remediation activities at Pools A and F have been completed. Metropolitan Coal will restore surface flow and pool holding capacity at Pools A to G as soon as reasonably practicable.

Pool G1 (downstream of Flat Rock Crossing) has not fallen below its cease to flow level and is behaving in a natural way.

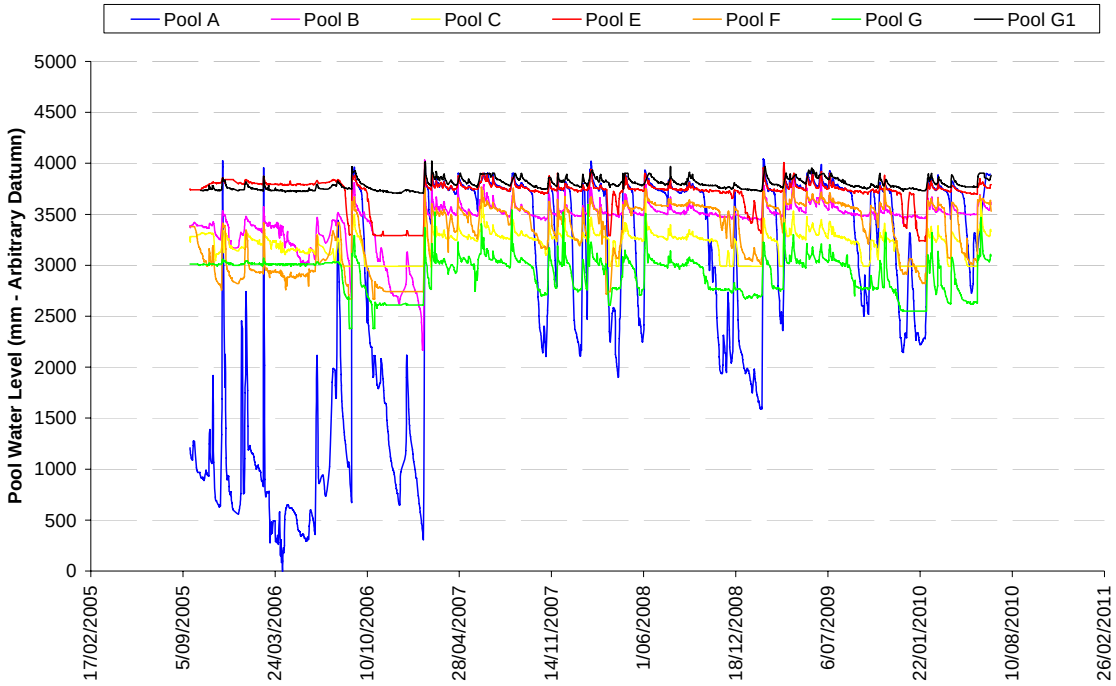

Chart 46 Pool Water Levels in Pools A, B, C, E, F, G and G1

Pool water level monitoring data is available for pools further downstream of Flat Rock Crossing (Pools H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V and W), however cease to flow levels are in the process of being surveyed for all pools except Pools P, R and S. It is considered that the water levels in Pools H to W have remained above their cease to flow level over the period of available data. The recorded pool water level response is consistent with natural pool behaviour of pools. The recorded pool water level responses in these downstream pools during low flow periods show the effects of daily temperature fluctuations (refer to Chart 32 for Pool P) but are otherwise consistent with natural pool behaviour and do not exhibit the rapid decline in pool water level observed in pools further upstream which are known to have been affected by subsidence. Pools downstream of Flat Rock Crossing have always been overflowing when observed by Metropolitan Coal personnel during the review period. Further, the Waratah Rivulet has been subject to minimal subsidence effects as a result of Longwall 20 over the reporting period given the distance of longwall extraction from the stream.

Metropolitan Coal is in the process of upgrading the pool water level meter instrumentation in order to remove the effects of daily temperature fluctuations.

Monitoring of Stream Remediation Measures

Stream remediation activities have commenced at Pools A and F on the Waratah Rivulet in accordance with approvals obtained from the SCA under Part 5 of the EP&A Act. An inspection and reporting system has been used to check that suitable environmental controls are in place and working effectively. Water quality monitoring is also conducted prior to the commencement of works and during grouting activities.

During the reporting period, stream remediation activities have been conducted without any environmental incidents or impacts to the water quality in the Waratah Rivulet.

3.11.4 Assessment of Environmental Performance

3.11.4.1 Surface Disturbance Areas

Analysis against Performance Indicators

Metropolitan Coal will assess the progress of the rehabilitation measures against the following performance indicators:

> *Redundant equipment/infrastructure items have been removed.*
>
> *The site is neat and tidy (i.e. it does not contain any rubbish).*
>
> *No weed management measures are required.*
>
> *No erosion or sediment control measures are required.*
>
> *Where appropriate, native vegetation is naturally regenerating or active revegetation is establishing.*
>
> *No further active revegetation measures are required.*

The progress of the rehabilitation will be recorded in the Rehabilitation Management Plan – Surface Disturbance Register and reported in Annual Reviews.

Analysis against Rehabilitation Objective

When appropriate, an assessment of the site will be made against the rehabilitation objective for other land affected by the Project, *viz*. *Restore ecosystem function, including maintaining or establishing self-sustaining native ecosystems: comprised of local native plant species; with a landform consistent with the surrounding environment*.

The rehabilitation objective will be considered to have been met if:

- the site contains self-sustaining native vegetation (i.e. the vegetation is able to sustain itself, without the implementation of any management measures);
- the vegetation is healthy;
- the native vegetation is comprised of local native plant species, as assessed by a suitably qualified botanist;
- ecosystem function is considered to have been restored (i.e. ecosystem processes [water cycle, nutrient cycle and energy interception] at site scale are functioning well); and
- the landform is consistent with the surrounding environment.

The assessment will be recorded in the Rehabilitation Management Plan – Surface Disturbance Register and the progress of rehabilitation will be reported in Annual Reviews.

3.11.4.2 Stream Pool/Rock Bar Remediation

Analysis against Performance Indicators

Metropolitan Coal will assess the progress of the stream remediation measures against the following performance indicator:

> *Analysis of water level recession rates for a pool indicates a similar pool behaviour to that which existed prior to being impacted by subsidence.*

The water level recession rates performance indicator will be considered to have been met if data analysis indicates there is not a statistically significant change in pool water level recession rates after stream remediation, compared to pool water level recession rates prior to the triggering of stream remediation.

Analysis of water level recession rates at Pools A and F will be conducted in the next reporting period following the conduct of further stream remediation measures.

Analysis against Rehabilitation Objective

The rehabilitation objective for the Waratah Rivulet between the downstream edge of Flat Rock Swamp and the full supply level of the Woronora Reservoir and the Eastern Tributary between the maingate of Longwall 26 and the full supply level of the Woronora Reservoir, *viz. Restore surface flow and pool holding capacity as soon as reasonably practicable*, will be assessed using the results of the assessment of the performance indicator and progress reported in Annual Reviews.

3.11.5 Further Initiatives

In the next reporting period, stream remediation activities will be conducted at Pools A and F on the Waratah Rivulet. Metropolitan Coal will restore surface flow and pool holding capacity at Pools A to G on the Waratah Rivulet as soon as reasonably practicable.

Metropolitan Coal will continue to monitor water levels in pools on the Waratah Rivulet and Eastern Tributary.

4 REVIEW OF ENVIRONMENTAL PERFORMANCE – SURFACE FACILITIES AREA

4.1 NOISE MANAGEMENT PLAN

4.1.1 Background

A Metropolitan Coal Noise Management Plan has been prepared for the Major Surface Facilities Area in accordance with Condition 8, Schedule 4 of the Project Approval.

4.1.2 Monitoring

Noise monitoring for the Project will consist of unattended and attended measurements, as described below.

Real-time Noise Monitoring

Real-time noise monitoring for the Project will be undertaken using an unattended statistical noise logger. Real-time noise monitoring will be used as an internal Metropolitan Coal noise management tool and not for compliance purposes. The Project site noise emissions will be monitored continuously at one location from December 2010.

At the commencement of the monitoring program (by December 2010), unattended noise monitoring equipment will initially be installed at the representative receiver location(s) for a period of one week in order to determine the received noise levels from the Project and will be supplemented with operator-attended noise surveys. Following this initial monitoring, recommendations on subsequent monitoring locations may be made by the acoustic consultant, dependent upon the measured noise levels at the surrounding sensitive receiver locations.

The real-time noise monitor will include the following general specifications:

- Records 15 minute statistical noise data.
- Records real-time audio (MP3 or wav) files continuously.
- Produces daily reports, including:
  - 15 minute statistical data ($L_{A10,}$ L_{A90});
  - $L_{Aeq(15\ minute)}$ and $L_{Aeq(period)}$ noise levels;
  - $L_{Aeq(15\ minute)}$ in 1/3 octave; and
  - $L_{Aeq(15\ minute)}$ in the 12.5 to 630 Hertz (Hz) $_{(low\ frequency)}$ range.

The real-time noise monitor will be set up to record noise levels 24 hours a day, 7 days a week and a graphical summary of the previous 24 hours of noise will be sent to mine staff via email on a daily basis.

The continuous recording will also include an audio function which allows the monitor to record audio of the noise signal. This audio information can be downloaded in order to allow the listener to determine whether the noise source is Project related. There are numerous other potential noise sources apart from Project noise, such as insects, frogs, local vehicles, domestic activities (lawn mowers, etc.) and wind and rain, which may influence noise monitoring results.

Attended Noise Monitoring

This continuous monitoring will be supplemented by attended noise monitoring.

Attended noise monitoring will be conducted quarterly and additional monitoring may also be conducted in the event of ongoing noise complaints from a particular landholder/locality that requires further investigation.

Results from the attended monitoring program will be used to verify data collected from the real-time noise monitor and to track the noise performance of the mine prior to 2014. Post-2014 attended monitoring will be utilised to determine compliance with noise impact criteria.

Attended noise measurements and recordings will be conducted quarterly to quantify the intrusive noise emissions from the mine, including processing and transportation operations as well as the overall level of ambient noise. The attended monitoring data will also be used to determine whether there is a consistent relationship between real-time continuous noise levels and long-term attended monitoring data.

The attended noise monitoring program will be conducted at sites representative of the nearest residences to the Project that are potentially most affected by Project noise emissions. The nearest residences are (Figure 19):

- residences to the south-west at 2 to 18 Oxley Place;
- residences to the west north-west at 53 to 59 Parkes Street;
- residences to the north-west at 48, 50, 52/54 Parkes Street; and
- residences further to the north-west at 42, 44 and 46 Parkes Street.

Attended noise monitoring will be conducted for 15 minute periods during the daytime, evening and night-time periods. The monitoring will be carried out on two consecutive days and nights resulting in at least two 15 minute samples for each monitoring location every three months. Daytime monitoring at residences to the south-west at 2 to 18 Oxley Place will be conducted in the morning period, to include a representative number of reject and product truck movements on the Mine Access Road.

The results of attended noise monitoring will be compared against the relevant noise performance indicators and noise criteria.

Complaints Records

During the reporting period two complaints relating to operational noise were received by Metropolitan Coal. Given the proximity of the major surface facilities to the nearby private residences (Figure 19) this is considered to be a very low number of noise complaints.

In comparison, some four operational noise complaints were received in the previous year and one complaint the year before (Chart 57 in Section 6).

Transport noise complaints are incorporated in traffic complaints (Section 4.4.2).

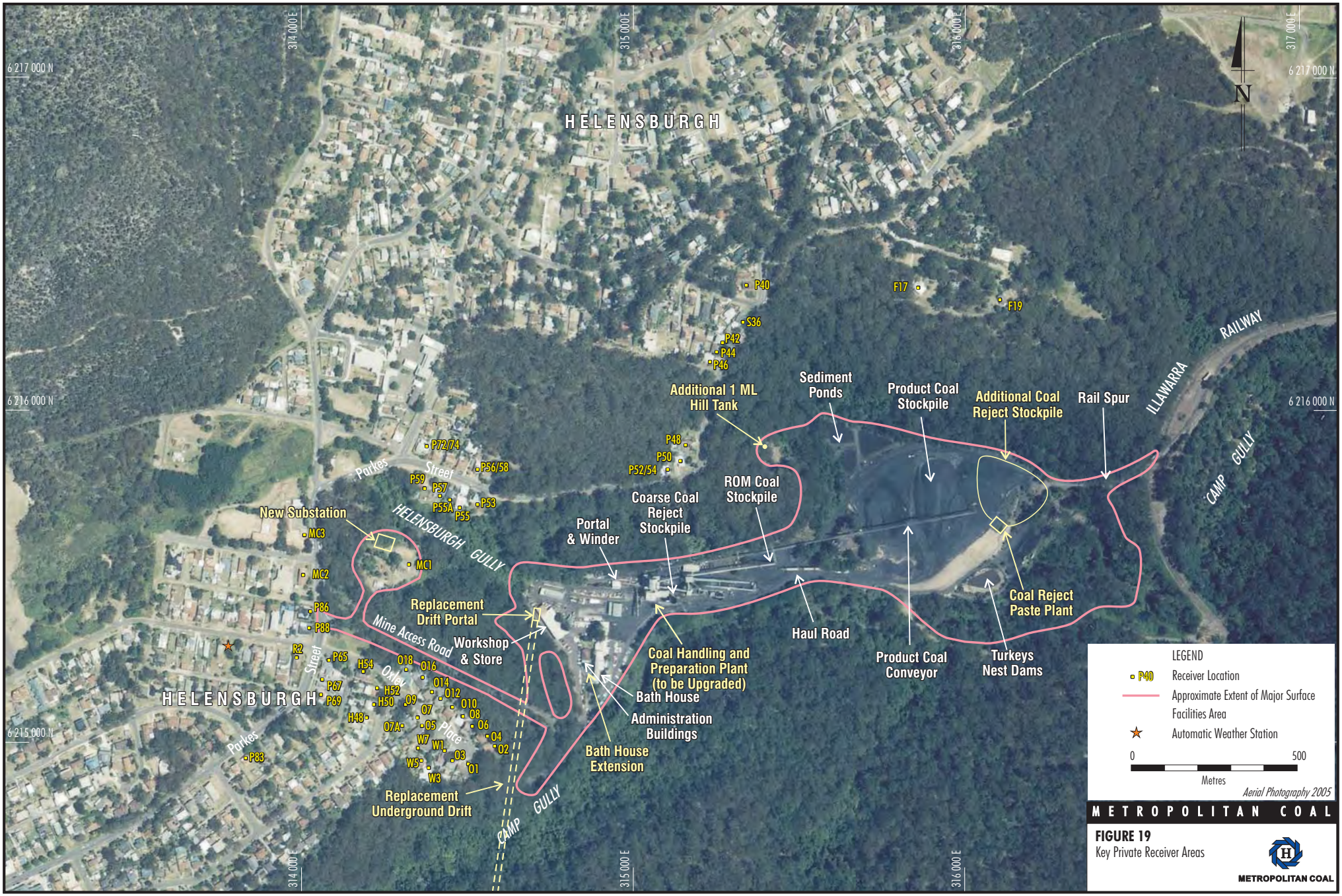

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FIGURE 19
Key Private Receiver Areas

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4.1.3 Assessment of Environmental Performance

Noise performance indicators and impact criteria have been developed in consideration of the predicted impacts of the Project on noise included in the Project EA, as described below.

Assessment against Performance Indicators

Metropolitan Coal has adopted interim noise performance indicators to allow tracking of mine noise improvements and performance, including noise levels at the nearest residential locations at which the Project noise impact criteria will be applicable from the end of 2014.

As described in the Project EA, Metropolitan Coal has, and will be, upgrading and/or extending the existing supporting infrastructure systems at the Major Surface Facilities Area. As noise performance will be linked to the progress of the major surface facilities upgrades, the performance indicators are also linked to the status of the upgrades (Table 14).

Table 14
Noise Performance Indicators

<table>
<tr><th>Status of Major Surface Facilities Upgrades</th><th>Noise Performance Indicator</th><th>Assessment of Noise Performance Indicator</th></tr>
<tr><td rowspan="3">Upgrades Design/ Construction.</td><td>Establishment of a quarterly operational attended noise monitoring program and real-time noise monitoring system at the site by December 2010.</td><td>The performance indicator will be considered to be exceeded if the installation and commissioning of the real-time noise monitor and commencement of quarterly attended noise monitoring is not undertaken prior to 31 December 2010.</td></tr>
<tr><td>Design of the major surface facilities fixed plant upgrades (and any associated mobile plant upgrades) is to be undertaken cognisant of the material noise reductions at the site that will be required.</td><td>The performance indicator will be considered to be exceeded if the formal notification of the design/engineering team is not undertaken.</td></tr>
<tr><td>Undertake noise modelling of the preferred upgrade design prior to construction to determine if sufficient noise reduction is likely to be achieved from the planned fixed and mobile plant upgrades.</td><td>The performance indicator will be considered to be exceeded if the sound power levels audit and noise modelling review (and associated additional design work if necessary) is not undertaken.</td></tr>
<tr><td>Upgrades Commissioned (Pre-end 2014).</td><td>Privately Owned Residences:<table><tr><th>Day $L_{Aeq(15\ minute)}$</th><th>Evening $L_{Aeq(15\ minute)}$</th><th>Night $L_{Aeq(15\ minute)}$</th><th>Night $L_{A1(1\ minute)}$</th></tr><tr><td>53 dB(A)</td><td>48 dB(A)</td><td>48 dB(A)</td><td>53 dB(A)</td></tr></table></td><td>The performance indicator will be considered to be exceeded if the indicator noise levels are not met at the nearest private receivers.</td></tr>
<tr><td>Upgrades Complete (Post-2014).</td><td>Develop real-time noise monitoring performance indicators.</td><td>The performance indicator will be considered to be exceeded if the Noise Management Plan is not updated to include real-time performance indicators prior to 30 June 2014.</td></tr>
</table>

The Noise Management Plan was approved by the Director-General of the Department of Planning on the 23 August 2010. In accordance with the Noise Management Plan, the performance of the mine will be assessed against the noise performance indicators in the 2011 Annual Review.

Assessment against Noise Impact Criteria

The Project Approval requires Metropolitan Coal by the end of 2014 to ensure that the noise generated by the Project does not exceed the noise impact assessment criteria in Table 2 of Condition 1, Schedule 4 at any residence on privately-owned land, or on more than 25% of any privately-owned land.

Table 2: Noise Impact Assessment Criteria

Day $L_{Aeq(15\ min)}$	***Evening $L_{Aeq(15\ min)}$***	***Night $L_{Aeq(15\ min)}$***	***Night $L_{A1(l\ min)}$***
50 dB(A)	45 dB(A)	45 dB(A)	50 dB(A)

Notes:

- *To determine compliance with the $L_{Aeq(period)}$ noise limits, noise from the project is to be measured at the most affected point within the residential boundary, or at the most affected point within 30 metres of a dwelling (rural situations) where the dwelling is more than 30 metres from the boundary. Where it can be demonstrated that direct measurement of noise from the project is impractical, alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy) may be accepted. The modification factors in Section 4 of the NSW Industrial Noise Policy shall also be applied to the measured noise levels where applicable.*
- *To determine compliance with the $L_{A1(1\ minute)}$ noise limits, noise from the project is to be measured at 1 metre from the dwelling façade. Where it can be demonstrated that direct measurement of noise from the project is impractical, alternative means of determining compliance (see Chapter 11 of the NSW Industrial Noise Policy may be accepted.*
- *The noise emission limits identified in the above table apply under meteorological conditions of:*
  - *wind speeds of up to 3 m/s at 10 metres above ground level; or*
  - *temperature inversion conditions of up to 3ºC/100m, and wind speeds of up to 2 m/s at 10 metres above ground level,*

  determined in accordance with the NSW Industrial Noise Policy.

Post 2014, the performance criteria in Table 2 of Condition 1, Schedule 4 will be considered to be exceeded if:

- the recorded noise levels are more than 2 decibels (dB) above the noise criteria specified in the Project Approval; and
- sustained non-compliances are not addressed and rectified.

4.1.4 Management and Mitigation Measures

Metropolitan Coal has commenced upgrades to the major surface facilities in the reporting period and upgrade works will be ongoing over the next few years.

One component of the site upgrades of relevance to major surface facilities noise management is the progressive implementation of additional noise controls.

The following significant noise reduction works were undertaken in 2009 at the Major Surface Facilities Area:

- attenuating the drift conveyor main drive (MD1) with an insulated enclosure;
- re-cladding and additional enclosure of the northern side of the crusher building;
- re-cladding and additional enclosure of the eastern side of the crusher building; and
- re-cladding and additional enclosure of the western side of the crusher building.

Before and after photographs of these noise attenuation works are provided on Plates 3 to 10.

While the noise impact assessment criteria described in Section 4.1.3 does not apply until the end of 2014, Metropolitan Coal has commenced addressing aspects of the noise impact criteria in Table 14, including:

- the design of major surface facilities upgrades cognisant of the material noise reductions that will be required, including the notification of the lead upgrade design contractors of the noise impact assessment criteria that need to be achieved; and
- early works for the establishment of the monitoring program in accordance with the Noise Management Plan (e.g. commencing land access negotiations, evaluating potential monitoring equipment and alert systems).

Plate 3. MD1 prior to enclosure and insulation

Plate 4. MD1 after enclosure and insulation

Plate 5. Crusher Building - northern side prior to upgrade

Plate 6. Crusher Building - northern side after upgrade

Plate 7. Crusher Building - eastern side prior to upgrade

Plate 8. Crusher Building - eastern side after upgrade

Plate 9. Crusher Building - western side prior to upgrade

Plate 10. Crusher Building - western side after upgrade

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PLATES 3 to 10
CHPP Noise Attenuation Upgrades

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4.1.5 Further Initiatives

Real-time noise monitoring for the Project will commence from December 2010 and attended noise monitoring will commence in September 2010.

In accordance with the Noise Management Plan, an audit of Metropolitan Coal's on-site sound power levels and noise modelling review will be undertaken in the next reporting period. The sound power level audit will be used to quantify the noise performance improvements associated with the significant crusher building and MD1 noise attenuation upgrades undertaken in 2009 and to identify other areas where reasonable and feasible noise attenuation may be able to be implemented.

The Project upgrades of the Major Surface Facilities Area will continue in the next reporting period and are anticipated to include:

- upgrades of the Coal Handling and Processing Plant (CHPP);
- finalisation of the paste plant and underground injection trials and commissioning of a permanent paste plant surface installation;
- design finalisation of the material handling systems, incorporating the replacement drift and associated coal conveyors; and
- design finalisation of the upgrades to supporting infrastructure such as the workshop, stores, etc.

4.2 AIR QUALITY AND GREENHOUSE GAS MANAGEMENT PLAN

4.2.1 Background

A draft Metropolitan Coal Air Quality and Greenhouse Gas Management Plan has been prepared for the surface facilities area in accordance with Condition 13, Schedule 4 of the Project Approval.

4.2.2 Monitoring

The Metropolitan Coal air quality monitoring network consists of the following components:

- ten dust deposition gauges to monitor monthly dust fall out;
- one High Volume Air Sampler (HVAS) to measure 24 hour average particulate matter less than 10 microns (µm) (PM_{10}) concentrations on a 6-day cycle; and
- one Automatic Weather Station.

In addition to the above, Metropolitan Coal will establish one Tapered Element Oscillating Microbalance (TEOM) monitor (or an alternative real-time monitoring system such as a Dustrak) to measure PM_{10} in real-time (to be installed by December 2010).

The dust deposition and PM_{10} monitoring results are described below.

Deposited Dust

Monthly dust deposition rates are measured at ten dust gauges (DG1 to DG10) (Figure 20).

Of the ten dust deposition gauges, five are monitored for compliance with Environment Protection Licence (EPL) 767 (DG1 to DG5). The remaining five dust gauges (DG6 to DG10), as well as the EPL dust gauges are used by Metropolitan Coal to guide operations and monitor the performance of on-site dust controls. It should be noted that DG4 is a control dust gauge that is located at the Helensburgh Golf Course some 2 km from the Major Surface Facilities Area.

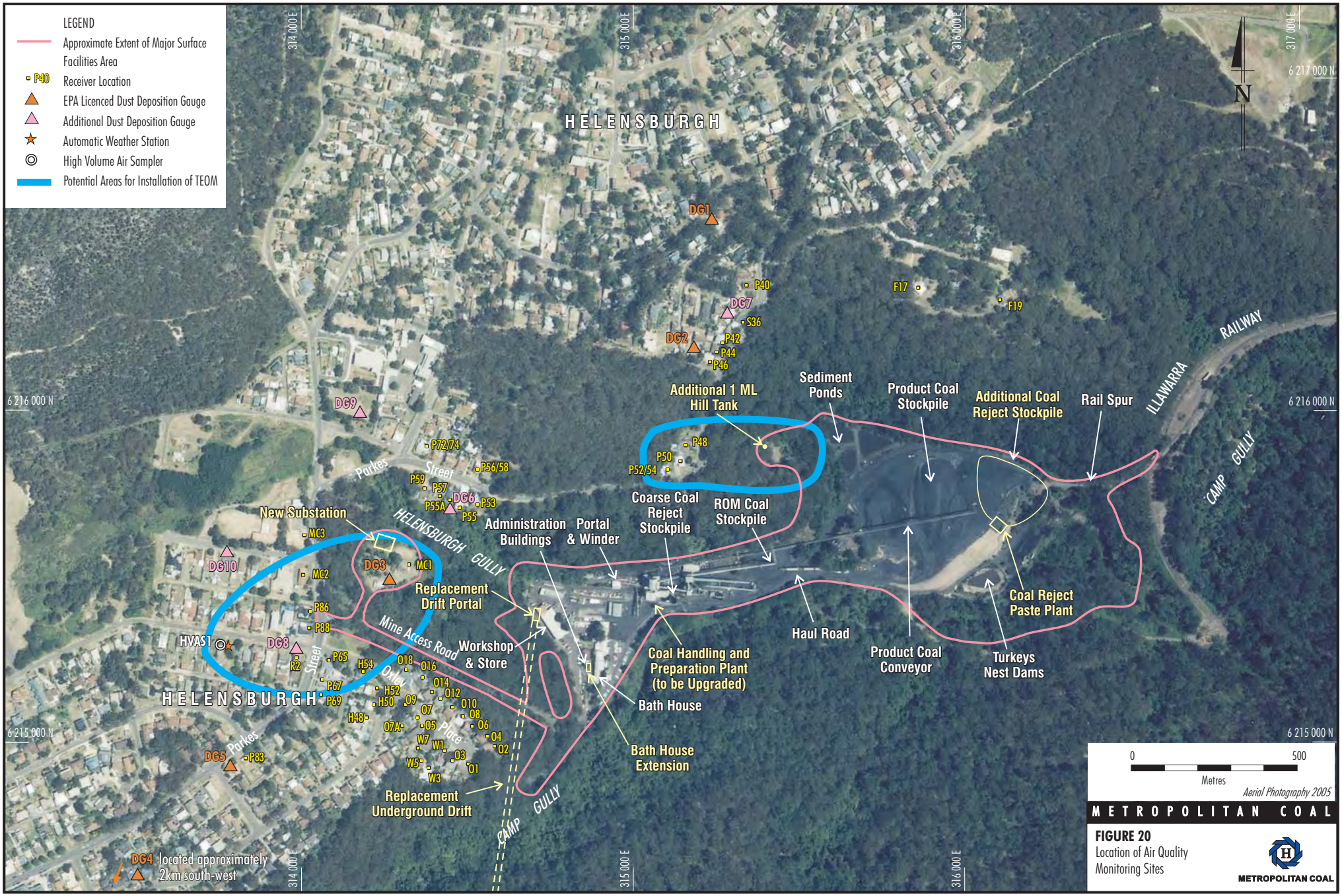

FIGURE 20
Location of Air Quality Monitoring Sites

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Chart 47 shows the annual average dust deposition monitoring results for the reporting period, while Charts 48 and 49 show the monthly dust deposition monitoring results for the reporting period. Chart 49 shows a subset of the data shown on Chart 48 in greater detail.

It is noted that some very high dust levels were recorded during September 2009. These high dust levels correspond to a large regional dust storm that passed over NSW during this period.

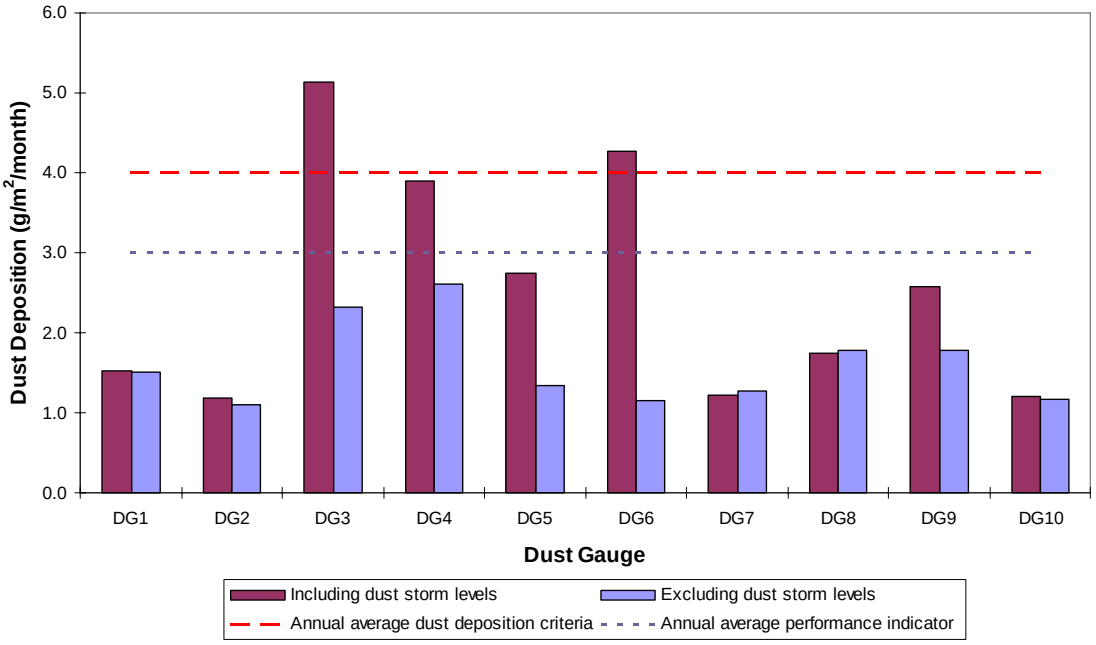


Chart 47 Annual Average Dust Deposition, August 2009 to July 2010

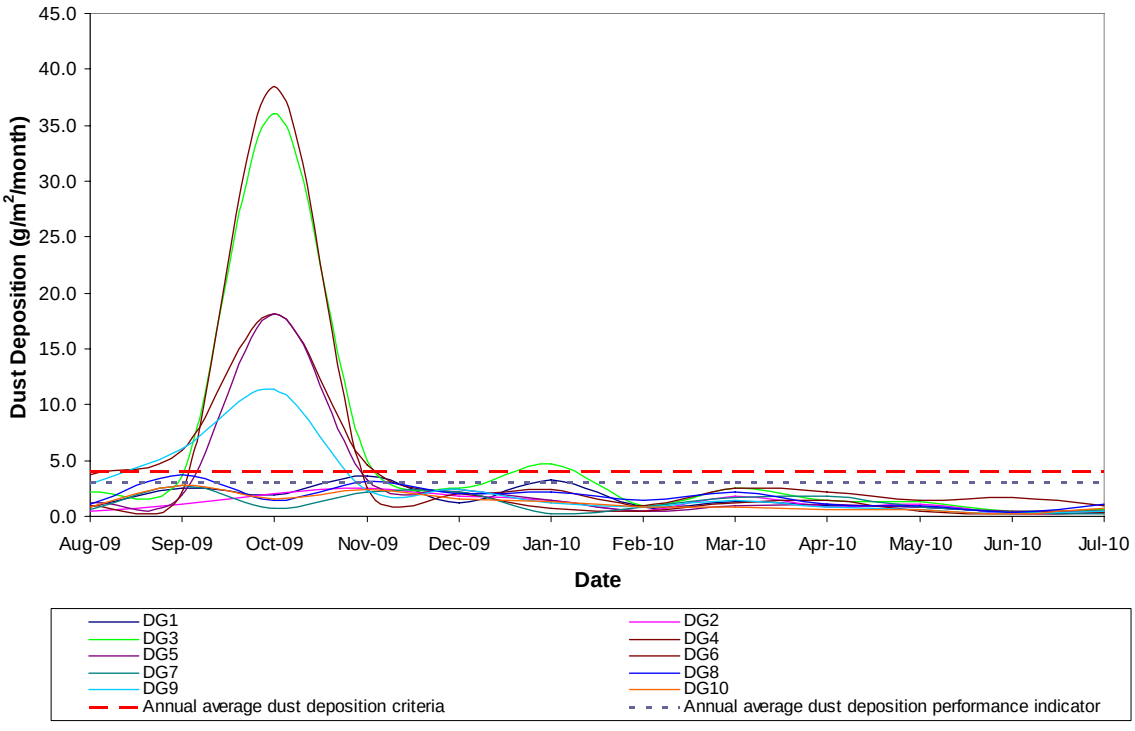


Chart 48 Monthly Dust Deposition, August 2009 to July 2010

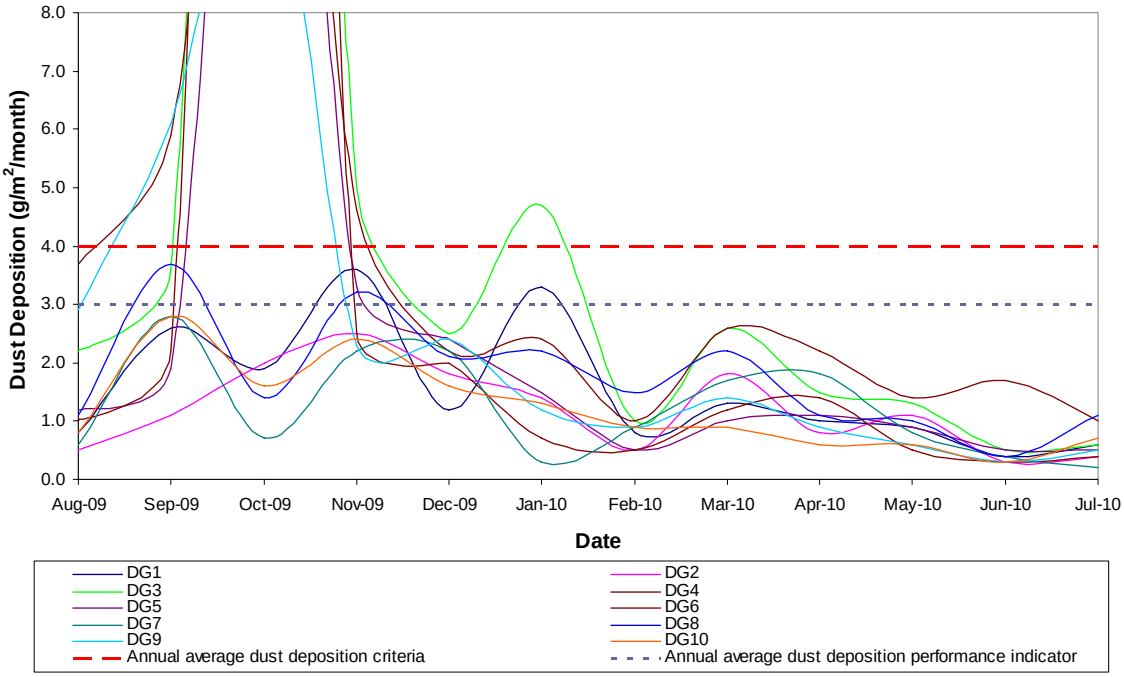


Chart 49 Monthly Dust Deposition, August 2009 to July 2010

The monthly average dust deposition results recorded during the reporting period are consistent with historical trends, with the exception of the very high recordings associated with regional dust storms in 2009 (Chart 48). Dust gauge DG4 is excluded from the analysis in Chart 50 as it is a control dust gauge located at the Helensburgh Golf Course.

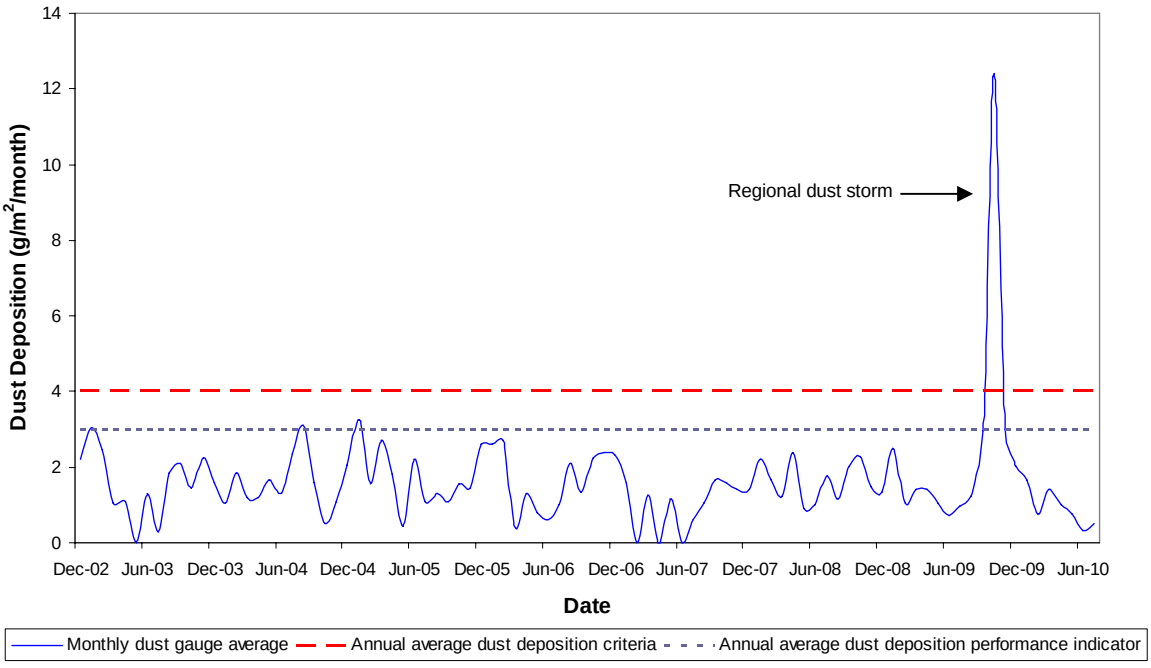


Chart 50 Monthly Average Dust Deposition Levels All Gauges (excluding Control DG4), January 2003 to July 2010

Particulate Matter

A high volume air sampler (HVAS1) measures 24 hour average PM_{10} concentrations at the location shown on Figure 20. During the reporting period, the HVAS1 was not operational between August 2009 and January 2010 due to maintenance issues.

Chart 51 presents the 24 hour average PM_{10} monitoring data recorded by HVAS1 at Helensburgh for the reporting period. The PM_{10} monitoring results indicate that 24 hour average concentrations have generally been well below 40 $\mu g/m^3$, with the exception of two elevated values measured in January and March 2010.

The annual average PM_{10} concentration for the reporting period, as well as previous years is shown on Chart 52. The annual average PM_{10} concentration for the reporting period is higher than previous years due to the two elevated levels recorded in January and March 2010. Without these elevated readings, the annual average for the reporting period is generally consistent with annual average PM_{10} levels.

Annual average total suspended particulate (TSP) concentrations can be estimated from the PM_{10} measurements by assuming that 40% of the TSP is PM_{10}. This relationship was obtained from data collected by co-located TSP and PM_{10} monitors operated for reasonably long periods of time in the Hunter Valley (NSW Minerals Council, 2000). Use of this relationship indicates that the annual average TSP concentration for the reporting period is approximately 65 $\mu g/m^3$.

It is noted that early in 2010 the HVAS was operating every seventh day, and all samples were taken on a Thursday. The HVAS is located on a large grassed double block and a maintenance contractor was using a small tractor to mow the lawn and a brush cutter to trim along fence lines. High PM_{10} concentrations were recorded on both Thursday 28 January 2010 and Thursday 25 March 2010. It is suspected that these elevated levels were caused by periodic yard maintenance. In April 2010 the operation of the HVAS was corrected to sample every sixth day. In order to prevent sampling occurring during yard maintenance activities, the contractor has been advised of the sampling schedule and now keeps a record of when yard maintenance activities are conducted.

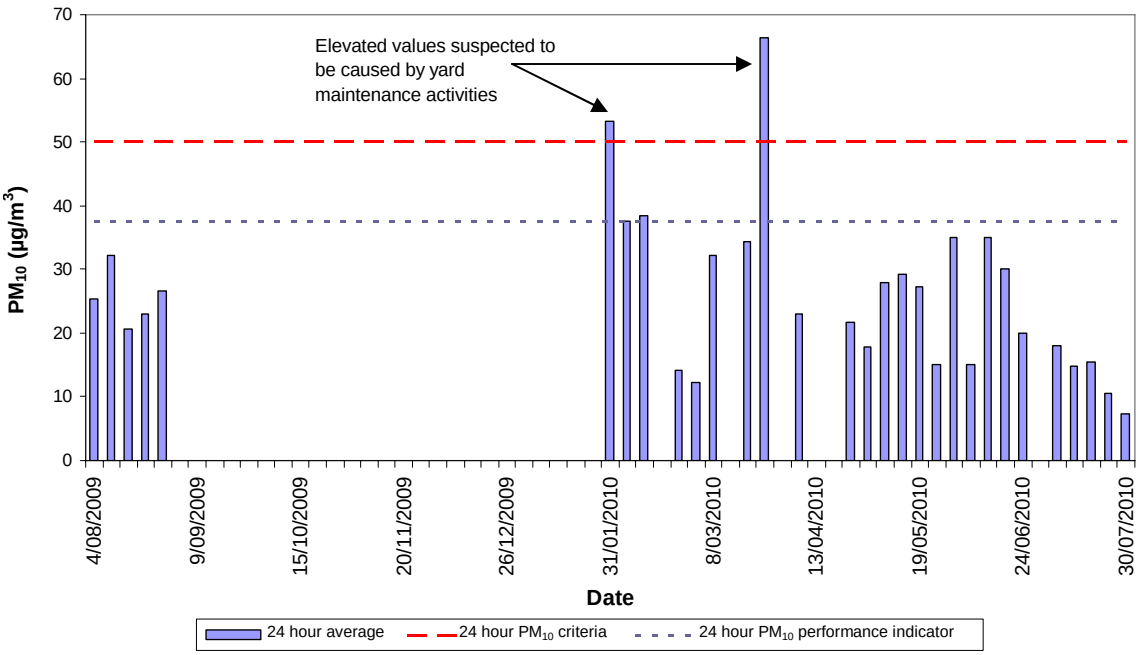
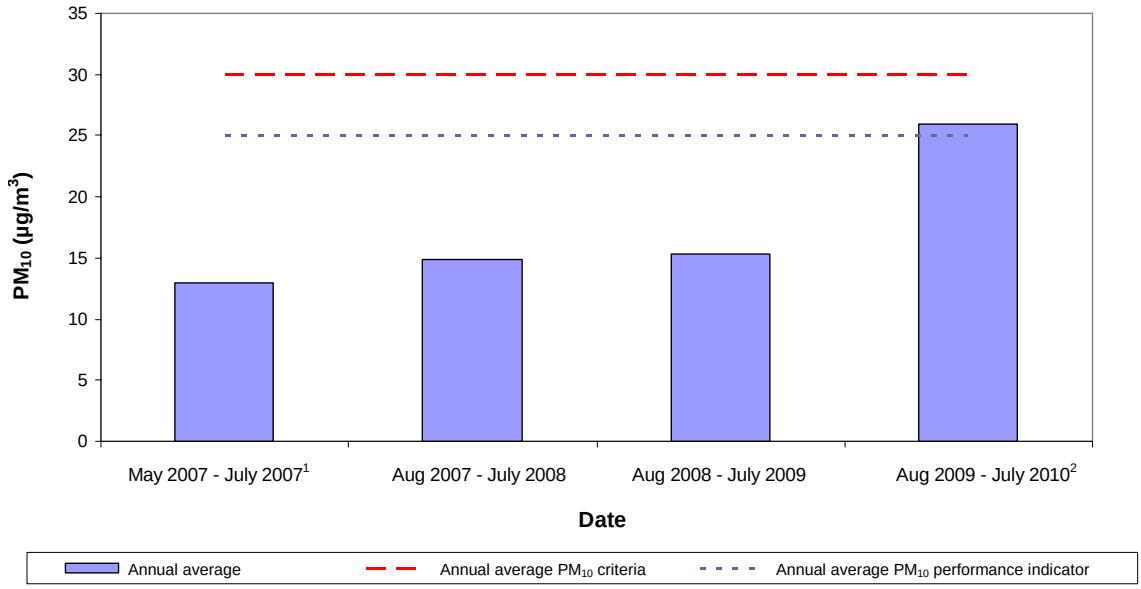


Chart 51 24 hour PM_{10}, August 2009 to July 2010



[1] Monitoring commenced in May 2007. Annual average based on three months of data.

[2] Based on eight months of data as a result of the HVAS1 not being operational between August 2009 and January 2010. Note that the data set includes the elevated PM_{10} levels recorded on the 28 January 2010 and 25 March 2010.

Chart 52 Annual Average PM_{10} Concentration, May 2006 to July 2010

Complaints Records

Metropolitan Coal records mine related complaints in a complaint register as described in Section 6.

Two dust related complaints were received in the reporting period. The number of dust complaints received during the reporting period is consistent with the historical average of two to four dust complaints per year (Chart 57 in Section 6).

4.2.3 Assessment of Environmental Performance

Air quality performance indicators and impact criteria have been developed in consideration of the predicted impacts of the Project on air quality included in the Project EA, as described below.

Assessment against Performance Indicators

Establishment of the Real-Time Monitoring System

Metropolitan Coal does not currently operate a real-time air quality monitoring system at the mine. The first performance indicator is therefore that Metropolitan Coal will establish a real-time air quality monitoring system at the site comprising one Tapered Element Oscillating Microbalance (TEOM) monitor (or an alternative real-time monitoring system such as a Dustrak) and associated data review and trigger based systems for Metropolitan Coal on-site dust management, by December 2010.

Monitoring Performance Indicators

In accordance with the draft Air Quality and Greenhouse Gas Management Plan, Metropolitan Coal will assess the Project against the air quality performance indicators outlined in Table 15 over the next reporting period.

Table 15
Air Quality Performance Indicators

Pollutant	Averaging Period	Monitoring Point	Performance Indicator[1, 2]
PM_{10}	24 hour	HVAS1	37.5 µg/m^3
	Annual		25 µg/m^3
Deposited Dust	Annual	Metropolitan Coal Dust Gauges excluding DG4	3 g/m^2/month

1 Total measured level excluding extraordinary events such as bushfires, prescribed burning, dust storms, sea fog, fire incidents, illegal activities.

2 Background PM_{10} concentrations due to all other sources plus the incremental increase in PM_{10} concentrations due to the mine alone.

3 HVAS1 = High Volume Air Sampler 1

µg/m^3 = micrograms per cubic metre.

g/m^2/month = grams per square metre per month.

The performance of the mine against the performance indicators outlined in Table 15 will be reported in the 2011 Annual Review.

Assessment against Air Quality Impact Criteria

The Project Approval requires Metropolitan Coal to ensure that dust generated by the Project does not cause additional exceedances of the air quality impact assessment criteria listed in Tables 5, 6 and 7 of Condition 11, Schedule 4 at any residence on privately-owned land, or on more than 25% of any privately-owned land.

Table 5: Long term impact assessment criteria for particulate matter

Pollutant	***Averaging period***	***Criterion***
Total suspended particulate (TSP) matter	Annual	90 µg/m^3
Particulate matter < 10 µm (PM_{10})	Annual	30 µg/m^3

Table 6: Short term impact assessment criterion for particulate matter

Pollutant	***Averaging period***	***Criterion***
Particulate matter < 10 µm (PM_{10})	24 hour	50 µg/m^3

Table 7: Long term impact assessment criteria for deposited dust

Pollutant	***Averaging period***	***Maximum increase in deposited dust level***	***Maximum total deposited dust level***
Deposited dust	Annual	2 g/m^2/month	4 g/m^2/month

Note: Deposited dust is assessed as insoluble solids as defined by Standards Australia, AS/NZS 3580.10.1:2003: Methods for Sampling and Analysis of Ambient Air - Determination of Particulate Matter – Deposited Matter - Gravimetric Method, or its latest version.

Deposited Dust

Chart 47 indicates that all annual average dust deposition monitoring results were below the annual average dust deposition criteria of 4 g/m^2/month if the regional dust storm results are excluded. Charts 48 and 49 also show that the high dust levels recorded during September 2009 are not consistent with the general trend of dust levels over the remainder of the reporting period.

Particulate Matter

As shown on Chart 52, PM_{10} levels remained below the annual average PM_{10} criteria of 30 µg/m^3 for the reporting period. Chart 51 shows that there were two exceedances of the 24-hour PM_{10} criteria of 50 µg/m^3 over the reporting period, however, as described above, it is likely that these exceedances were not related to Project specific activities (i.e. the elevated levels are thought to be related to yard maintenance activities). In NSW, it is quite common to measure 24 hour average concentrations above the criterion of 50 µg/m^3 on occasions. Events such as bushfires or dust storms are often the cause of elevated PM_{10} concentrations, which can normally be observed over large geographical areas.

The annual average TSP concentration for the reporting period is approximately 65 µg/m^3, which is well below the TSP annual average criteria of 90 µg/m^3.

4.2.4 Management and Mitigation Measures

A number of measures have been implemented to minimise dust emissions at Metropolitan Coal, including:

- enclosing conveyor systems;
- the operation of water sprays on conveyors, transfer points and stockpile areas;
- watering of haulage roads and stockpile areas with a water truck when required;
- progressive sealing of car parks and yard areas;
- the use of chemical dust suppressant on unsealed haulage roads; and
- planting of native plants on exposed areas to stabilise soils.

Metropolitan Coal has also implemented the following measures to minimise dust emissions associated with off-site coal and coal reject haulage:

- automatic covers have been fitted to coal reject haulage trucks;
- automatic or manual covers have been fitted to coal haulage trucks;
- audits have been performed to ensure haulage truck covers are being used appropriately;
- all haulage vehicles are required to pass through a truck wash before leaving the site;
- the mine entrance road is washed five days per week;
- the mine entrance road is scrubbed using a road sweeper and then washed each Saturday; and
- a sweeper/sucker is operated on Parkes Street by Metropolitan Coal four days per week and one day per week by the Wollongong City Council.

4.2.5 Greenhouse Gas Management

Condition 10, Schedule 4 of the Project Approval requires that Metropolitan Coal implement all reasonable and feasible measures to minimise:

a) energy use on site; and

b) the scope 1, 2 and 3 greenhouse gas emissions produced on site,

to the satisfaction of the Director-General of the Department of Planning.

Scope 1 and Scope 2 greenhouse gas emissions are emissions due to the operation of the Project and consumption of electricity on-site. Scope 3 greenhouse gas emissions are emissions that will result from the off-site transport and burning of the coal produced by the Project, plus emissions associated with the production of diesel that is used on-site.

Table 16 below outlines the key greenhouse gas emission sources at the Project and the respective scope of emissions.

Table 16
Summary of Project CO_2-e Emission Sources

Project Component	Direct Emissions (Scope 1)	Indirect Emissions (Scope 2)	Indirect Emissions (Scope 3)
Consumption of diesel fuel to power on-site equipment.	Emissions from the combustion of diesel during operations.	N/A	Emissions attributable to the extraction of diesel fuel.
Electricity consumption.	N/A	Emissions resulting from generation of the electricity consumed during operations.	Emissions attributable to the extraction of fuel used in electricity generators.
Coal extraction (gas flaring and ventilation).	Emissions resulting from venting or burning methane and venting carbon dioxide (CO_2).	N/A	N/A
Transporting product and reject coal by truck.	N/A	N/A	Emissions from the combustion of diesel from third-party truck operators.
Transporting product coal by train.	N/A	N/A	Emissions from the combustion of diesel from third-party train operators.
Steelmaking.	N/A	N/A	Emissions generated from off-site coke usage for steel and iron production.

Energy Savings Action Plan

Under the NSW Government's Energy Efficiency Action Strategy, high energy users are required to implement *cost effective* energy saving measures identified in their ESAPs.

The ESAP for Metropolitan Coal was formally accepted in January 2008. Annual Reports are required and the ESAP is to be reviewed and updated every four years.

The first Annual Report for Metropolitan Coal was released in March 2010 (Metropolitan Coal, 2010k) as a composite report for 2008 and 2009.

Energy savings are seen as an important component of Peabody Energy Australia's commitment to sustainable development. The energy savings measures that have been put into place have resulted in energy savings of more than 1,430 gigajoules (GJ) per annum, more than 890 tonnes of CO_2 and a reduction in the electricity demand of more than 50 kilovolt amps. Table 17 shows energy saving actions that have been completed over the previous five years.

Table 17
Completed Energy Savings Actions over Previous Five Years

Description	Annual Savings (gigajoules [GJ])	Annual Greenhouse Gas Savings (tonnes CO_2-e)	Status
Increased conveyor maintenance frequency to reduce friction losses and wear.	Not estimated[1]		Completed
High efficiency motor replacement policy.	Not estimated[1]		Completed
Installation of Current Transformer on hot water system to monitor load on SCADA and detect failures.	Not Applicable[2]		Completed
Low impendence transformer purchasing policy.	Not estimated[1]		Completed
Redundant equipment disconnection policy.	> 360	> 100	Completed
Replace existing heat coil ducting with heat pumps.	Abandoned as not technically feasible		
Compressed air receiver installation.	359	98	Completed
Compressed air review and ongoing 10% leakage reduction.	35	10	Completed
Surface lighting optimisation.	35	10	60% complete

[1] Annual savings not estimated as these are measures that will provide minor efficiency gains over an extended period (e.g. gains of approximately 0.5% to 4% on power demand from these components). Minor ongoing efficiency savings will continue as a result of these policies.

[2] This is a monitoring system to evaluate the load on, and efficiency of, the hot water system.

The increasing ROM coal production at the Metropolitan Colliery will increase electricity demand as the throughput of coal handling and processing systems increases. Approved construction activities (e.g. construction of the Replacement Drift) are also likely to increase site electricity demand in the short term.

However, upgrades to the major surface facilities, materials handling systems and ventilation will provide significant opportunities to improve the energy efficiency of the operations (i.e. energy demand per tonne of coal produced).

Metropolitan Coal is also continuing to progressively replace old fluorescent lighting with modern high efficiency lighting.

Reporting on additional actions to improve the energy efficiency of the site will be provided in ESAP Annual Reports and also in the Annual Reviews completed under the Project Approval.

4.2.6 Further Initiatives

Metropolitan Coal will seek approval for the draft Air Quality and Greenhouse Gas Management Plan from the Department of Planning.

Metropolitan Coal will establish a real-time air quality monitoring system. This will include the installation of a TEOM monitor (or an alternative real-time monitoring system such as a Dustrak) and associated data review and trigger based systems for Metropolitan Coal on-site dust management, by December 2010. In addition to the static monitoring items, Metropolitan Coal will acquire a mobile or portable particulate monitoring device (e.g. a Dustrak) for use as a supplementary real-time monitoring tool for responding to specific dust complaints as required. The portable particulate monitor may also be used periodically to monitor particulate levels upwind and downwind of the site to review the effectiveness of on-site controls.

A wind speed and direction monitor will be installed adjacent to the product stockpile during September 2010. The monitor will be wirelessly linked to the existing weather station, and will be used in real-time to refine the use of stockpile spays to effectively manage dust emissions. In the future, the stockpile sprays will be operated automatically through input from the meteorological station.

A revegetation program commenced during the reporting period to stabilise exposed areas and minimise wind blown dust emissions. The revegetation program will continue during the next reporting period.

4.3 SURFACE FACILITIES WATER MANAGEMENT PLAN

4.3.1 Background

A draft Metropolitan Coal Surface Facilities Water Management Plan has been prepared for the surface facilities area and two ventilation shaft sites in accordance with Condition 15, Schedule 4 of the Project Approval.

4.3.2 Monitoring

The surface facilities water management system is monitored by HPCL, as described below.

Meteorology

Daily total rainfall and rainfall intensity are measured at the Metropolitan Coal meteorological station at Robertson Street in Helensburgh. The rainfall data is used as an input to the surface facilities water balance model.

The total rainfall recorded during the reporting period was 874 mm. The total monthly rainfall data for the reporting period is shown in Chart 53.

Water Use

Flow meters at key points in the water management system monitor flow rates using an electronic system and manual (weekly) readings. Manual weekly readings have been recorded during the reporting period while the electronic system has been updated.

Metropolitan Coal used approximately 156 ML of potable town water (as recorded by the Sydney Water meter) during the reporting period, with a monthly average of approximately 13 ML. The amount of town water used over the reporting period is shown in Chart 53. Metropolitan Coal also sourced approximately 77 ML of water from Camp Gully during the reporting period.

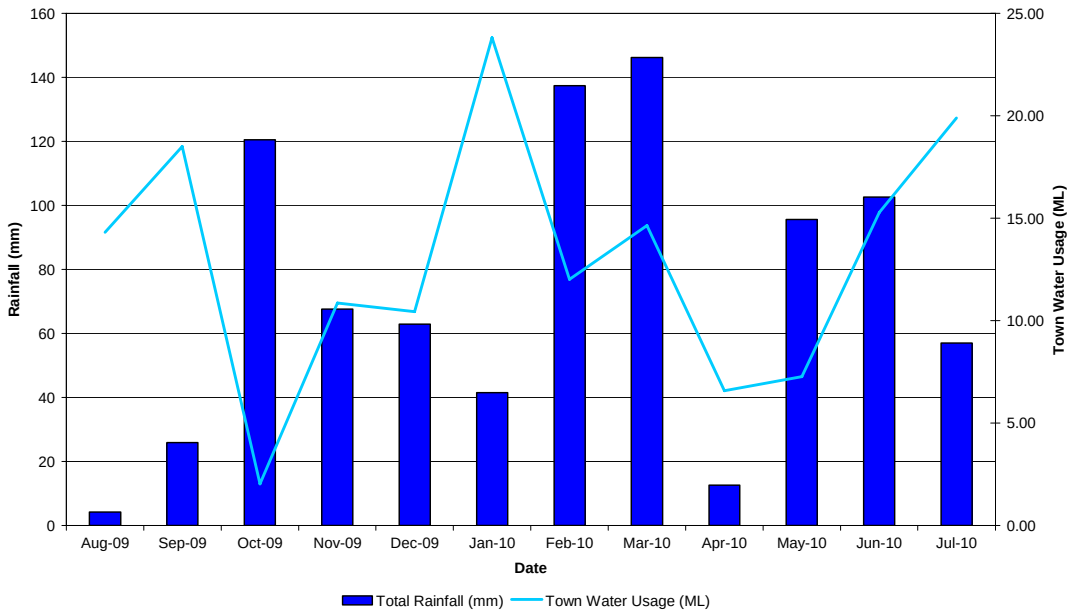


Chart 53 Rainfall and Town Water Use during the Reporting Period

Licensed Discharge

Water discharged from the Water Treatment Plant to Camp Gully is monitored in accordance with EPL No. 767, which requires Metropolitan Coal to continuously monitor the volume (KL/day) of water discharged from the clean water tank in the Water Treatment Plant to Camp Gully.

The total amount of water discharged from the Water Treatment Plant to Camp Gully during the reporting period was 65 ML.

Water Quality

Surface water quality monitoring is conducted at EPL No. 767 monitoring point 9 (clean water tank of the water treatment plant), if discharge is occurring to Camp Gully. Water quality parameters for EPL No. 767 monitoring point 9 include: pH (pH units), oil and grease (mg/L) and total suspended solids (mg/L).

The levels of pH recorded at EPL No. 767 monitoring point 9 during the reporting period ranged from 8.1 to 8.4, with an average of 8.3 (Chart 54). Oil and grease concentrations recorded at EPL No. 767 monitoring point 9 during the reporting period ranged from less than the detection limit (<0.1 mg/L from August 2009 to December 2009; <5 mg/L from January 2010 to July 2010) to 7 mg/L (Chart 55). Total suspended solids during the reporting period ranged from 1 mg/L to 80 mg/L, with a monthly average of 9.7 mg/L (Chart 56). The site water management system continuously monitors total suspended solids and prevents discharges of water that exceeds the criteria. Water that exceeds the criteria is treated further to ensure that only water which meets the acceptable criteria is discharged.

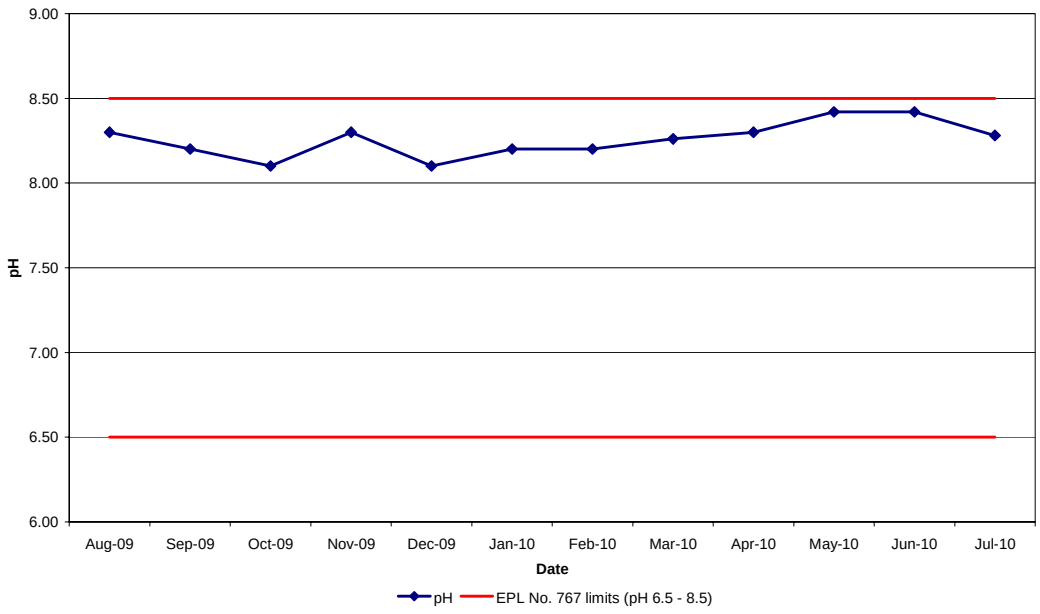


Chart 54 pH recorded at EPL No. 767 Monitoring Point 9

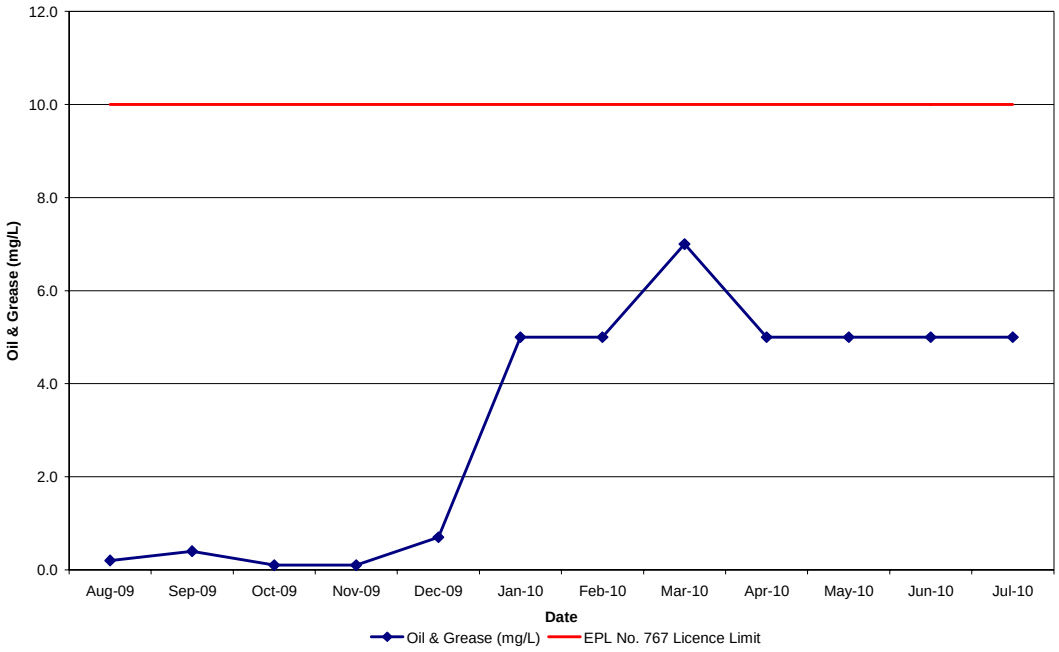


Chart 55 Oil and Grease recorded at EPL No. 767 Monitoring Point 9

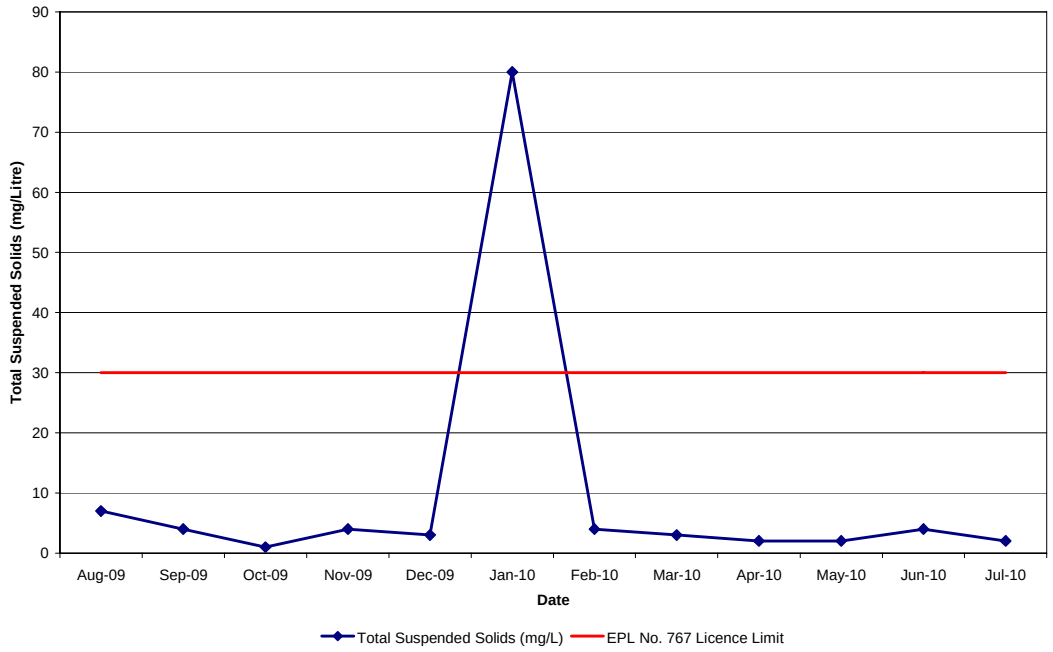


Chart 56 Total Suspended Solids recorded at EPL No. 767 Monitoring Point 9

Mine Water Make

Monitoring of mine water make is conducted in accordance with the Water Management Plan. The monitoring results are described in Section 3.3 of this Annual Review.

Overall System Integrity

The following water management items are visually inspected and reported in accordance with the mine's maintenance system:

- Integrity of all water management system pipelines and pumps for leaks and general serviceability (daily inspection).
- Integrity of all concrete bunded areas (hydrocarbon storages) for integrity and signs of leakage (daily inspection).
- Integrity of main water storages (Turkey's Nests, Sediment Ponds and Taj Mahal) and status of sediment accumulation (daily inspection).
- Signs of discharge of site runoff to Camp Gully or Helensburgh Gully, other than via licensed discharge points (daily inspection).
- Integrity of upslope diversions at site perimeter (weekly inspection).
- Integrity and effectiveness of erosion control measures (weekly inspection).

The Water Treatment Plant is also checked daily by the site's maintenance personnel under the direction of the Environment and Community Manager.

The Environment and Community Manager (or their delegate) also inspects the site weekly.

The daily and weekly inspections identified a number of improvements and required maintenance measures. The improvements and measures are described in Section 4.3.4 below.

During the reporting period, the Turkey's Nest dams overflowed to Camp Gully on 31 March 2010 and 4 June 2010. Both overflows occurred during significant rainfall events (97.2 mm of rainfall was recorded in the 24 hours prior to 31 March 2010 and 50 mm of rainfall was recorded in the 24 hours prior to 4 June 2010). The Turkey's Nest Dam was identified to be overflowing to Camp Gully at approximately 7.30 am on 31 March 2010 and had ceased to overflow by 6.00 am on 1 April 2010. On 4 June 2010 the Turkey's Nest Dam overflowed into Camp Gully sometime between 6.00 pm on 3 June 2010 and 7.00 am on 4 June 2010. The overflow had ceased by 7.00 am on 4 June 2010.

4.3.3 Assessment of Environmental Performance

In accordance with the draft Surface Facilities Water Management Plan, the performance indicators outlined in Table 18 will be used to assess the performance of the Surface Facilities Water Management Plan.

Table 18
Summary of Surface Facilities Water Management Performance Indicators

Aspect	Objective	Performance Indicator
Water use.	To minimise the use of potable water (i.e. town water) and maximise the use water recycled from underground and water captured on site.	The use of potable water (i.e. megalitres of town water used per tonne of coal produced) does not increase over time, after taking into consideration climatic conditions. Potable water has not been used in circumstances where there is a viable alternative.
Erosion control.	To implement measures to effectively control erosion.	Inspections of the major surface facilities area and ventilation shaft(s) indicate the measures implemented are effectively controlling erosion.
Containment of contaminants.	To implement effective isolation and containment systems to prevent contaminants from impacting on groundwater resources.	Effective containment and/or isolation measures are in place for potential contaminants on site.
Licensed discharge.	To comply with the licensed discharge limits for surface water discharges to Camp Gully.	Surface water discharges comply with the requirements of EPL No. 767.
System integrity.	To regularly check that key components of the water management system are operating effectively.	Inspections of system components indicate no maintenance or additional management measures are required to be implemented.

The performance of the mine will be assessed against the performance indicators outlined in Table 18 in the 2011 Annual Review, with the exception of licensed discharge which is described below.

Licensed Discharge

Water discharged from the Water Treatment Plant to Camp Gully is monitored in accordance with EPL No. 767 and the monitoring results have been assessed against the following performance indicator:

Surface water discharges comply with the requirements of EPL No. 767.

EPL No. 767 requires that the concentration of oil and grease, pH and total suspended solids discharged from the Water Treatment Plant to Camp Gully do not exceed the levels specified in the licence. EPL No. 767 states that the monitoring results at EPL No. 767 monitoring point 9 (clean water tank of the water treatment plant) are to be used to determine compliance with the concentration limits in the licence. The recorded monitoring results at EPL No. 767 monitoring point 9 are assessed against the concentration limits specified by EPL No. 767 in Charts 54 to 56 above and Table 19 below.

Table 19
Assessment of Licensed Discharge Compliance

Parameter	EPL No. 767 Concentration Limit	Recorded Values During the Reporting Period[1] (minimum-maximum)
Oil and grease (mg/L)	10	0.1 – 7.0
pH (pH units)	6.5 – 8.5	8.1 – 8.4
Total suspended solids (mg/L)	30	1 – 80

[1] August 2009 to July 2010

The level of total suspended solids recorded in January 2010 was 80 mg/L, which is higher than the EPL limit of 30 mg/L (Chart 56). The site water management system continuously monitors turbidity and prevents discharges of water that exceeds the criteria. Water that exceeds the criteria is treated further to ensure that only water which meets the acceptable criteria is discharged.

4.3.4 Management and Mitigation Measures

Metropolitan Coal implemented a number of surface facilities water management measures over the reporting period including:

- Works to convert the Metropolitan Coal truck wash from the use of potable town water to recycled water, with a final potable water rinse. These works will be completed in the next reporting period and it is conservatively estimated that the conversion will reduce potable water use by one megalitre per month (around 10% of the average monthly potable water use).
- The installation and maintenance of erosion and sediment control measures in association with administration office construction works.
- Rehabilitation of areas disturbed by the administration office construction works (i.e. exposed soil) - seeded with grass seed or planted with native species to minimise the potential for erosion.
- Measures to improve the operation of the Turkey's Nest dams including:
  - The installation of a new alarm system at the Turkey's Nest dam to identify when additional storage capacity is required. The alarm system notifies the Environment and Community Manager via Short Message Service (SMS) when the dam reaches 80% capacity (and higher). This notification allows Metropolitan Coal to maximise water treatment and discharging in line with EPL 767 requirements.
  - The purchase and installation of a new high capacity diesel pump to increase the treatment capacity of the water treatment plant.
  - Improvements to the existing pumps at the Water Treatment Plant have increased the treatment capacity of the Water Treatment Plant.
  - Excavation of the Turkey's Nest dams to remove silt and maintain storage capacity.
  - Adjustment of the Turkey's Nest Dam pump float switches to improve accuracy.
- Improvements to the dirty water drainage system adjacent to the product stockpile to ensure product coal is contained on-site during rainfall events.
- Management measures in response to system integrity issues identified by daily or weekly inspections including:
  - correction of irregularities in the flocculent dosing system;
  - rectification of power supply issues to the water treatment plant, sediment ponds pumps, sewage pumps, weir pumps and truck wash;
  - replacement of water pumps as required;
  - servicing of the sand filter number four in the water treatment plant to improve performance;
  - repair and servicing of the weir pump and Camp Gully discharge flow meters;
  - repair of a leak in a water tank used for fire-fighting purposes;
  - replacement of the number three sedimentation pond pump;
  - repair of water meters that failed calibration tests; and
  - repair of a valve in a water treatment plant sampling chamber.

4.3.5 Further Initiatives

Metropolitan Coal will seek approval for the draft Surface Facilities Water Management Plan from the Department of Planning during the next reporting period.

Metropolitan Coal will investigate the potential for improvements to the re-use of site water and site water management over the next reporting period.

Additional water meters will be installed in the water management system to monitor water use.

Flow permitting, monthly surface water quality monitoring will be conducted at Sites A, B, C and D on Camp Gully from September 2010. More frequent (i.e. event-based) sampling will be conducted at the Camp Gully sites during larger rainfall events (i.e. greater than 25 mm/day). Water quality parameters will include: pH (pH units), electrical conductivity (µS/cm), oil and grease (mg/L), total suspended solids (mg/L), dissolved oxygen (% Saturation and mg/L) and oxygen reduction potential (mV).

4.4 TRAFFIC MANAGEMENT PLAN

4.4.1 Background

A draft Metropolitan Coal Traffic Management Plan has been prepared to minimise the traffic impacts of the Project on the residential areas and schools within Helensburgh in accordance with Condition 22, Schedule 4 of the Project Approval.

4.4.2 Monitoring

The majority of product coal from Metropolitan Coal is transported by train to the Port Kembla Coal Terminal for transport to domestic and overseas customers, with trains operating up to 24 hours per day, seven days per week (Figure 1). Small volumes of product coal for the domestic market are transported by road to the Corrimal Coke Works and Coalcliff Coke Works (Figure 1), five days per week.

Coal reject material is also transported by road to the Glenlee Washery for disposal (Figure 1), five days per week.

Coal and coal reject deliveries are weighed on receipt at their destination (e.g. Port Kembla, Glenlee Washery) and the delivered tonnages are reported at regular intervals to Metropolitan Coal.

Metropolitan Coal monitors the amount of product coal transported from site by road and by rail. A total of 1.38 Million tonnes (Mt) of product coal was transported from Metropolitan Coal in the 2009 calendar year. A total of 0.73 Mt of product coal was transported from site by rail and 0.08 Mt by road in the period July to December 2009 and 0.62 Mt by rail and 0.10 Mt by road in the period January to June 2010.

Metropolitan Coal monitors the amount of coal reject that is transported from the site by road each year. A total of 0.14 Mt of coal reject was transported from site in the period July to December 2009 and 0.14 Mt in the period January to June 2010.

The results of the monitoring will be provided on Metropolitan Coal's website every six months, commencing in December 2010.

Complaints Records

In the reporting period some eight complaints relating to transport or transport noise were received, which is approximately half of all complaints received (Chart 57, Section 6).

Complainants raised issues such as:

- inappropriate use of air brakes by haulage contractors;
- truck noise; and
- haulage contractor driver behaviour.

This compares to some four traffic/traffic noise complaints in the previous year and one complaint the year before (Chart 57, Section 6). The increased number of traffic and traffic noise related complaints may be a result of increased traffic movements associated with on-site construction activities and some incremental increases in production.

4.4.3 Assessment of Environmental Performance

Analysis against Performance Indicators

In accordance with the draft Traffic Management Plan, performance indicators will be used to monitor the performance of Project traffic management. If data analysis indicates a performance indicator has been exceeded or is likely to be exceeded, management measures will be implemented and Metropolitan Coal will continue to monitor.

Performance Indicator 1: *When annual road maintenance contribution negotiations are required, the negotiations will commence with the relevant councils and/or DoP by 31 August.*

The performance indicator will be considered to have been exceeded if the annual contribution negotiations have not commenced by 31 August.

This performance indicator will be assessed in the next reporting period and reported in the 2011 Annual Review.

Performance Indicator 2: *Annual road maintenance contributions to relevant councils are made by 30 November.*

The performance indicator will be considered to have been exceeded if the annual contributions to the relevant councils are not made by 30 November each year.

This performance indicator will be assessed in the next reporting period and reported in the 2011 Annual Review.

Performance Indicator 3: *Coal transported off-site by road in a calendar year does not reach 100,000 tonnes prior to 31 October.*

The performance indicator will be considered to have been exceeded if the amount of coal transported off-site by road exceeds 100,000 tonnes prior to 31 October in any one year.

This performance indicator will be assessed in the next reporting period and reported in the 2011 Annual Review.

Performance Indicator 4: *Coal and coal reject haulage trucking contractors will be notified of Metropolitan Coal's off-site haulage requirements by 31 October 2010.*

The performance indicator will be considered to be exceeded if the formal notification of the haulage contractors is not undertaken by 31 October 2010.

This performance indicator will be assessed in the next reporting period and reported in the 2011 Annual Review.

Analysis against Project Approval Conditions

Condition 6, Schedule 2:

Limits on Approval

6. The Proponent shall not:

.....

(b) transport more than 2.8 million tonnes of product coal from the site in a calendar year.

A total of 1.38 Mt of product coal was transported from Metropolitan Coal in the 2009 calendar year, and some 0.78 Mt of product coal has been transported from site in the period January to July 2010.

Condition 17, Schedule 21:

Parkes Street Intersection

17. By the end of 2010, the Proponent shall:

(a) undertake a road safety audit of the Parkes Street and Colliery Road intersection, in consultation with the RTA and WCC; and

(b) implement any recommendations of this audit, to the satisfaction of the Director-General.

The Road Safety Audit site inspection of the Mine Access Road and Parkes Street intersection (Figure 21) will be undertaken in September 2010. The Road Safety Audit Report will be completed in the next reporting period in accordance with *Austroads Road Safety Audit Guidelines, 2002* and *RTA Accident Reduction Guide Part 2 – Road Safety Audits, 2005*.

Metropolitan Coal will report against this Approval Condition in the 2011 Annual Review.

Condition 18, Schedule 21:

Road Maintenance Contributions

18. From the end of 2009, the Proponent shall make a suitable annual contribution to WCC, WSC, and CC for the maintenance of local roads that are used as haulage routes by the project. If there is any dispute over the amount of the contribution, the matter must be referred to the Director-General for resolution.

Metropolitan Coal has commenced negotiations with the relevant local Councils to make annual contribution payments for the maintenance of local roads that are used as haulage routes by the Project. It is expected that the first round of annual Council road maintenance payments will be made in the latter half of 2010 (i.e. the next reporting period).

As coal reject trucking movements to Glenlee Washery will vary annually and will not extend for the whole Project life, negotiation of suitable road maintenance contributions for Metropolitan Coal coal reject truck movements will be undertaken annually, or at an alternative interval agreed by the Department of Planning.

Conditions 19 and 20, Schedule 21:

Road Transport Restrictions

19. The Proponent shall not:

(a) load coal or coal reject onto trucks, or transport it off site by road, outside the hours of 7am and 6pm Monday to Friday;

(b) transport more than 120,000 tonnes of coal off site by road in a calendar year; or

(c) transport any coal off site to the Port Kembla Coal Terminal by road.

20. During emergencies (such as the disruption of rail services) the Proponent may exceed the restrictions in Condition 19 above with the written approval of the Director-General.

The haulage of coal product and coal reject has been undertaken in accordance with the hours of operation set out in Metropolitan Coal's Project Approval.

As described in Section 4.4.2, a total of 0.73 Mt of product coal was transported from site by rail and 0.08 Mt by road, in the period July to December 2009 and 0.62 Mt by rail and 0.10 Mt by road in the period January to June 2010.

In accordance with the Project Approval no coal has been transported by road to the Port Kembla Coal Terminal.

METROPOLITAN COAL

FIGURE 21
Mine Access Road and Parkes Street Intersection

METROPOLITAN COAL

MET-08-AD7 2010 Ann Rev_103B

Condition 21, Schedule 21:

Monitoring

21. The Proponent shall monitor the amount of coal and coal reject transported from the site by road and rail each year, and report the results of this monitoring on its website every six months.

The results of coal transport monitoring will be provided on Metropolitan Coal's website every six months, commencing in December 2010.

4.4.4 Management and Mitigation Measures

As described above, Metropolitan Coal has commenced negotiations with the relevant local Councils to make annual contribution payments for the maintenance of local roads that are used as haulage routes by the Project.

The haulage of coal product and coal reject has been undertaken in accordance with the hours of operation set out in the Metropolitan Coal's Project Approval.

A telephone number for the provision of comments or complaints regarding Metropolitan Coal is displayed on the signage at the entrance to Metropolitan Coal (1800 115 003). This number can be used for members of the community to provide comments regarding product coal and coal reject haulage.

4.4.5 Further Initiatives

The draft Traffic Management Plan has been provided to the Metropolitan Coal Community Consultative Committee for review and comment. The draft Traffic Management Plan will be re-submitted to the Department of Planning for approval.

Metropolitan Coal product coal and coal reject haulage is undertaken by private haulage companies. In the next reporting period Metropolitan Coal will provide its contract haulage companies with written instructions and/or a driver's code of conduct regarding:

- the approved hours of haulage operations;
- speed management and use of air brakes; and
- general community courtesy measures.

Metropolitan Coal will instruct its haulage companies to provide these instructions to individual drivers and incorporate these measures in their standard operating procedures. This will include a disciplinary procedure for breaches of the standard instructions and operating procedures.

In the next reporting period, Metropolitan Coal will conduct a Road Safety Audit of the Mine Access Road and Parkes Street intersection (Figure 21) in consultation with the Roads and Traffic Authority and Wollongong City Council. Metropolitan Coal will also make annual monetary contributions to local councils for the maintenance of local roads that are used as haulage routes by Metropolitan Coal.

4.5 WASTE MANAGEMENT PLAN

4.5.1 Background

A Metropolitan Coal Waste Management Plan has been prepared for the surface facilities area in accordance with Condition 25, Schedule 4 of the Project Approval to:

- identify waste streams and monitor the quantities generated;
- identify waste management measures to minimise waste generation; and
- ensure that waste generated by Metropolitan Coal is appropriately stored, handled and disposed of.

4.5.2 Monitoring

Waste generated at the Project is monitored on a monthly basis through waste disposal receipts provided by Metropolitan Coal's waste contractors.

During the reporting period (1 August 2009 to 31 July 2010), approximately 233,459 tonnes (t) of waste were recycled and 534,871 t were disposed of.

Some 262,529 t of coal reject was generated by Metropolitan Coal during the reporting period.

Visual inspections of on-site waste storage areas have been conducted on a regular basis by Metropolitan Coal to confirm waste materials are being suitably stored. During the inspections, Metropolitan Coal identified the need to improve the storage of liquids.

In accordance with the NSW *Protection of the Environment Operations Act, 1977* and DECCW's waste tracking system, Metropolitan Coal has tracked the transportation of waste oil to a licensed recycling facility during the reporting period. Some 6,000 Litres of waste oil has been recycled.

4.5.3 Assessment of Environmental Performance

The Waste Management Plan was approved by the Director-General of the Department of Planning on the 23 August 2010.

In accordance with the Waste Management Plan, the performance of the mine will be assessed against the performance indicators outlined in Table 20 in the 2011 Annual Review.

Table 20
Waste Management Performance Indicators

Aspect	Performance Indicator
Waste generation	Waste generation has been minimised, as evidenced by: - an increase in the amount or type of waste recycled; - a decrease in the amount of waste generated that is disposed of to licensed landfill facilities; and/or - no practicable opportunities for additional waste minimisation have been identified to those currently being implemented.
Storage of waste	Waste has been separated and stored according to type in appropriate storage facilities (e.g. sealed containers for liquid waste).
Handling and disposal of waste	The transport of particular waste types has been tracked in accordance with DECCW waste tracking requirements. Metropolitan Coal's waste management contracts, where relevant, specify that the waste is to be transported by an appropriately licensed contractor and disposed of at an appropriately licensed facility.

4.5.4 Management and Mitigation Measures

Metropolitan Coal aims to implement the waste hierarchy established under the NSW *Waste Avoidance and Resource Recovery Act, 2001* to manage Project waste generation. The waste hierarchy ensures that management measures are considered against the following priorities:

1. Avoidance of unnecessary resource consumption.
2. Resource recovery.
3. Disposal, including management of disposal options in the most environmentally responsible manner.

Metropolitan Coal implemented a number of measures over the reporting period to minimise waste generation and increase recycling at Metropolitan Coal, including:

- The implementation of a two week recycling program to recycle surplus materials at the surface facilities area. The proceeds generated by the recycling program are earmarked by Metropolitan Coal for charitable donation.
- The donation of more than 20 railway sleepers to the Helensburgh Public School to re-use in their gardening and bank stabilisation programs.
- The setting of double-sided, black and white as a default for printing.
- The purchase of new spill containment kits and standardisation of the colour of all spill kits.
- The purchase of crockery to reduce waste packaging.
- The discontinued use of polystyrene cups on-site.

Waste streams have been kept separate where practicable to improve waste handling and classification, minimise costs associated with disposal and improve environmental outcomes. For example, hazardous waste has not been mixed with non-hazardous waste and where practicable, recyclable waste has been separated out from other waste.

In order to reduce the volume of coal reject that requires off-site transport, Metropolitan Coal will undertake backfilling of the mine void using a proportion of the coal reject produced over the Project life. Field trials of the coal rejects backfill process commenced in July 2010 and will be completed in the next reporting period. To date, the field trials have met or exceeded the expectations from laboratory studies. It is anticipated that the field trials will progress to the pilot phase of underground emplacement in late 2010.

4.5.5 Further Initiatives

Over the next reporting period:

- Waste data will be collected and recorded according to type in the Metropolitan Coal Waste Register in accordance with the Waste Management Plan.
- Metropolitan Coal will consolidate and update existing waste management contracts to specify that the waste is to be transported by an appropriately licensed contractor and disposed of at an appropriately licensed facility.
- Metropolitan Coal will investigate opportunities to increase the recycling of waste quantities or waste types.
- Metropolitan Coal will implement an education program on-site to increase the awareness of mine site personnel regarding waste management and measures to minimise the generation of waste.
- Metropolitan Coal will progress the coal rejects backfill process and anticipate commencing the pilot phase underground emplacement in the last quarter of 2010.

4.6 REHABILITATION STRATEGY

A Metropolitan Coal Rehabilitation Strategy for the surface facilities area will be prepared in consultation with relevant stakeholders to the satisfaction of the Director-General of the Department of Planning by the end of October 2011.

The Rehabilitation Strategy will define the rehabilitation objectives for the area and will investigate options for the future use of the area upon the completion of mining in accordance with Condition 2, Schedule 6 of the Project Approval.

5 OTHER APPROVAL CONDITIONS

The Project Approval includes a number of additional conditions that are not specifically addressed in the Metropolitan Coal management plans or monitoring programs. These are discussed below.

Structural Adequacy

Condition 9, Schedule 2 of the Project Approval requires Metropolitan Coal to ensure that new buildings and structures, and any alterations or additions to existing buildings and structure at the surface facilities area, are constructed in accordance with the relevant requirements of the Building Code of Australia and any additional requirements of the Mines Subsidence Board in areas where subsidence effects are likely to occur.

No buildings or structures were constructed in the underground mining area during the reporting period.

The former mine managers residence at the Major Surface Facilities Area was renovated for Metropolitan Coal administration offices during the reporting period. The renovations were conducted in accordance with Building Code of Australia requirements.

Demolition

In accordance with Condition 10, Schedule 2 of the Project Approval, Metropolitan Coal is required to ensure that all demolition work is carried out in accordance with *Australian Standard AS 2601-2001: The Demolition of Structures*, or its latest version.

HPCL has not conducted any demolition activities over the reporting period.

Operation of Plant and Equipment

HPCL is required to ensure that all plant and equipment used at the site is maintained in a proper and efficient condition and operated in a proper and efficient manner in accordance with Condition 11, Schedule 2 of the Project Approval.

All plant and equipment in use at Metropolitan Coal is regularly serviced in accordance with the relevant NSW Department of Industry and Investment Mining Design Guidelines to ensure plant and equipment is maintained in proper and efficient condition. All plant and equipment are operated in a proper and efficient manner.

Rail Noise

Condition 4, Schedule 4 of the Project Approval requires Metropolitan Coal to only use locomotives that are approved to operate on the NSW rail network in accordance with noise limits L6.1 to L6.4 in RailCorp's EPL (No. 12208) and Australian Rail Track Corporation's EPL (No. 3142) or a Pollution Control Approval issued under the former *Pollution Control Act, 1970*.

All locomotives that have been used by Metropolitan Coal are approved to operate on the NSW rail network in accordance with the relevant noise limits.

Blasting

The Project Approval (Condition 7, Schedule 4) requires that Metropolitan Coal not undertake blasting operations at the surface facilities area without the written approval of the Director-General of the Department of Planning.

No blasting activities were carried out at the surface facilities area during the reporting period.

Minor blasting underground is necessary at times when geological structures are encountered that cannot be excavated by the longwall mining machine. Minor blasting is also required underground at times when a section of the longwall roof falls ahead of the hydraulic supports of the longwall mining machine.

Odour

In accordance with Condition 9, Schedule 4 of the Project Approval, Metropolitan Coal has not caused or permitted the emission of offensive odours from the site. No odour complaints were received during the reporting period.

The Metropolitan Coal sewage system is connected to the town sewage network, and is maintained on a regular basis. Back-up pump systems are incorporated in the Metropolitan Coal sewage system to compensate for any unexpected malfunctions.

Visual

Metropolitan Coal has minimised the visual impacts of the surface facilities area and the ventilation shaft site, particularly the off-site lighting impacts, in accordance with Condition 23, Schedule 4 of the Project Approval.

The Major Surface Facilities Area is located within a narrow valley with heavily vegetated slopes which limit the visibility of the buildings and structures to public areas and private residences in the surrounding area. During the reporting period, three lighting complaints were received (as discussed in Section 6) relating to the lighting impacts from sources near the entrance to the mine. Two of these were considered likely to be related to delivery trucks, and the cause of one complaint was unresolved.

Additional lighting installed during the reporting period was restricted to the minimum required for operational and safety requirements and lights were directed away from public receptors where practicable.

Flood lights in the car park are fitted with timers which turn the lights off during periods when the car park is not in use to minimise light nuisance.

A planting program has been established along Parkes Street in Helensburgh to develop a vegetation screen to further minimise the visibility of the Major Surface Facilities Area.

Ventilation Shaft No. 3 has previously been painted a suitable colour to blend in with the surrounding environment and visual vegetation screening has been incorporated to minimise visual impacts. Ventilation Shaft No. 4 is yet to be constructed.

6 ENVIRONMENTAL COMPLAINTS

A protocol for the managing and reporting of complaints has been developed as a component of Metropolitan Coal's Environmental Management Strategy.

A dedicated telephone number for the provision of comments or complaints is maintained by Metropolitan Coal (1800 115 003) and is displayed on signage at the entrance to the mine.

Metropolitan Coal records and responds to all complaints and maintains a complaints register on its website.

During the reporting period a total of 12 complaints were received identifying 17 issues. Approximately half of the issues (eight) related to traffic and traffic noise, with a smaller number of issues relating to dust, lighting, operational noise and other issues (Chart 57).

A copy of the complaints register is provided in Appendix 2, including actions taken by Metropolitan Coal to address the complaints received.

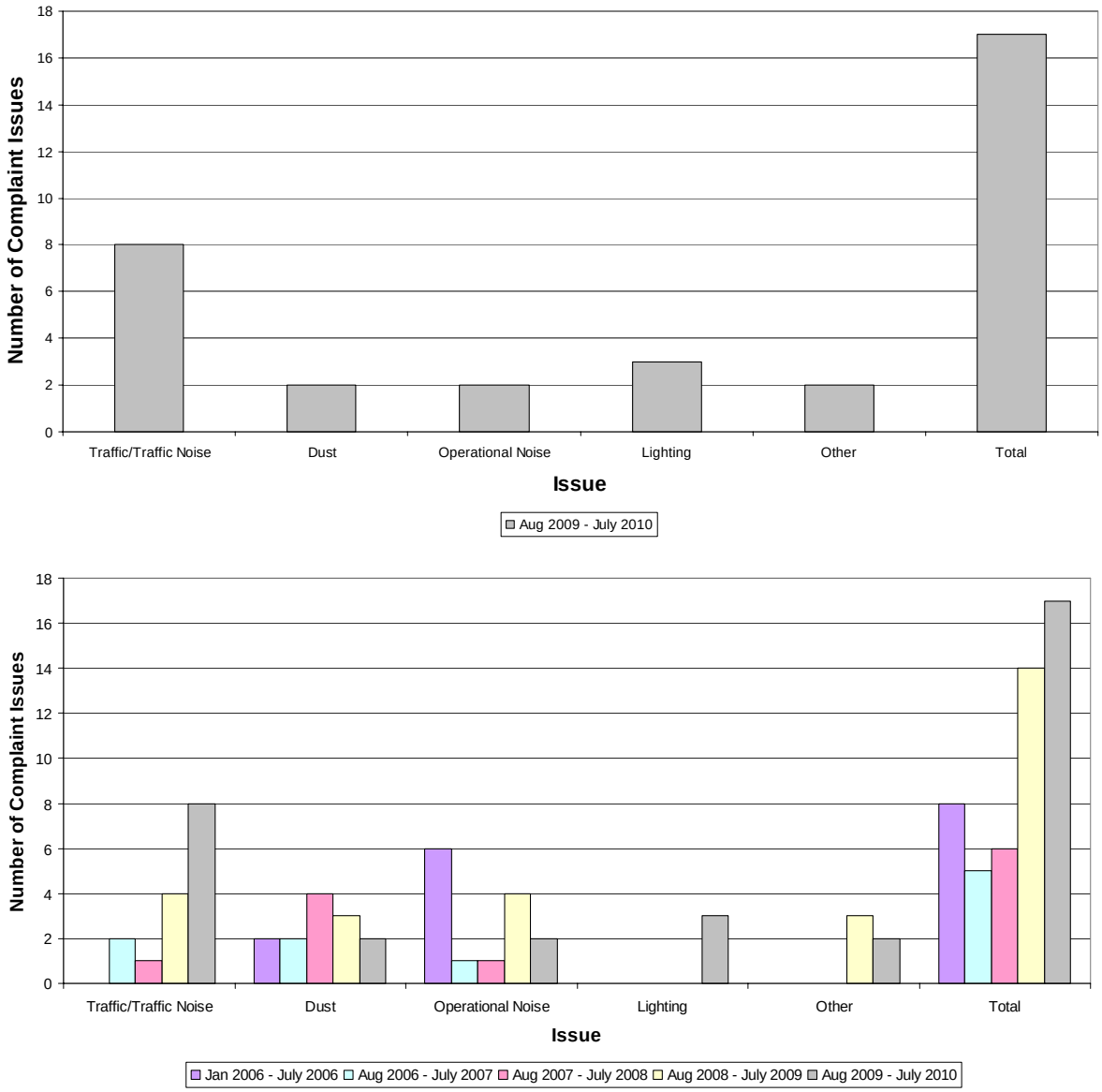


Chart 57 Summary of Metropolitan Coal Complaints Record

7 WORKS PROPOSED IN THE NEXT REPORTING PERIOD

The layout of Longwalls 20-22 is shown on Figure 5. In the next reporting period (1 August 2010 to 31 July 2011), it is anticipated that secondary extraction of Longwall 20 will advance to within 400 m of the finish line.

Metropolitan Coal will commence construction of the replacement underground drift, including construction of a new drift portal at the mine's Major Surface Facilities Area.

8 REFERENCES

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Metropolitan Coal (2010c) *Metropolitan Coal Longwalls 20-22 Subsidence Monitoring Program.*

Metropolitan Coal (2010d) *Metropolitan Coal Longwalls 20-22 Water Management Plan.*

Metropolitan Coal (2010e) *Metropolitan Coal Longwalls 20-22 Biodiversity Management Plan.*

Metropolitan Coal (2010f) *Metropolitan Coal Longwalls 20-22 Land Management Plan*.

Metropolitan Coal (2010g) *Metropolitan Coal Longwalls 20-22 Heritage Management Plan*.

Metropolitan Coal (2010h) *Metropolitan Coal Longwalls 20-22 Built Features Management Plan*.

Metropolitan Coal (2010i) *Metropolitan Coal Longwalls 20-22 Public Safety Management Plan.*

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New South Wales Minerals Council (2000) *Technical Paper – Particulate Matter and Mining Interim Report*.

APPENDIX 1

SURFACE WATER QUALITY GRAPHS

Note: where a graph presents zero values, this corresponds to results that are below the laboratory detection limits.

Graphical Plots of Water Quality Monitoring Results for Waratah Rivulet

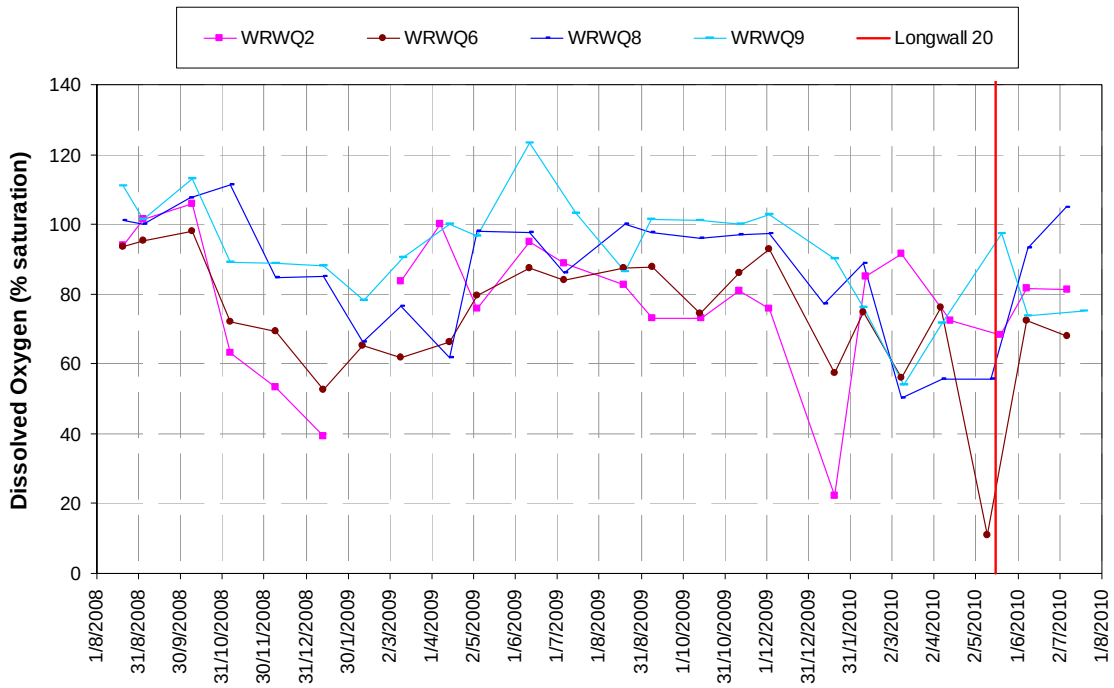

Chart A1 Dissolved Oxygen (% Saturation) Waratah Rivulet

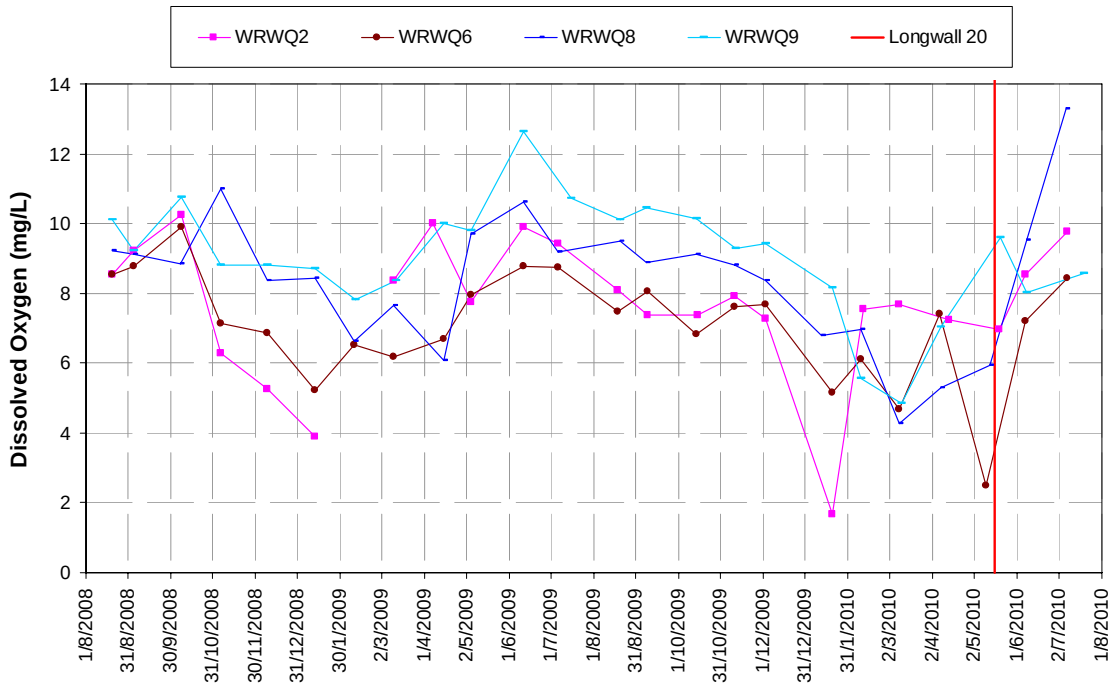

Chart A2 Dissolved Oxygen (mg/L) Waratah Rivulet

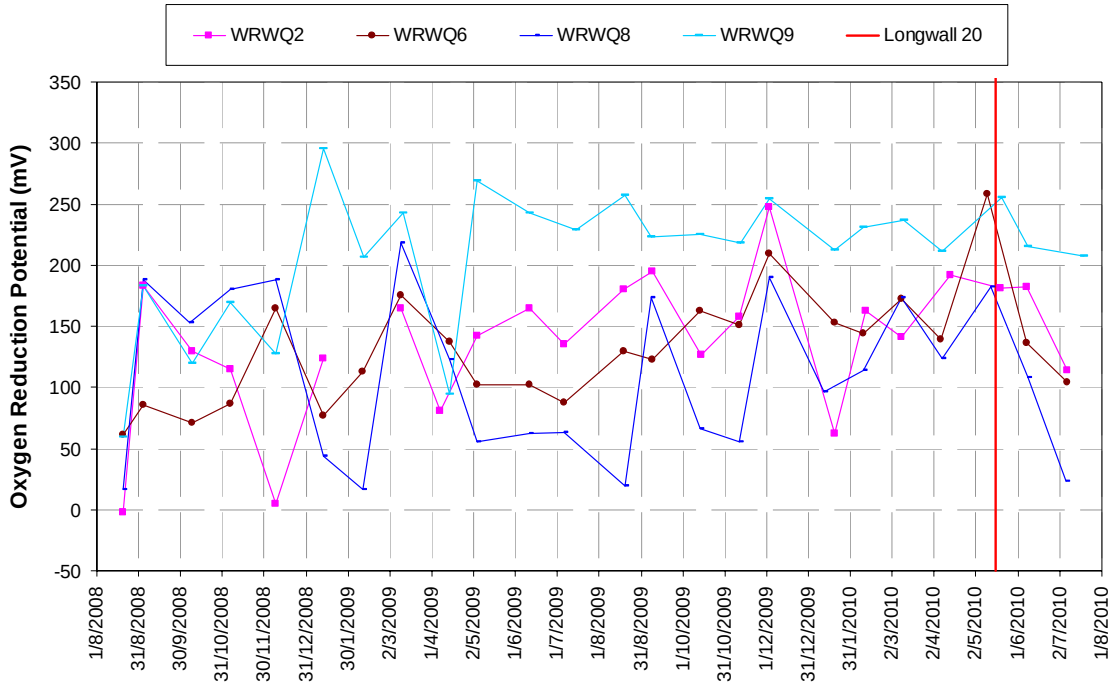

Chart A3 Oxygen Reducing Potential (mV) Waratah Rivulet

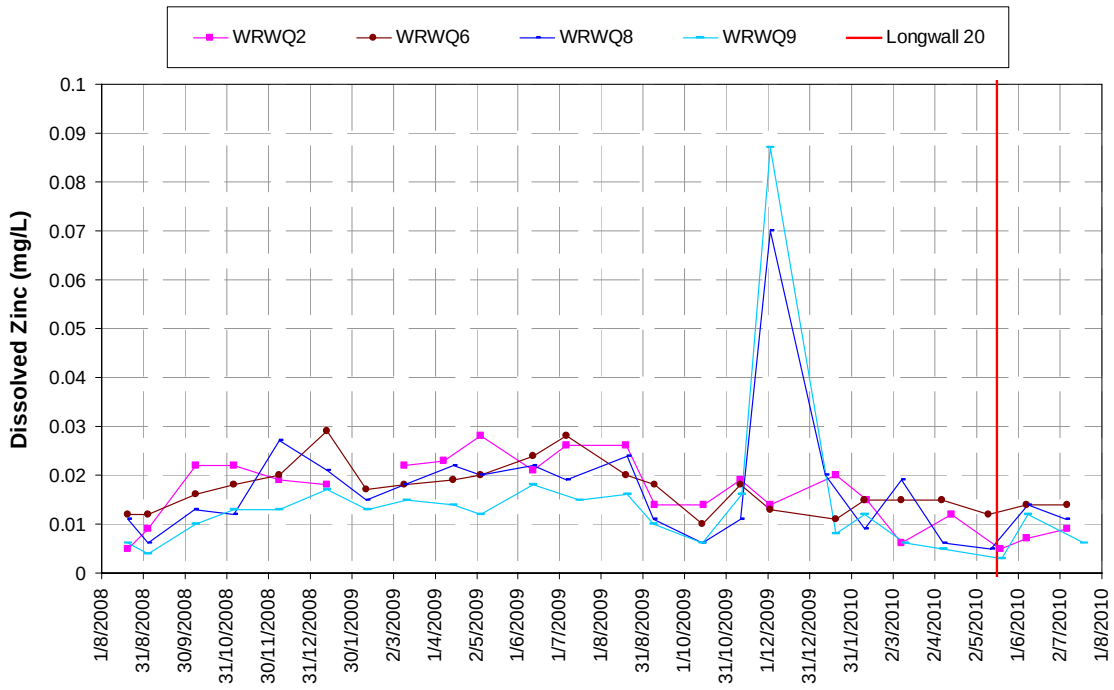

Chart A4 Dissolved Zinc (mg/L) Waratah Rivulet

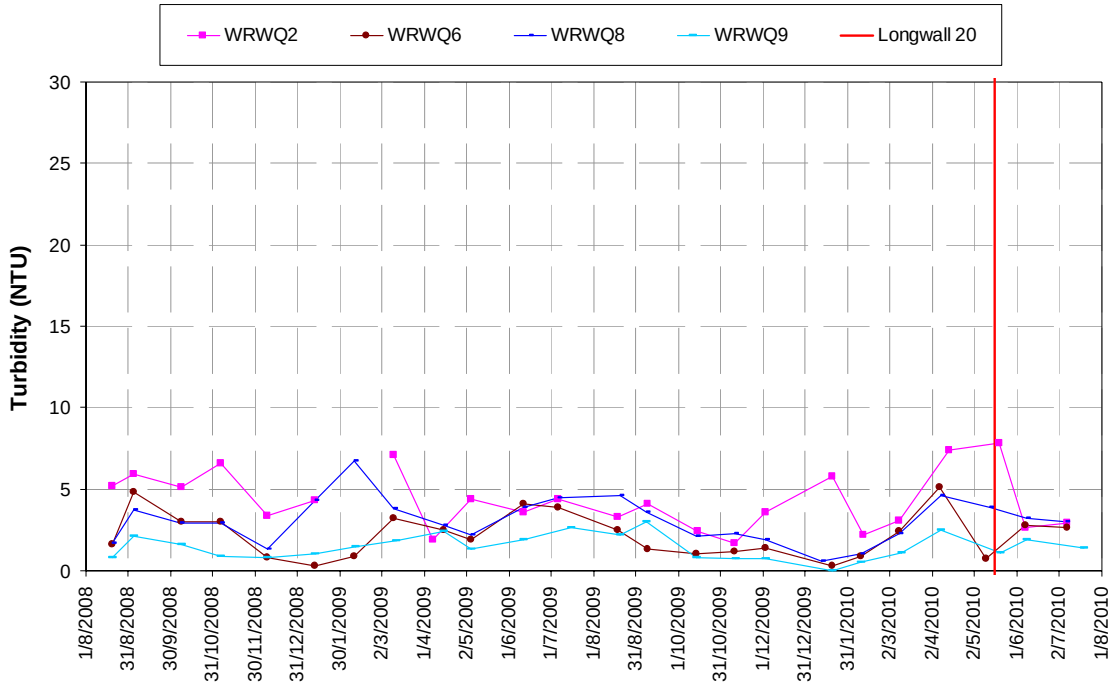

Chart A5 Turbidity (NTU Field) Waratah Rivulet

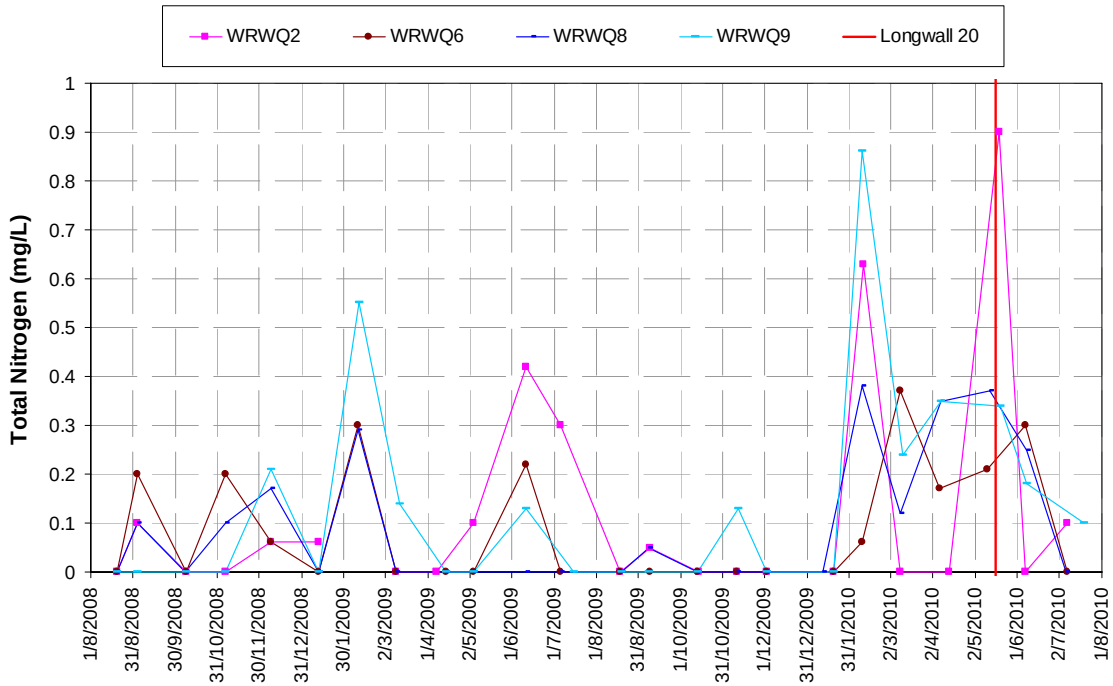

Chart A6 Total Nitrogen (mg/L) Waratah Rivulet

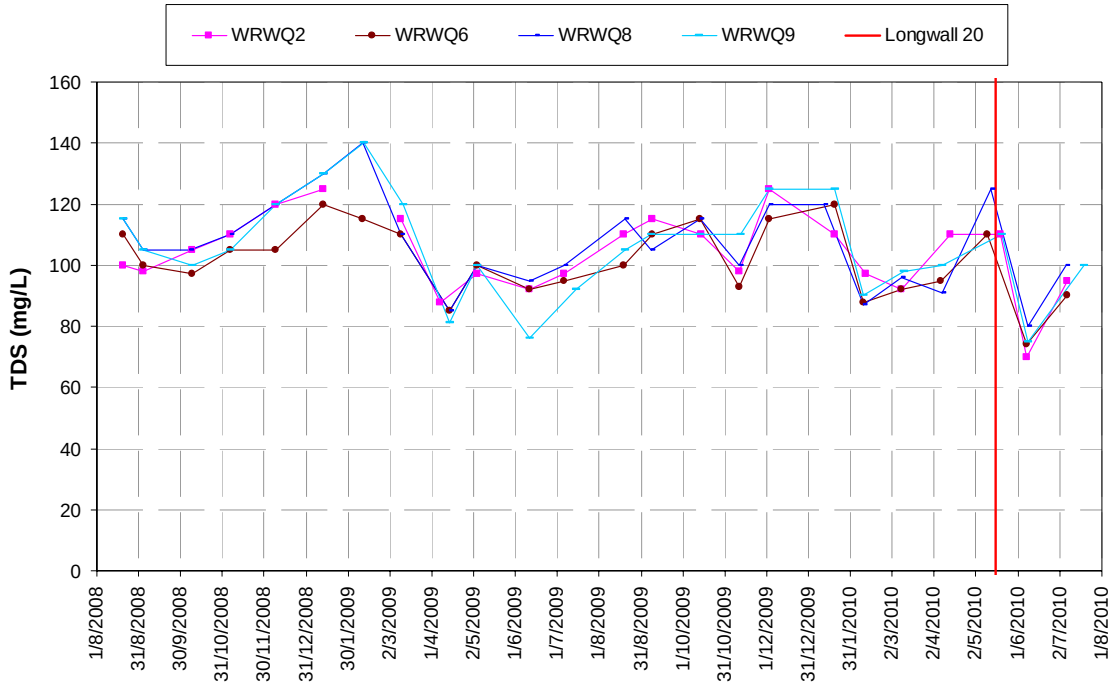

Chart A7 Total Dissolved Solids (mg/L) Waratah Rivulet

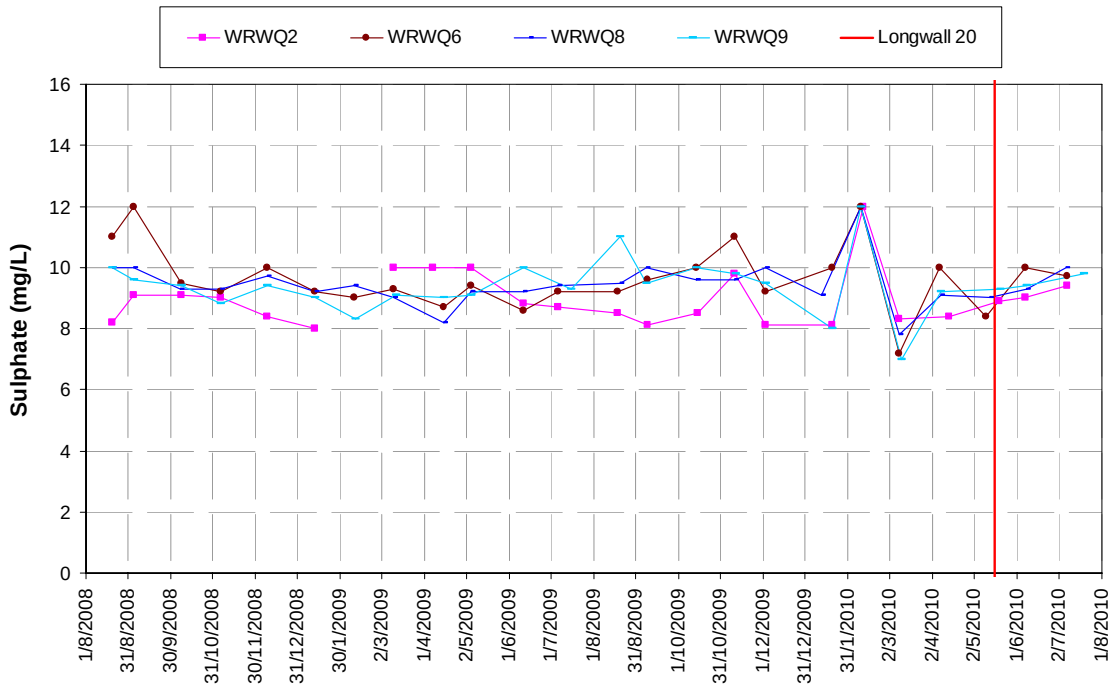

Chart A8 Sulphate (mg/L) Waratah Rivulet

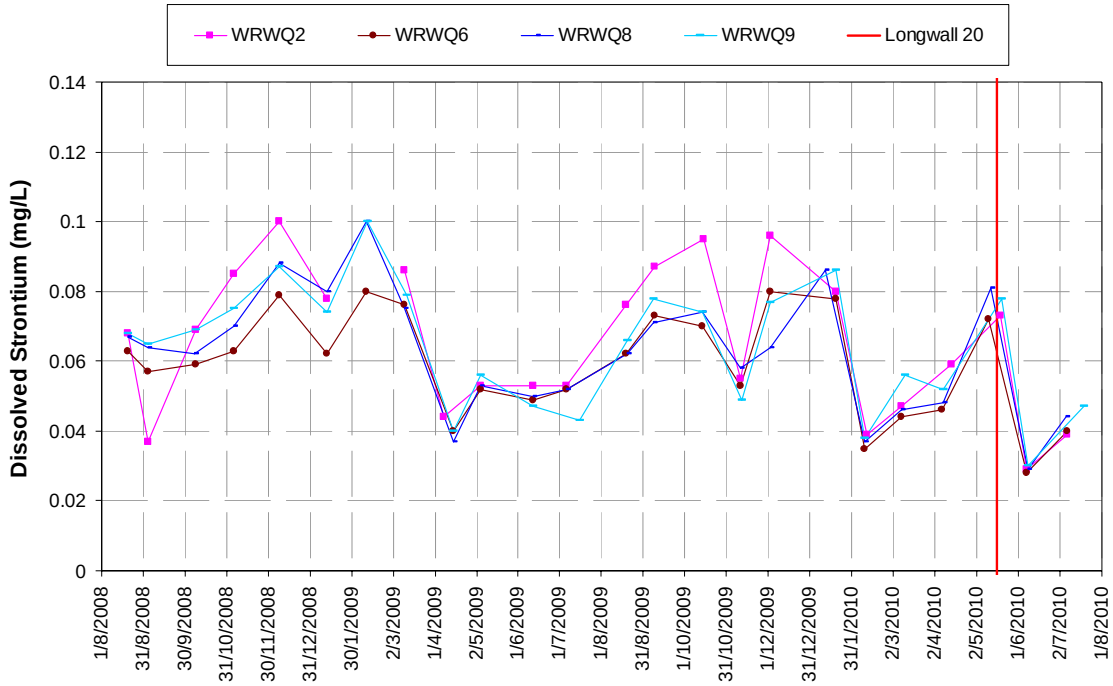

Chart A9 Dissolved Strontium (mg/L) Waratah Rivulet

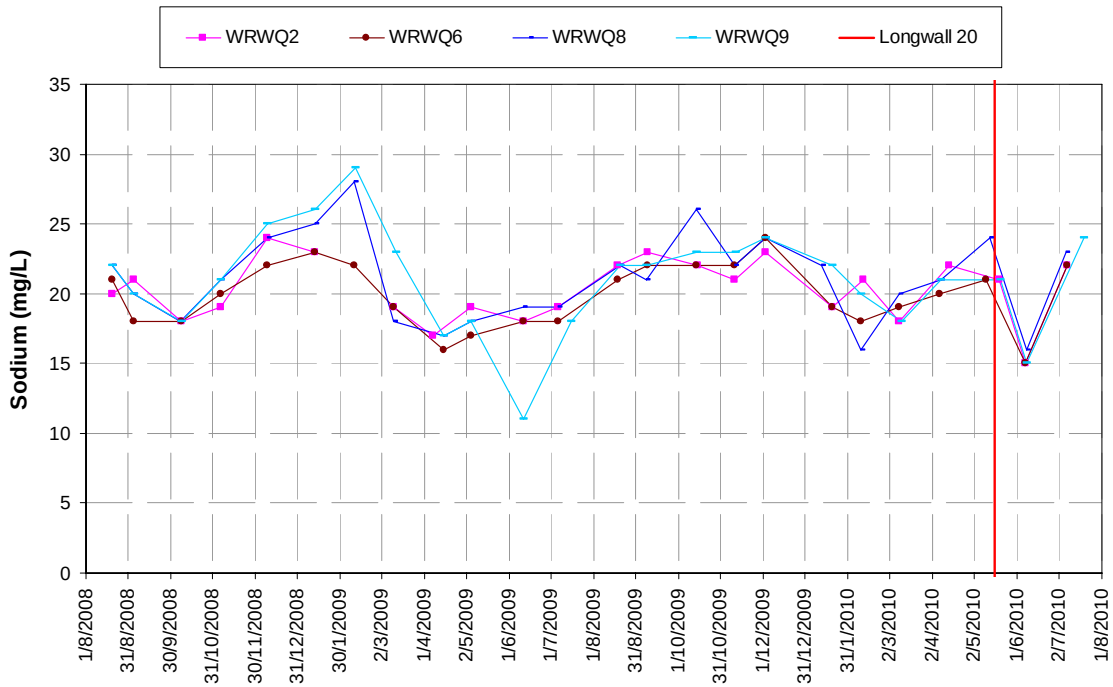

Chart A10 Sodium (mg/L) Waratah Rivulet

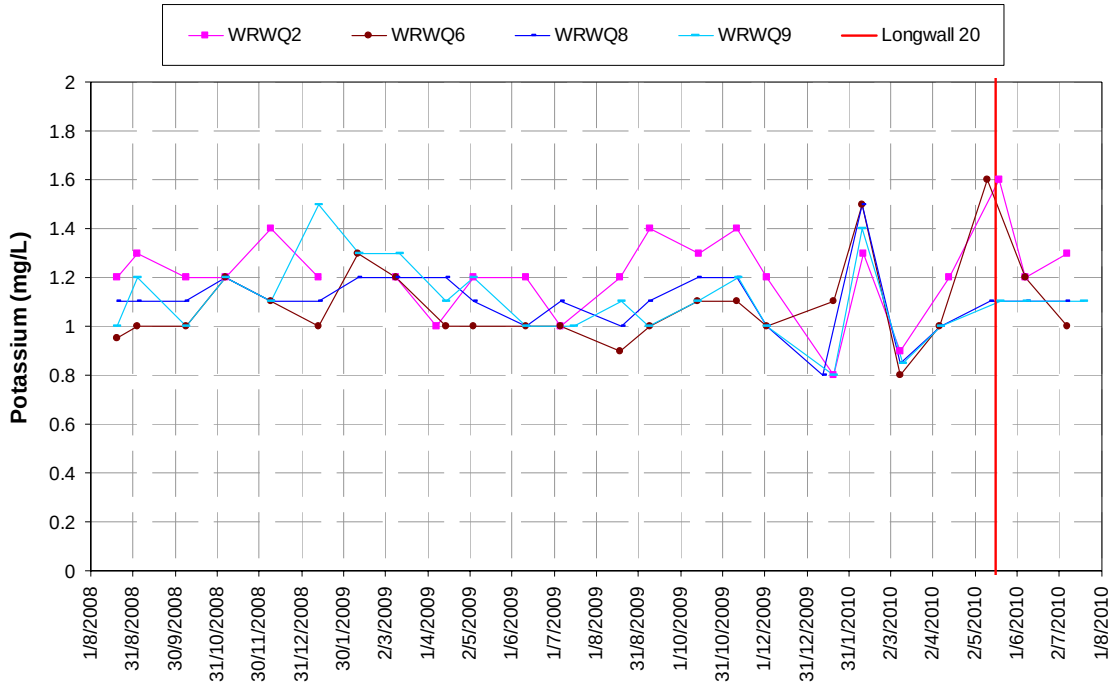

Chart A11 **Potassium (mg/L) Waratah Rivulet**

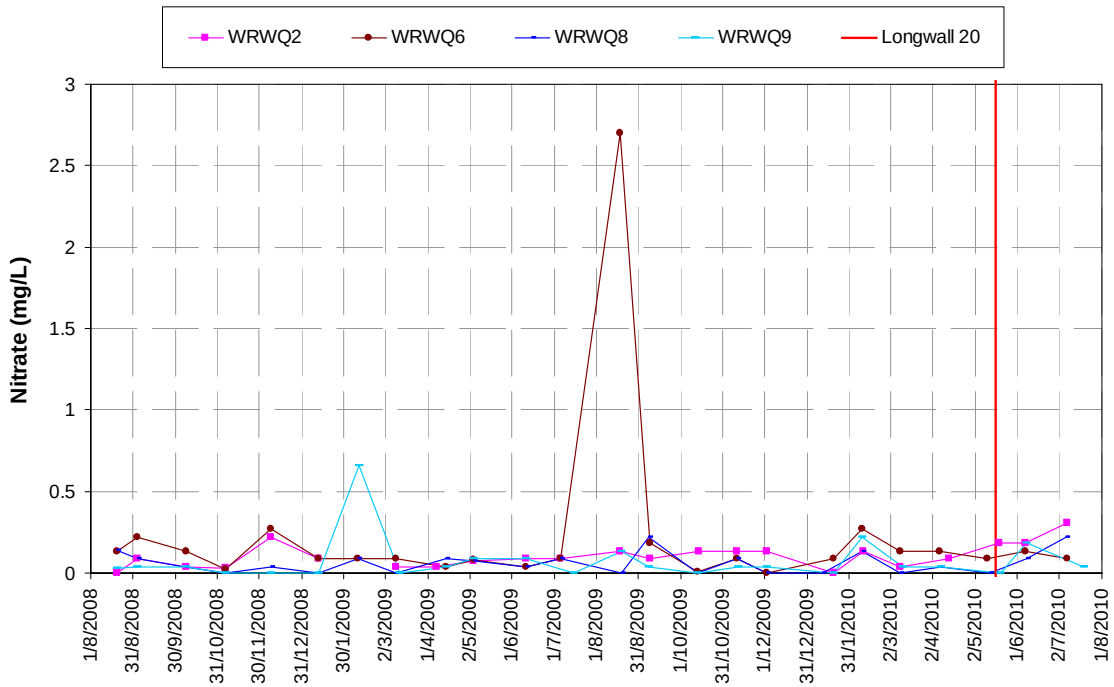

Chart A12 **Nitrate (mg/L) Waratah Rivulet**

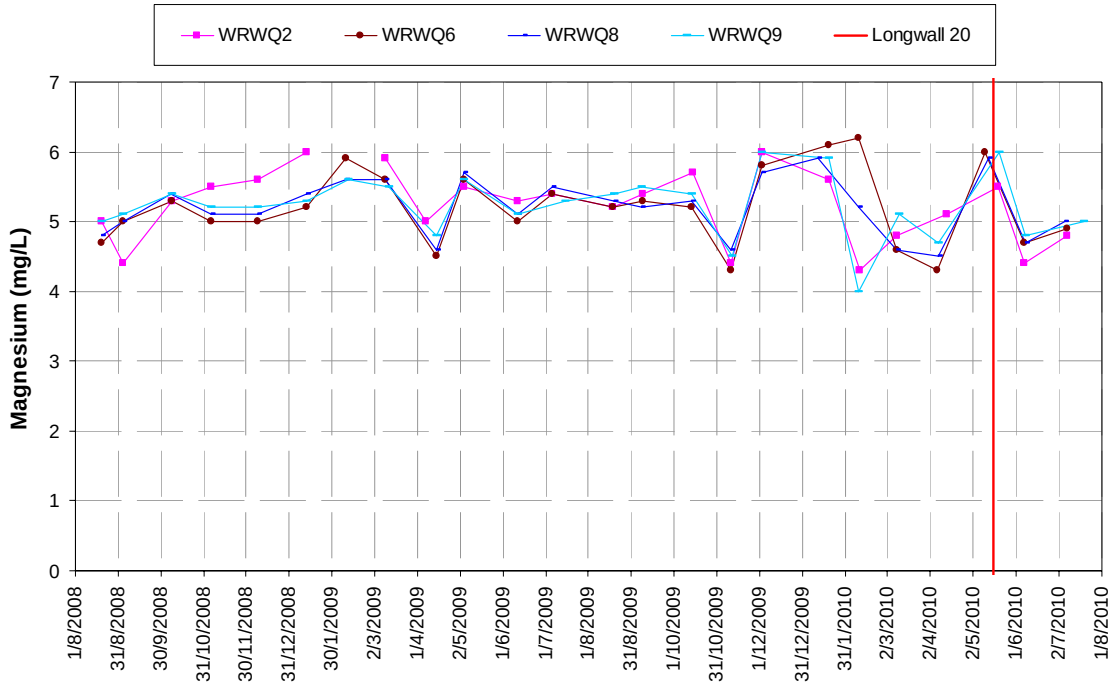

Chart A13 **Magnesium (mg/L) Waratah Rivulet**

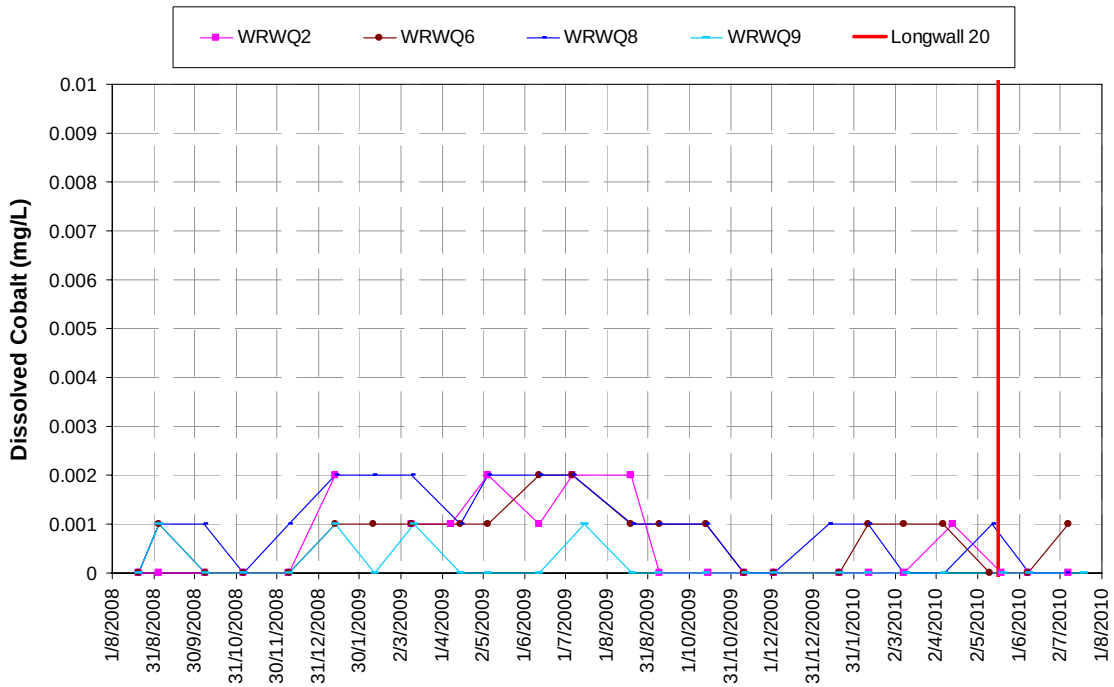

Chart A14 **Dissolved Cobalt (mg/L) Waratah Rivulet**

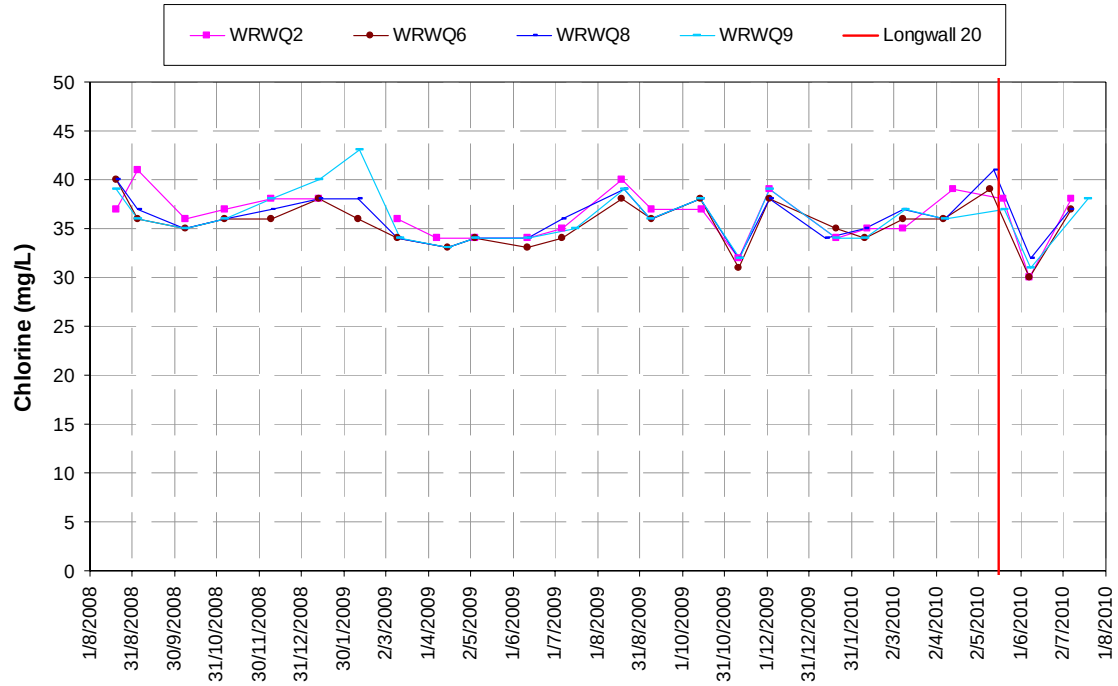

Chart A15 **Chlorine (mg/L) Waratah Rivulet**

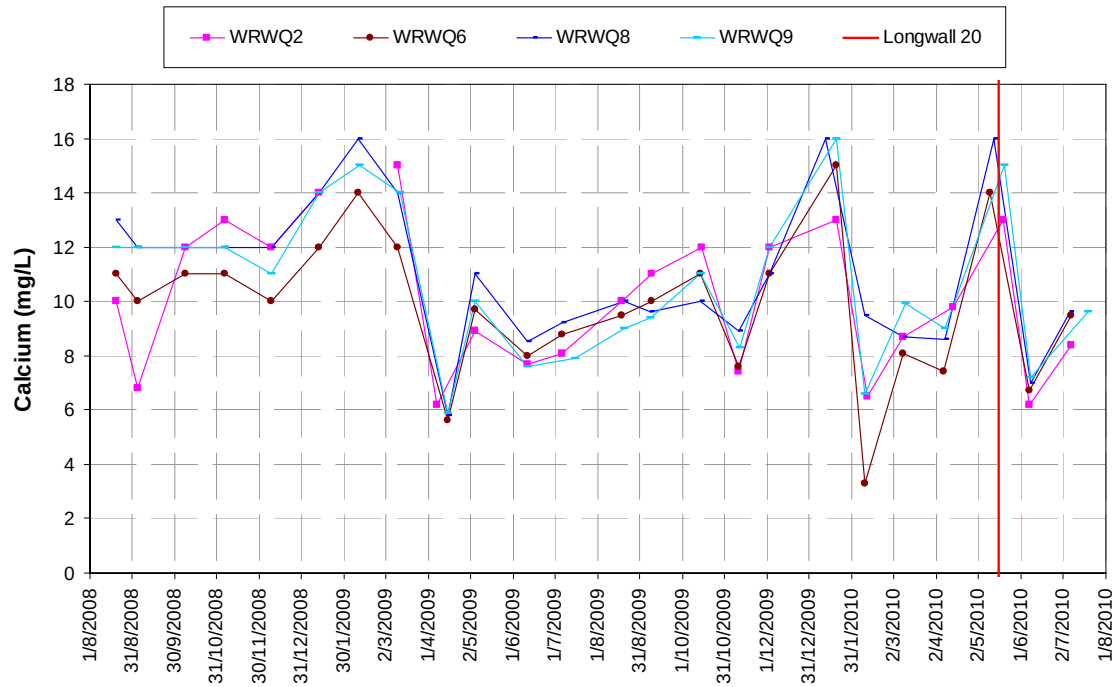

Chart A16 **Calcium (mg/L) Waratah Rivulet**

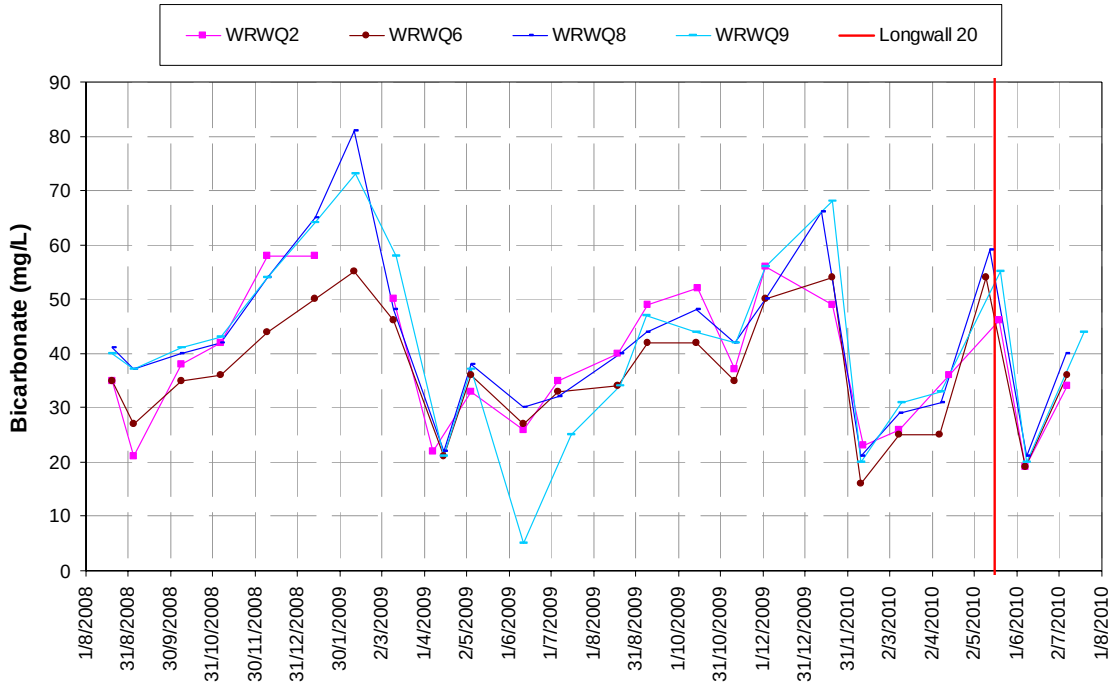

Chart A17 **Bicarbonate (mg/L) Waratah Rivulet**

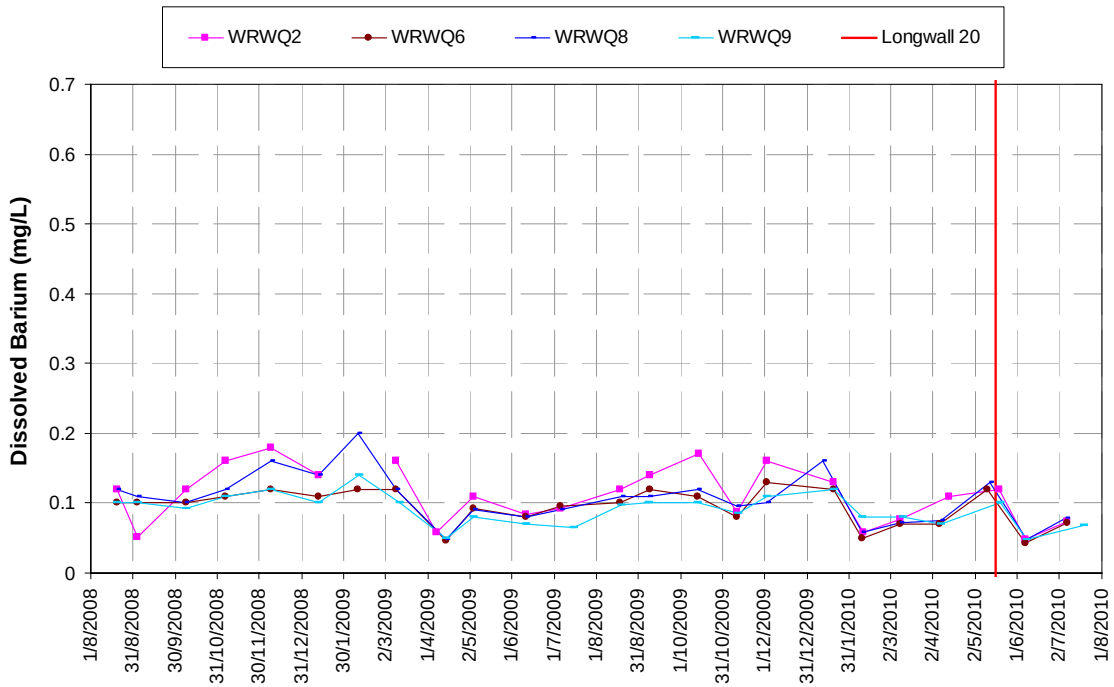

Chart A18 **Dissolved Barium (mg/L) Waratah Rivulet**

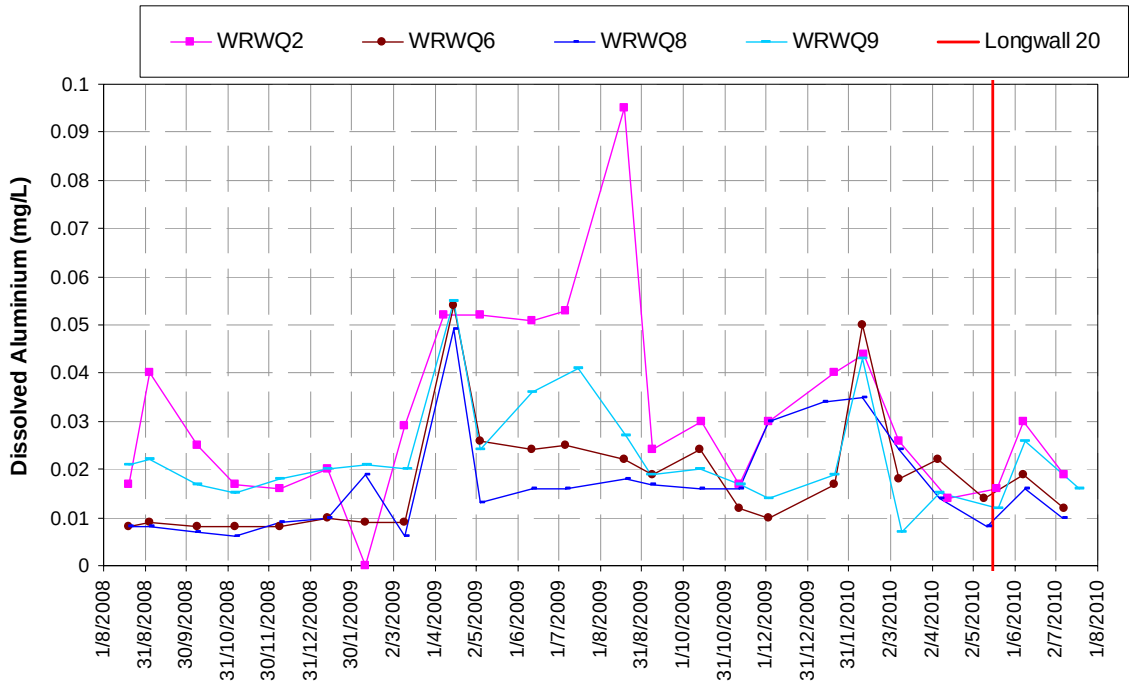

Chart A19 **Dissolved Aluminium (mg/L) Waratah Rivulet**

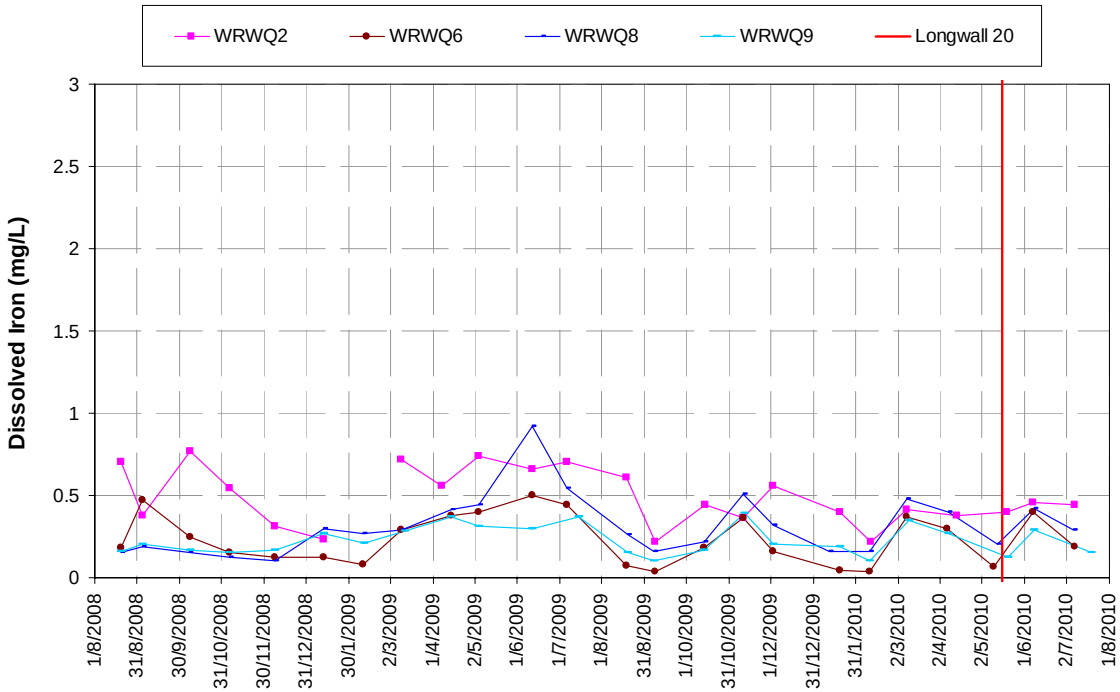

Chart A20 **Dissolved Iron (mg/L) Waratah Rivulet**

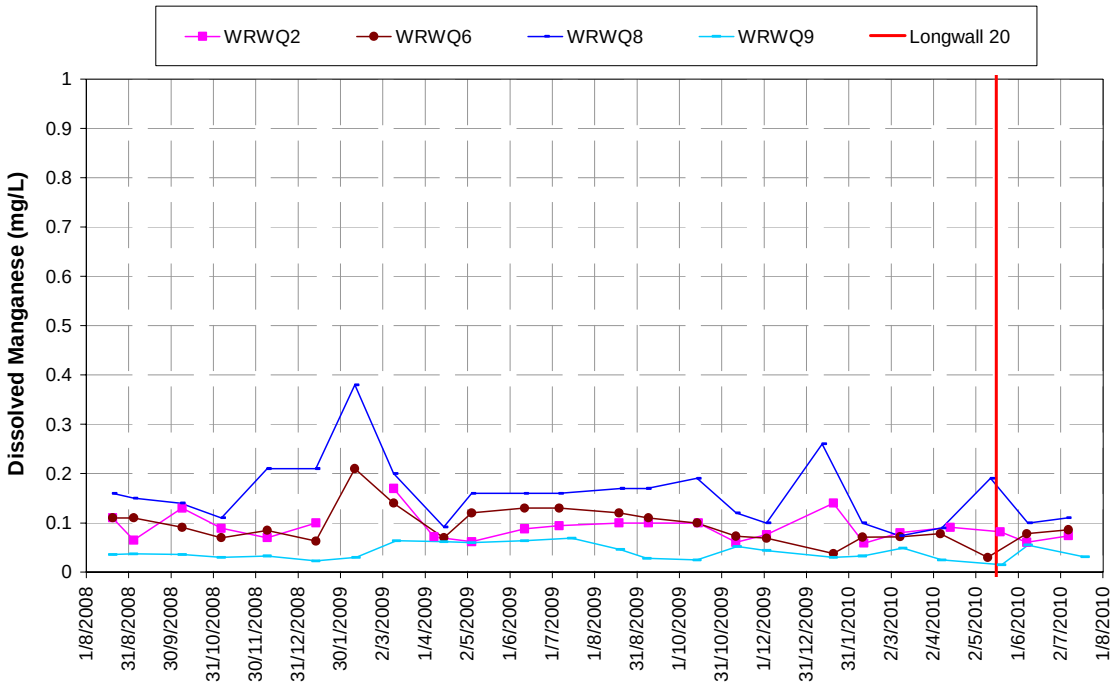

Chart A21 Dissolved Manganese (mg/L) Waratah Rivulet

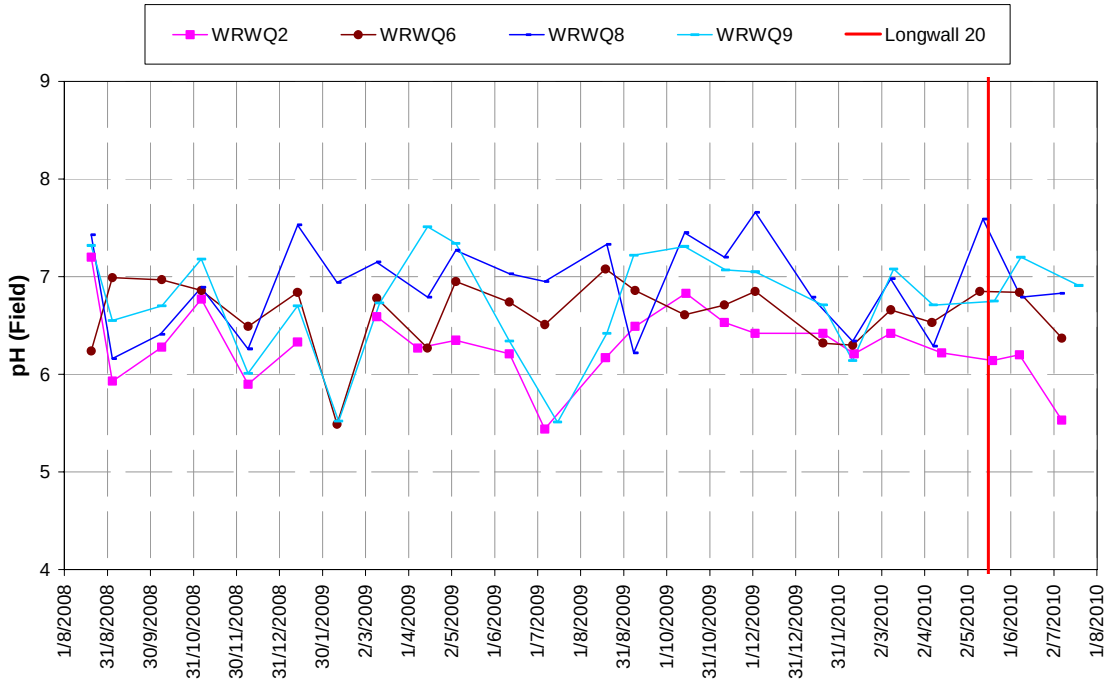

Chart A22 pH (Field) Waratah Rivulet

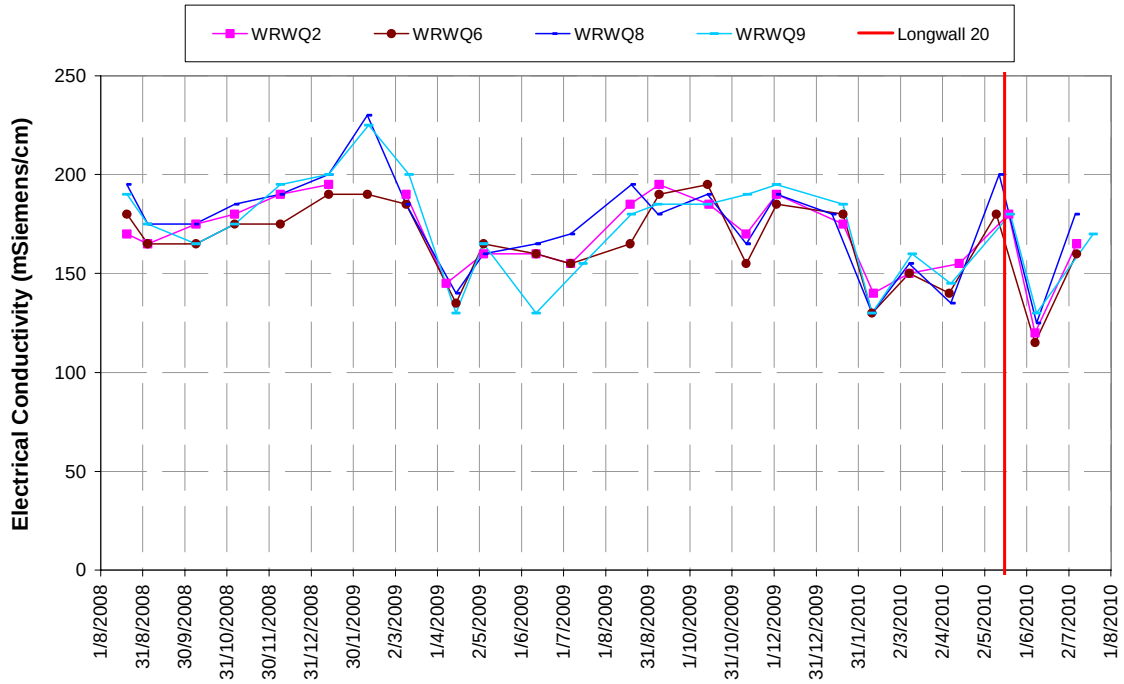

Chart A23 **Electrical Conductivity (µSiemens/cm) Waratah Rivulet**

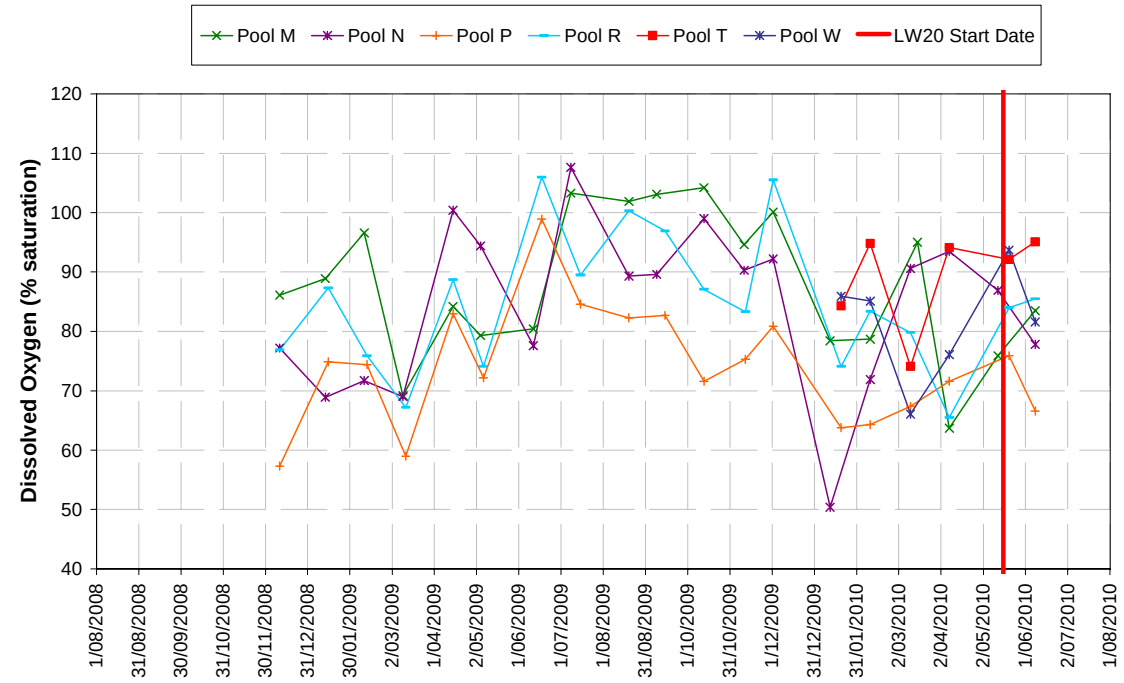

Chart A24 **Dissolved Oxygen (% Saturation) Waratah Rivulet Pools**

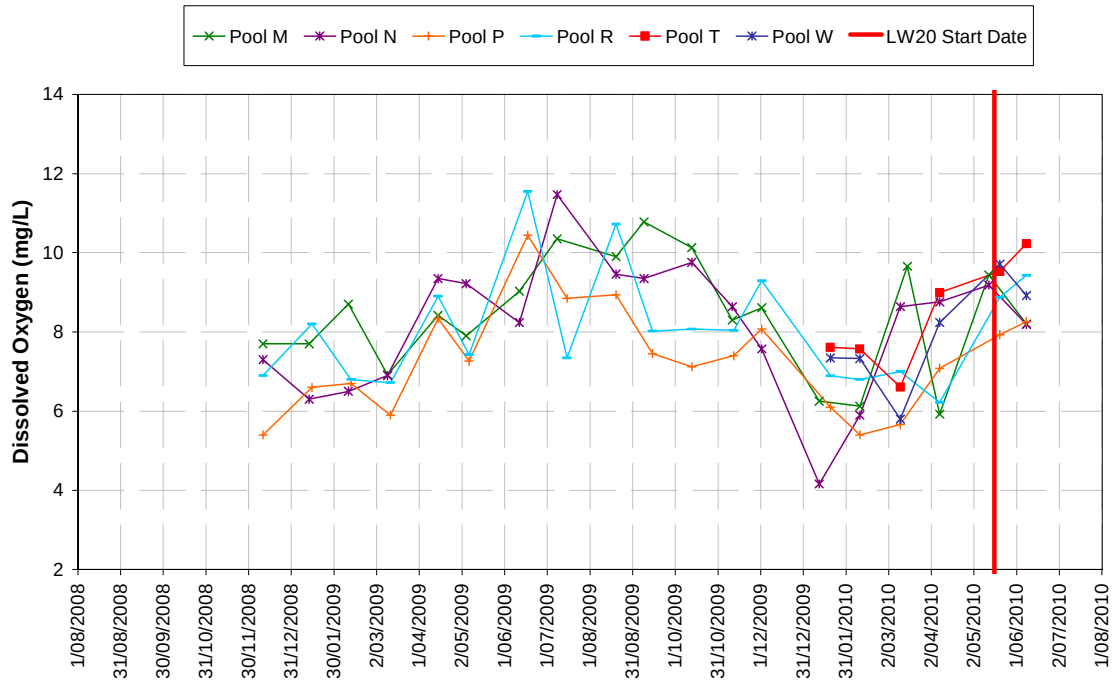

Chart A25 Dissolved Oxygen (mg/L) Waratah Rivulet Pools

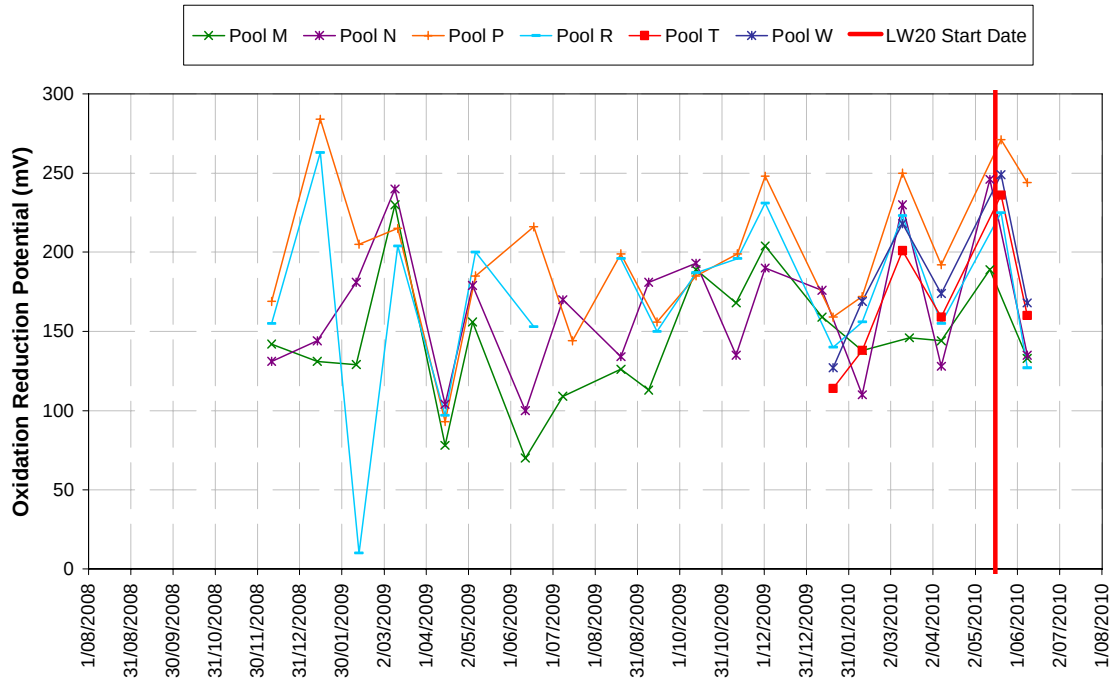

Chart A26 Oxidation Reduction Potential (mV) Waratah Rivulet Pools

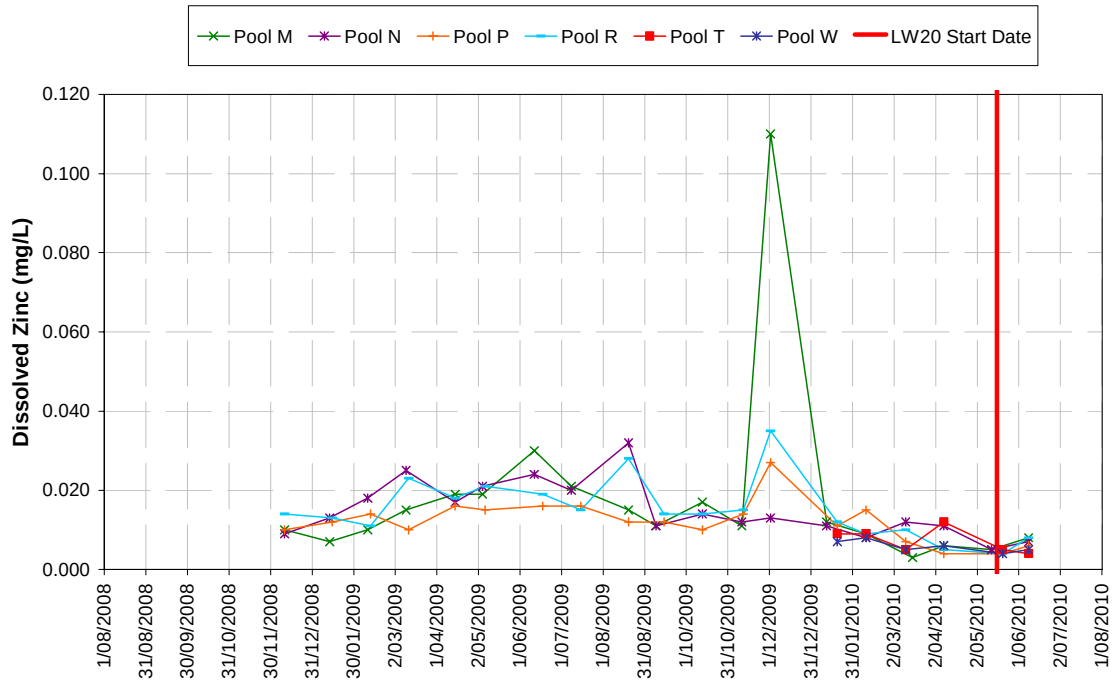

Chart A27 **Dissolved Zinc (mg/L) Waratah Rivulet Pools**

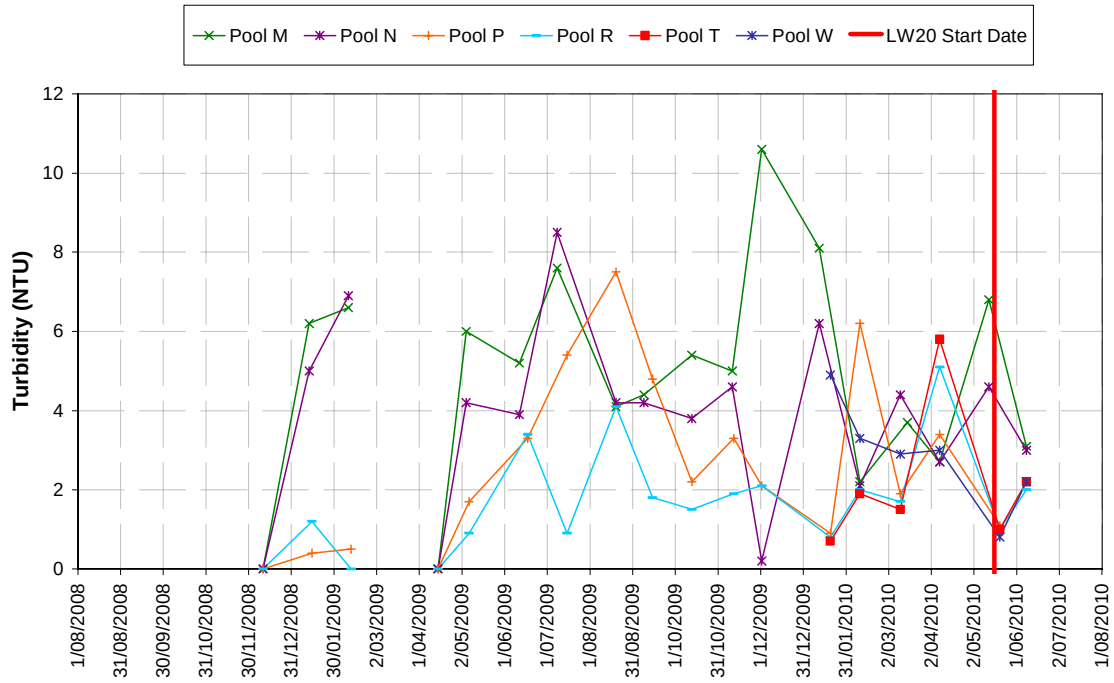

Chart A28 **Turbidity (NTU) Waratah Rivulet Pools**

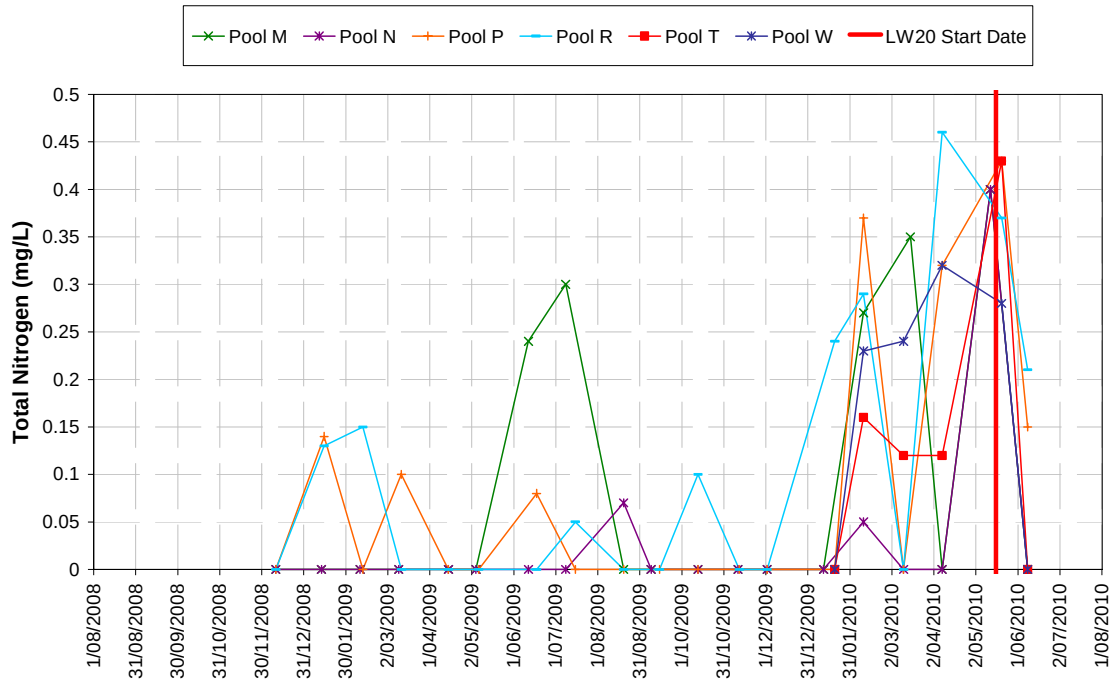

Chart A29 **Total Nitrogen (mg/L) Waratah Rivulet Pools**

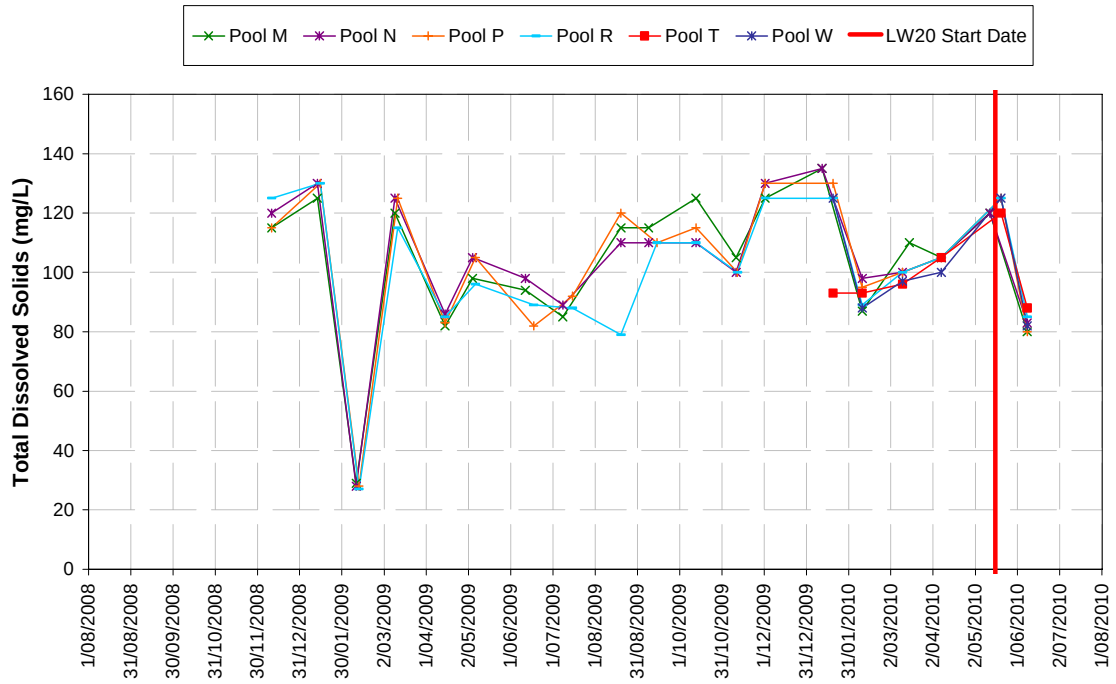

Chart A30 **Total Dissolved Solids (mg/L) Waratah Rivulet Pools**

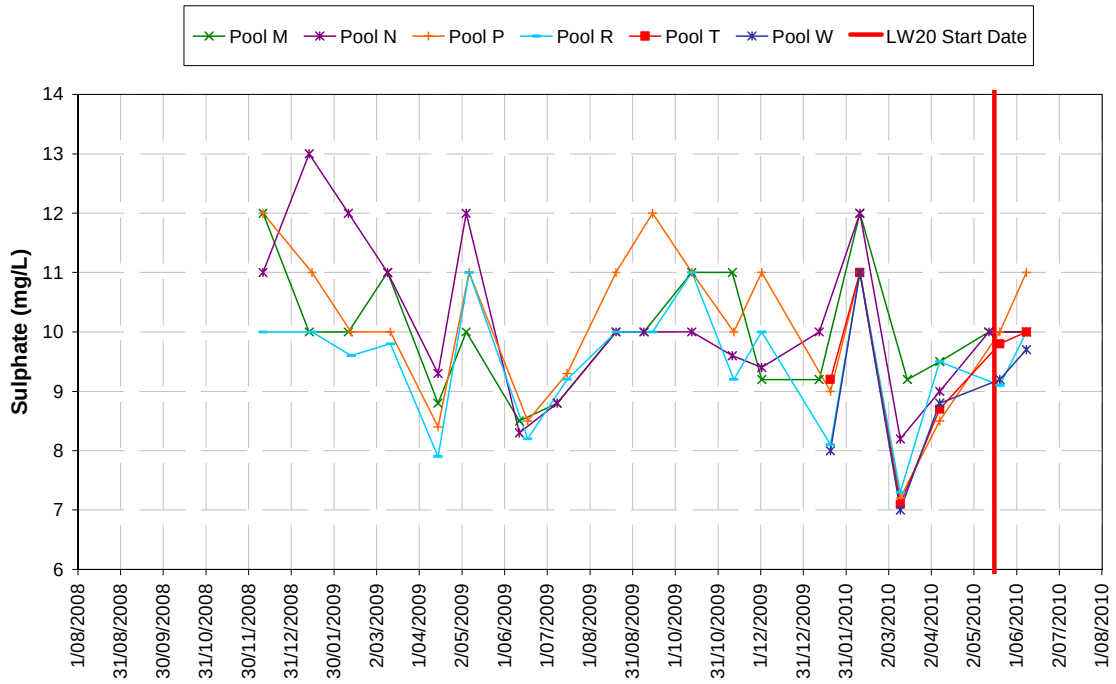

Chart A31 Sulphate (mg/L) Waratah Rivulet Pools

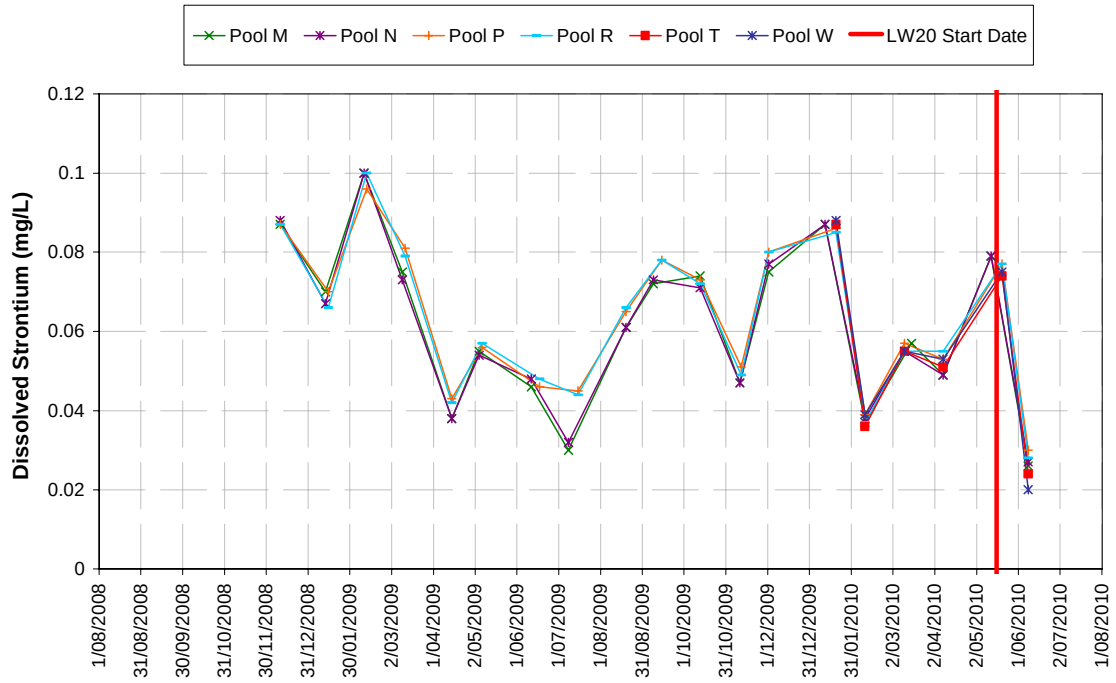

Chart A32 Dissolved Strontium (mg/L) Waratah Rivulet Pools

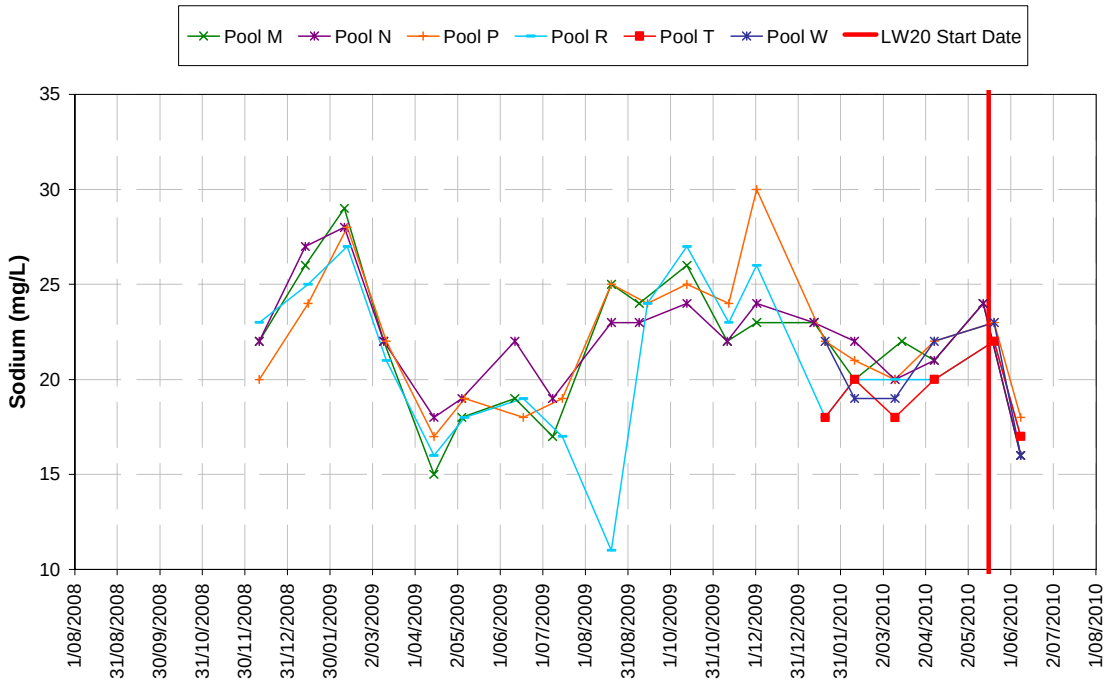

Chart A33 Sodium (mg/L) Waratah Rivulet Pools

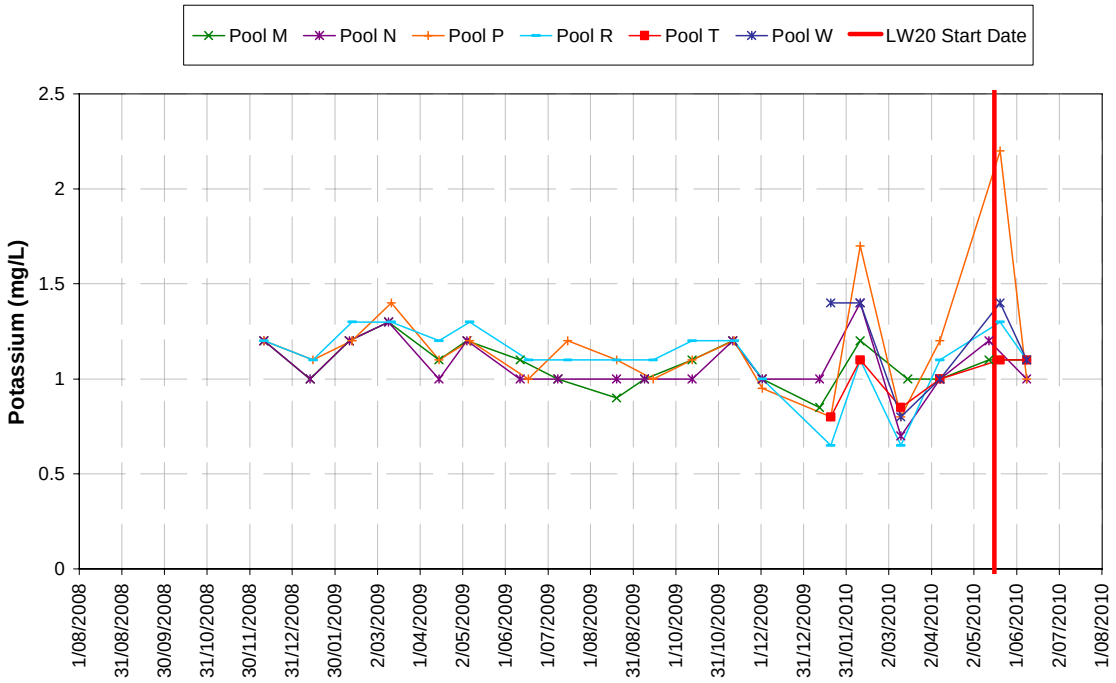

Chart A34 Potassium (mg/L) Waratah Rivulet Pools

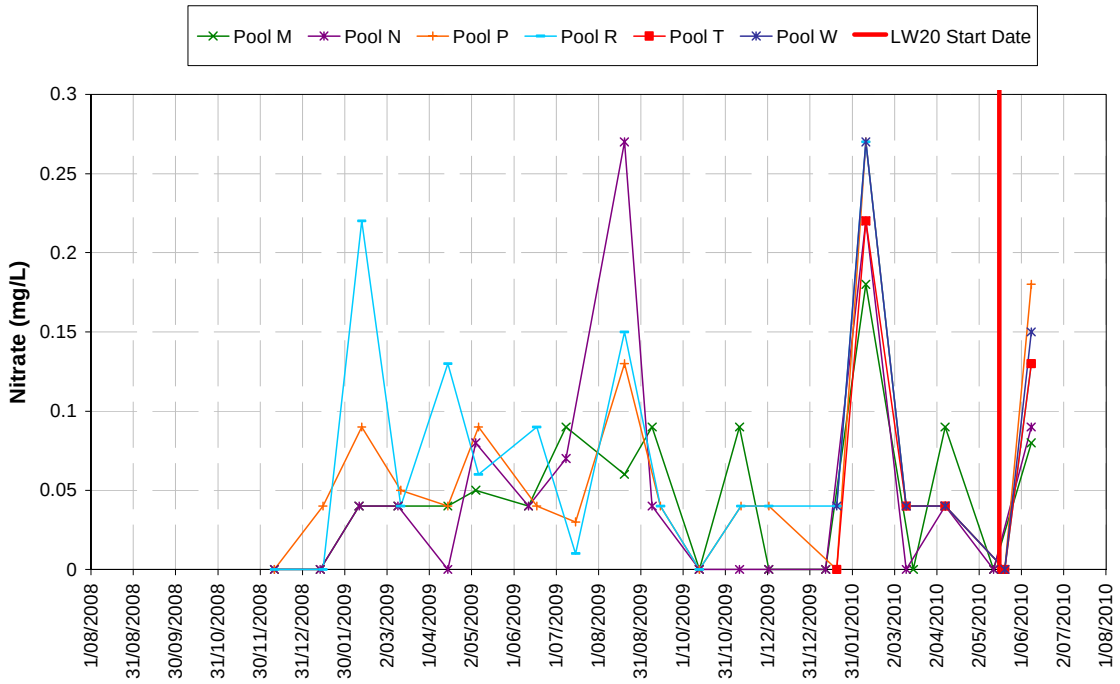

Chart A35 Nitrate (mg/L) Waratah Rivulet Pools

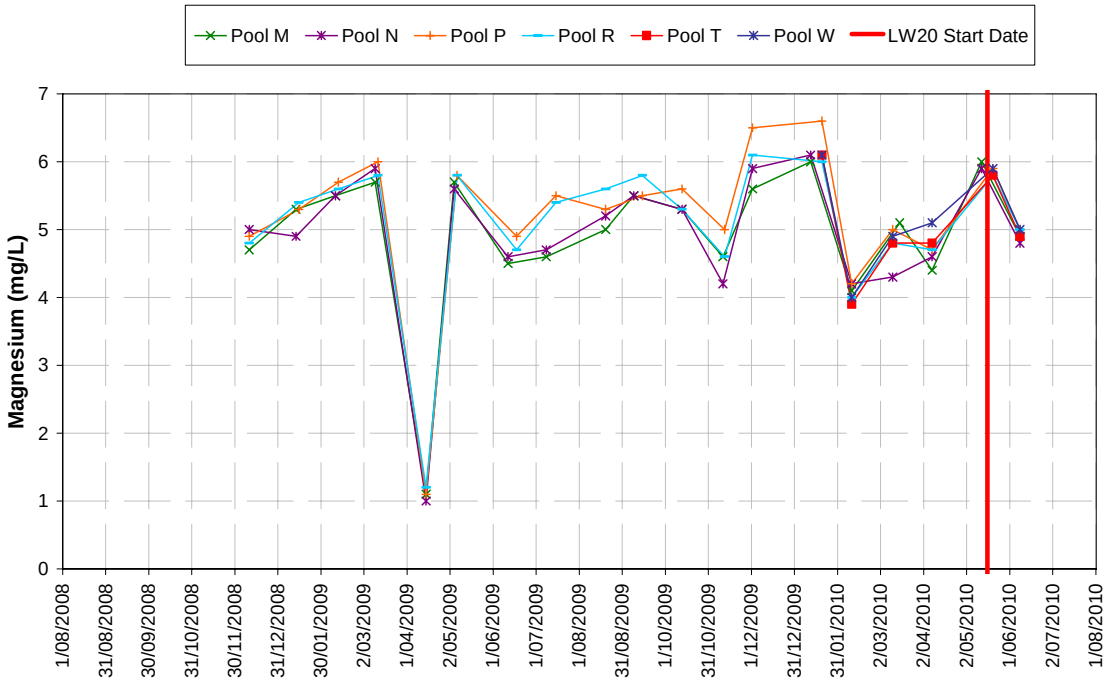

Chart A36 Magnesium (mg/L) Waratah Rivulet Pools

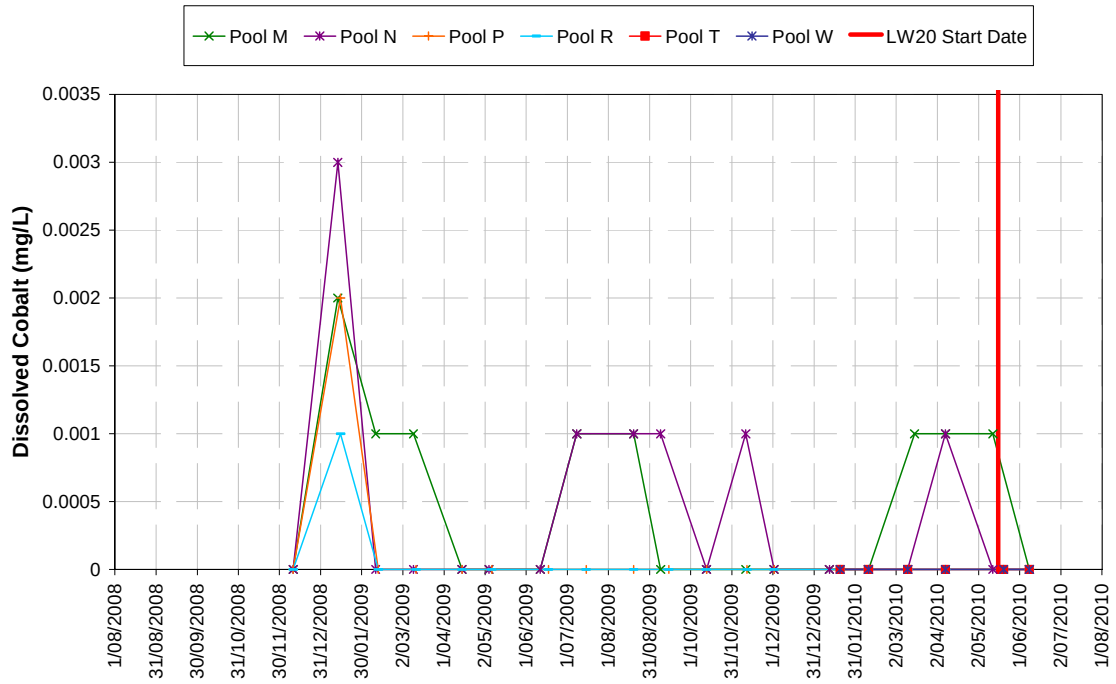

Chart A37 Dissolved Cobalt (mg/L) Waratah Rivulet Pools

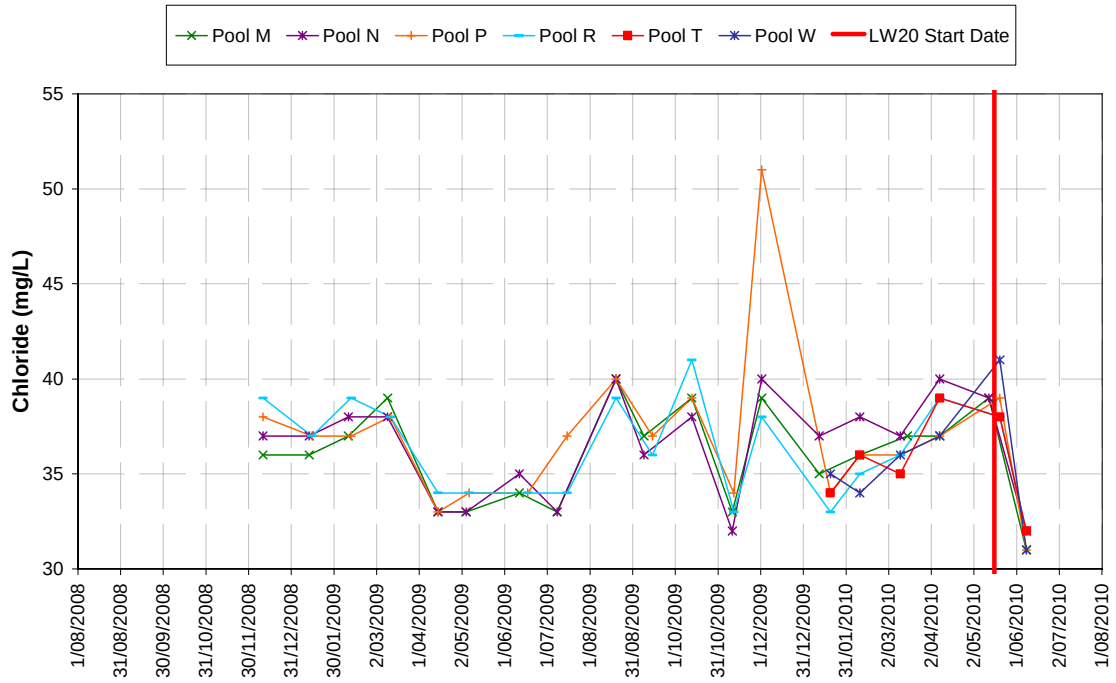

Chart A38 Chlorine (mg/L) Waratah Rivulet Pools

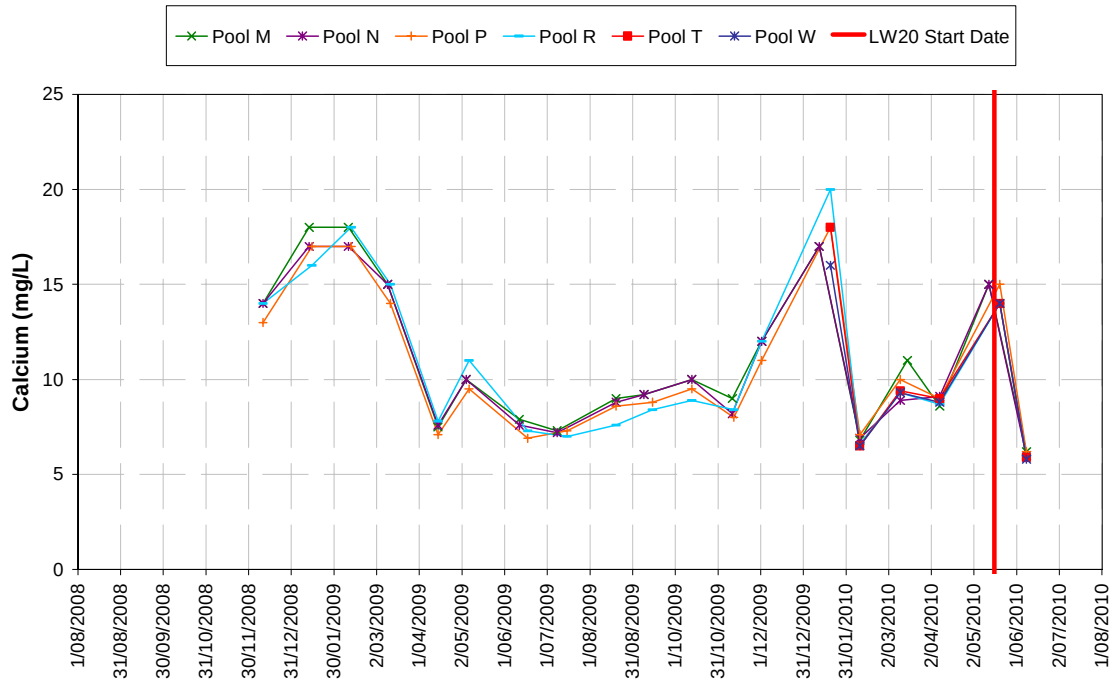

Chart A39 Calcium (mg/L) Waratah Rivulet Pools

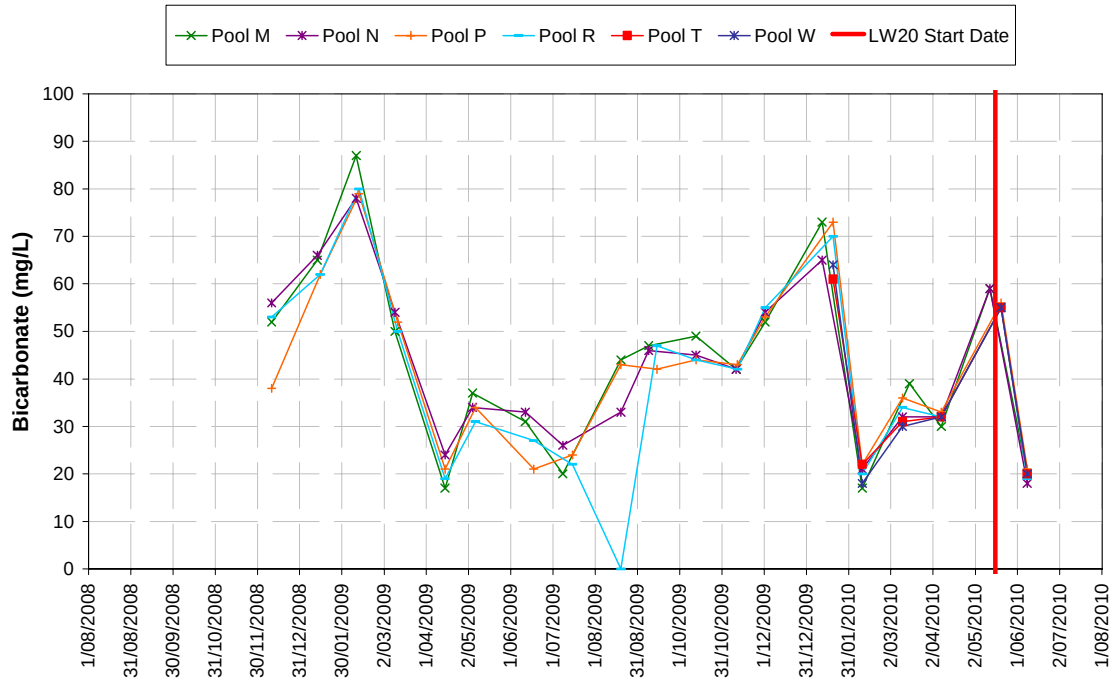

Chart A40 Bicarbonate (mg/L) Waratah Rivulet Pools

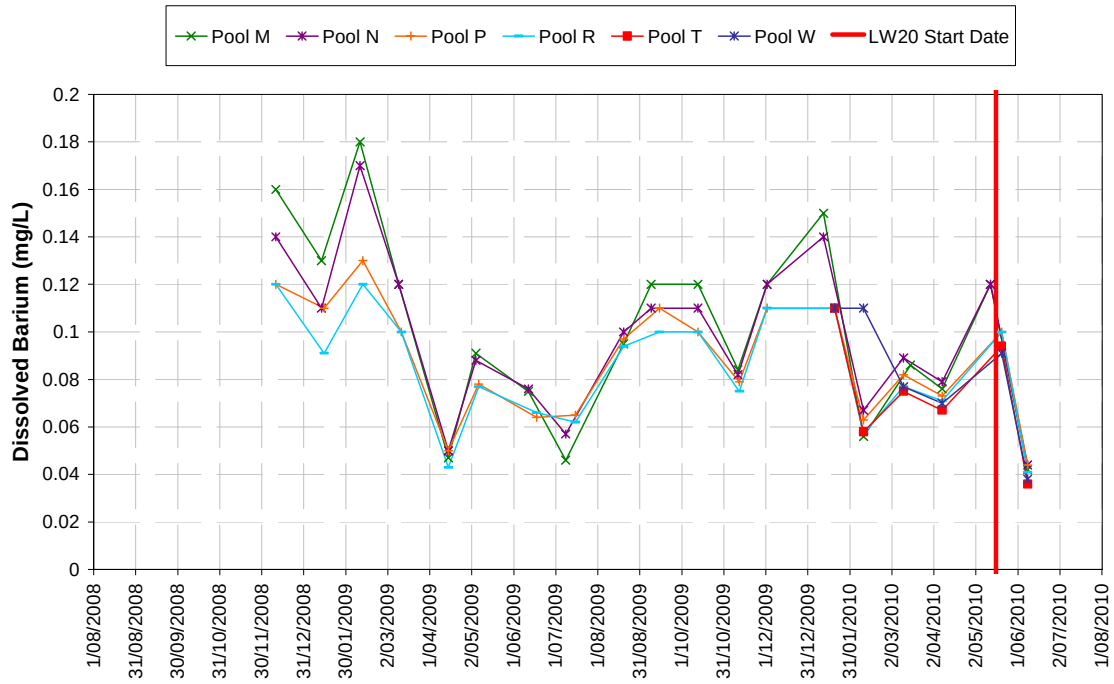

Chart A41 Dissolved Barium (mg/L) Waratah Rivulet Pools

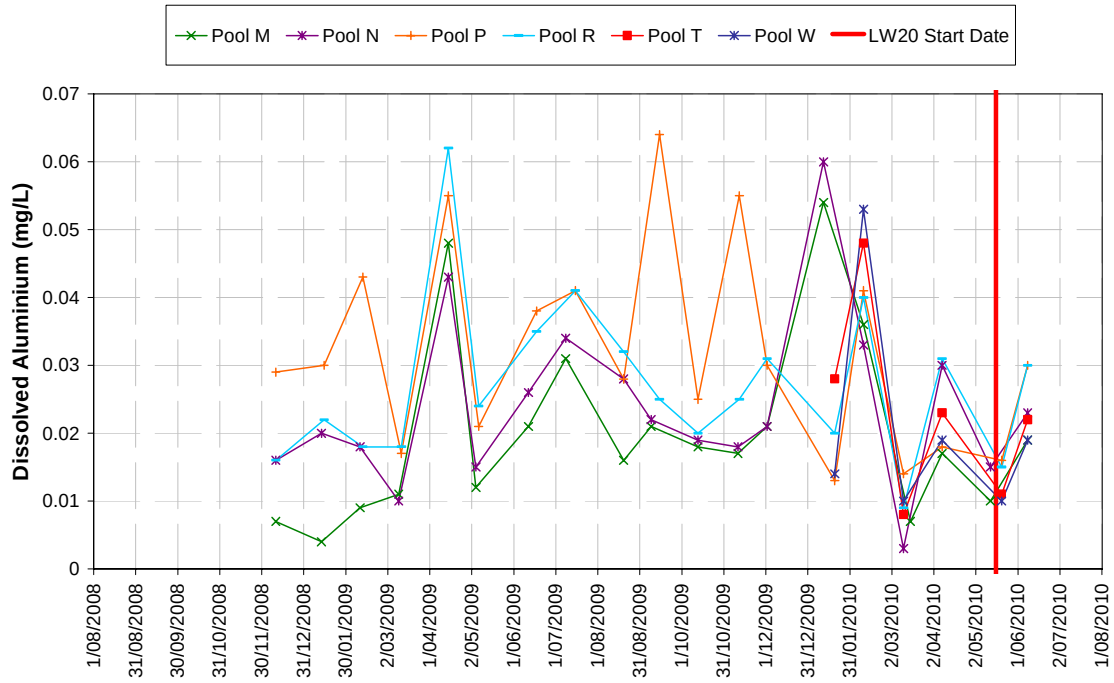

Chart A42 Dissolved Aluminium (mg/L) Waratah Rivulet Pools

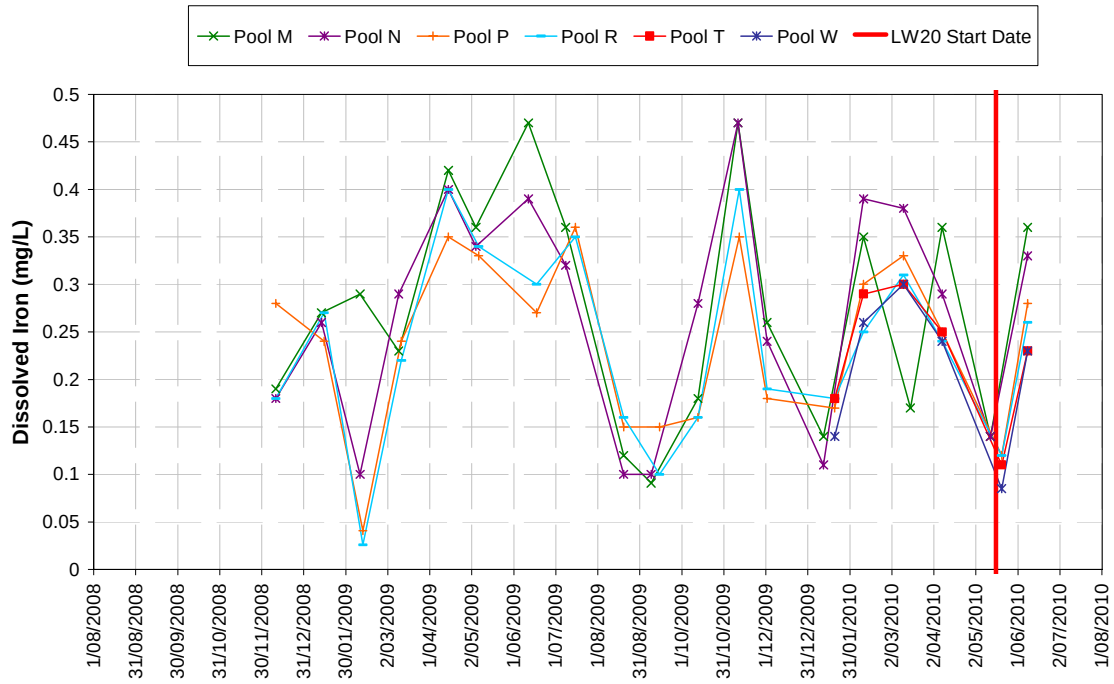

Chart A43 Dissolved Iron (mg/L) Waratah Rivulet Pools

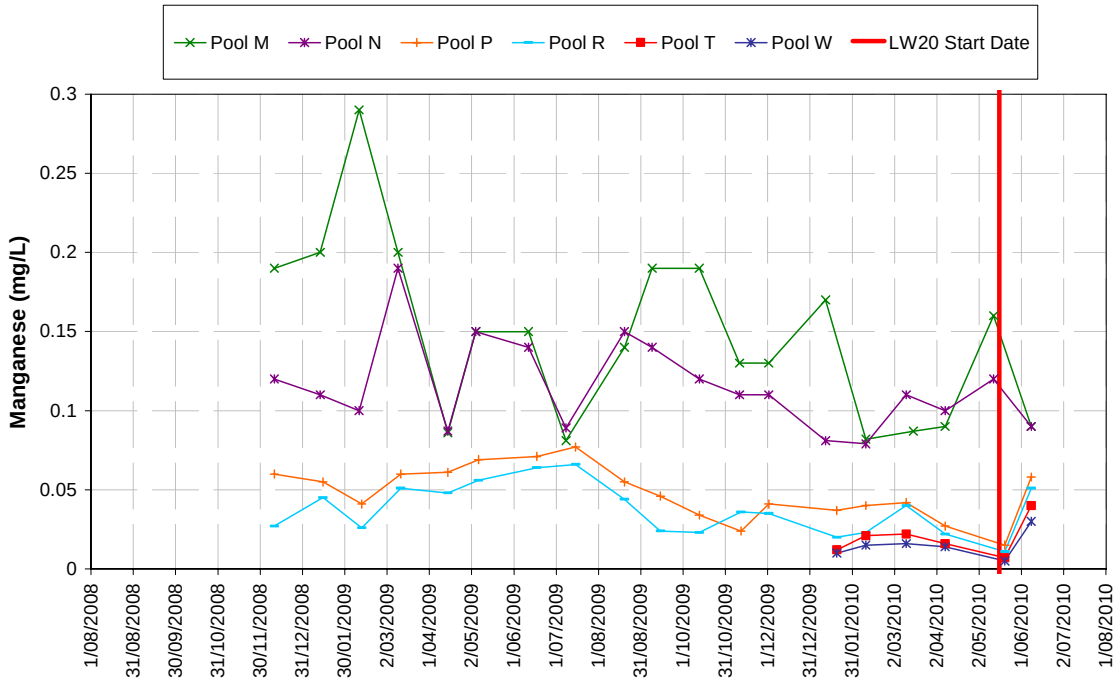

Chart A44 Manganese (mg/L) Waratah Rivulet Pools

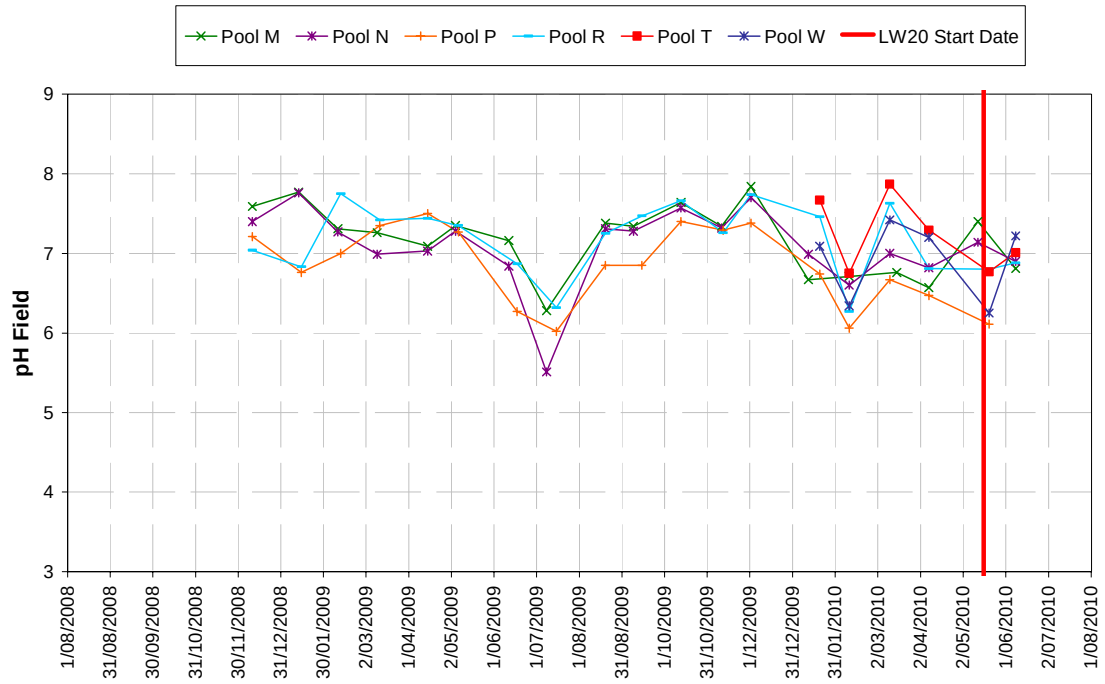

Chart A45 pH (Field) Waratah Rivulet Pools

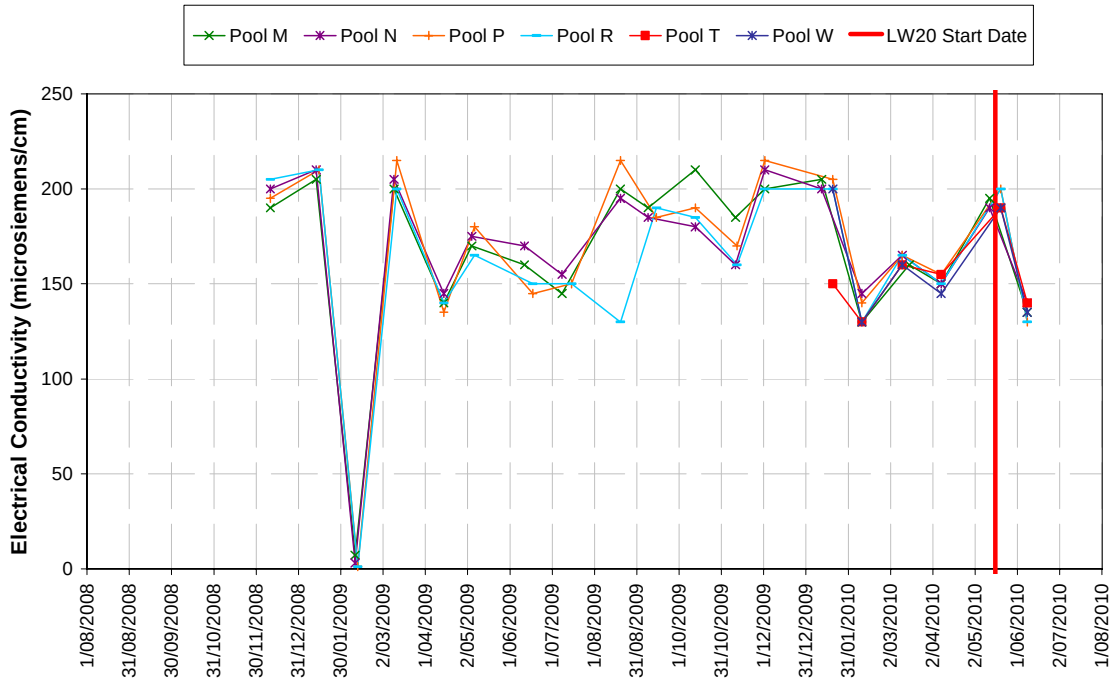

Chart A46 Electrical Conductivity (microSeimens/cm) - Waratah Rivulet Pools

Graphical Plots of Water Quality Monitoring Results for Eastern Tributary

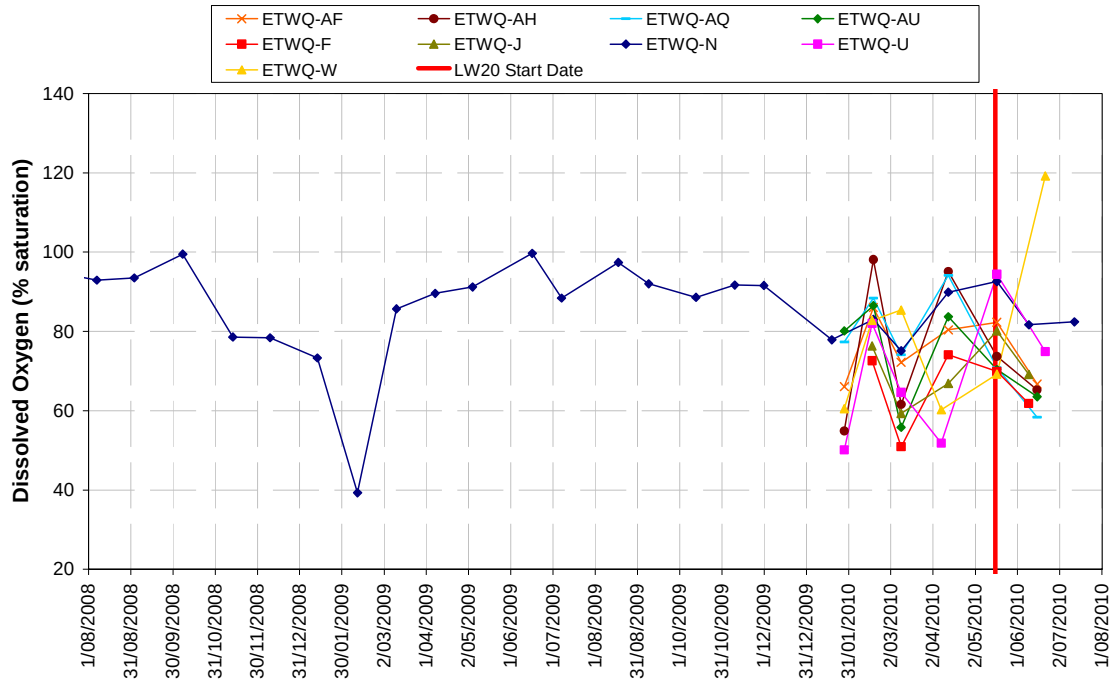

Chart A47 **Dissolved Oxygen (% Saturation) Eastern Tributary**

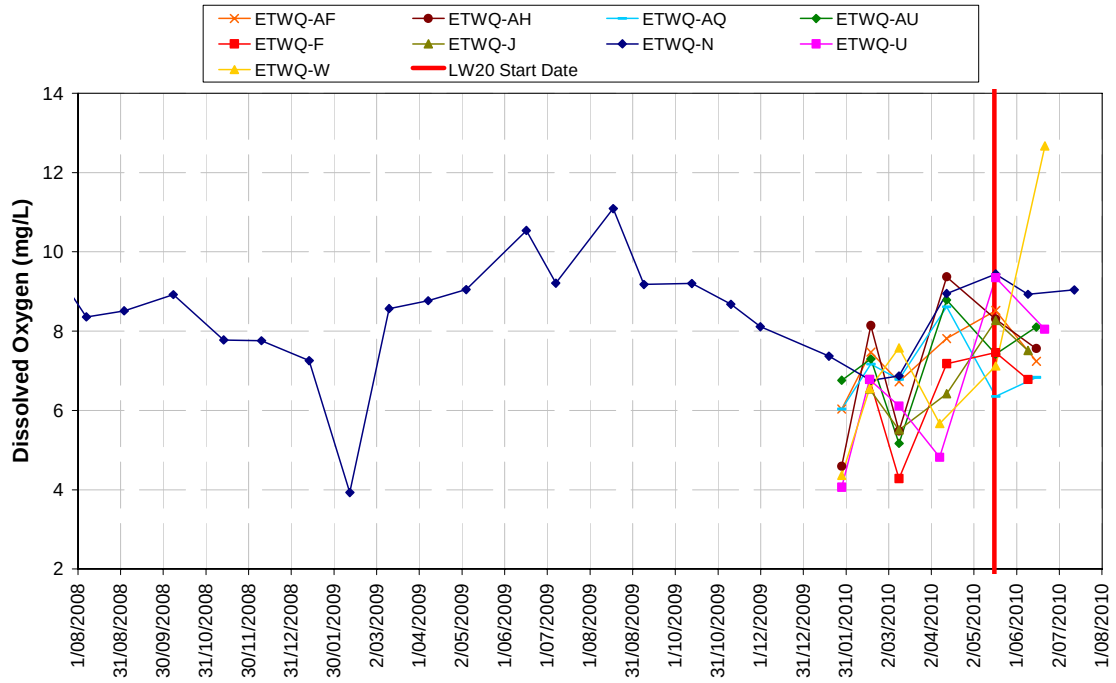

Chart A48 **Dissolved Oxygen (mg/L) Eastern Tributary**

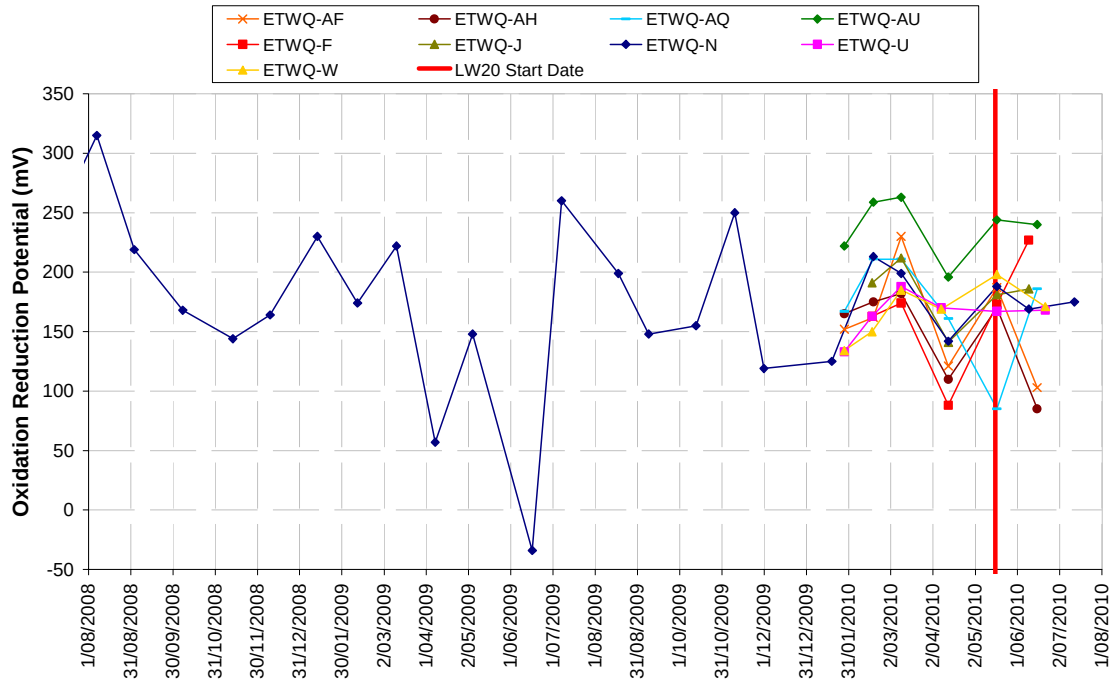

Chart A49 Oxidation Reduction Potential (mV) Eastern Tributary

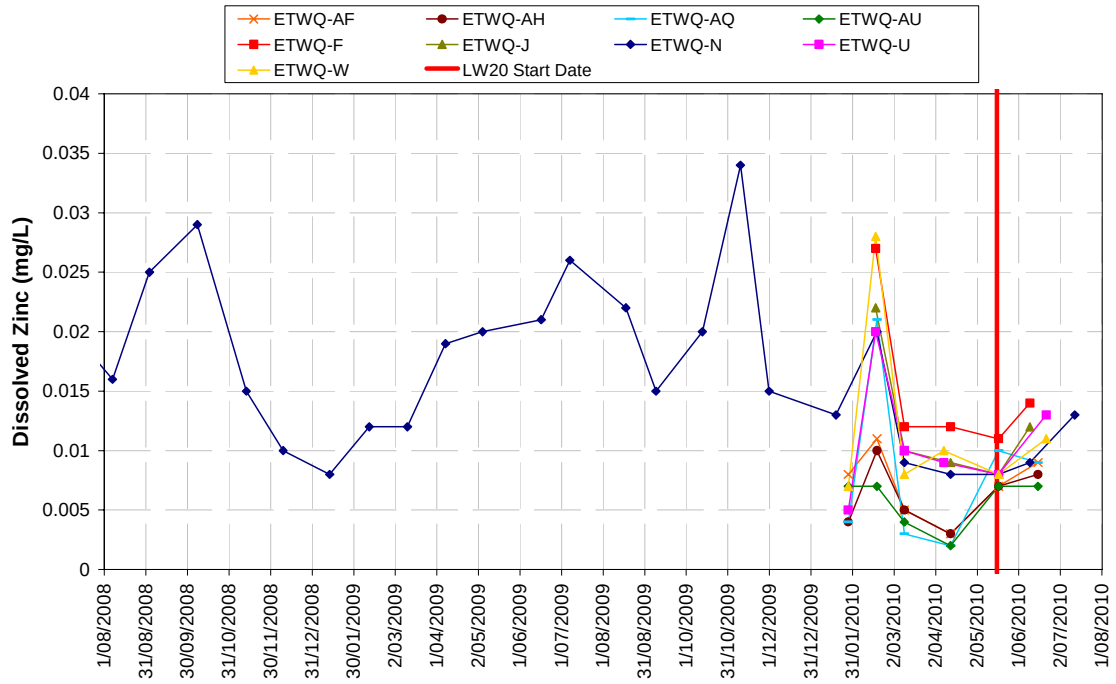

Chart A50 Dissolved Zinc (mg/L) Eastern Tributary

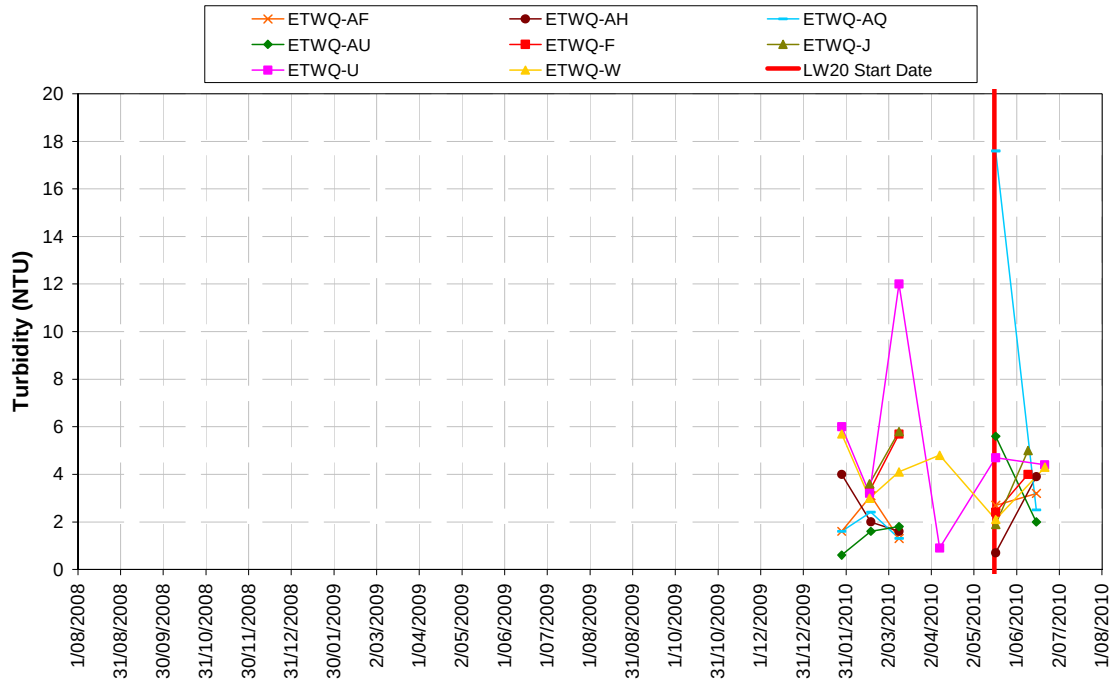

Chart A51 Turbidity (NTU Field) Eastern Tributary

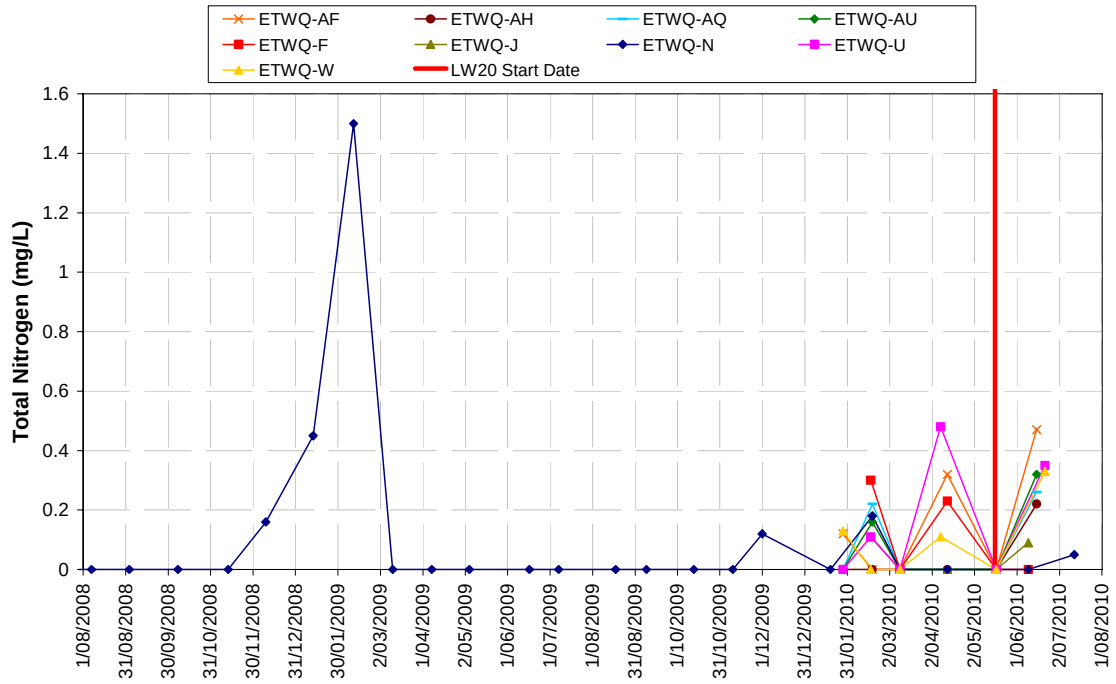

Chart A52 Total Nitrogen (mg/L) Eastern Tributary

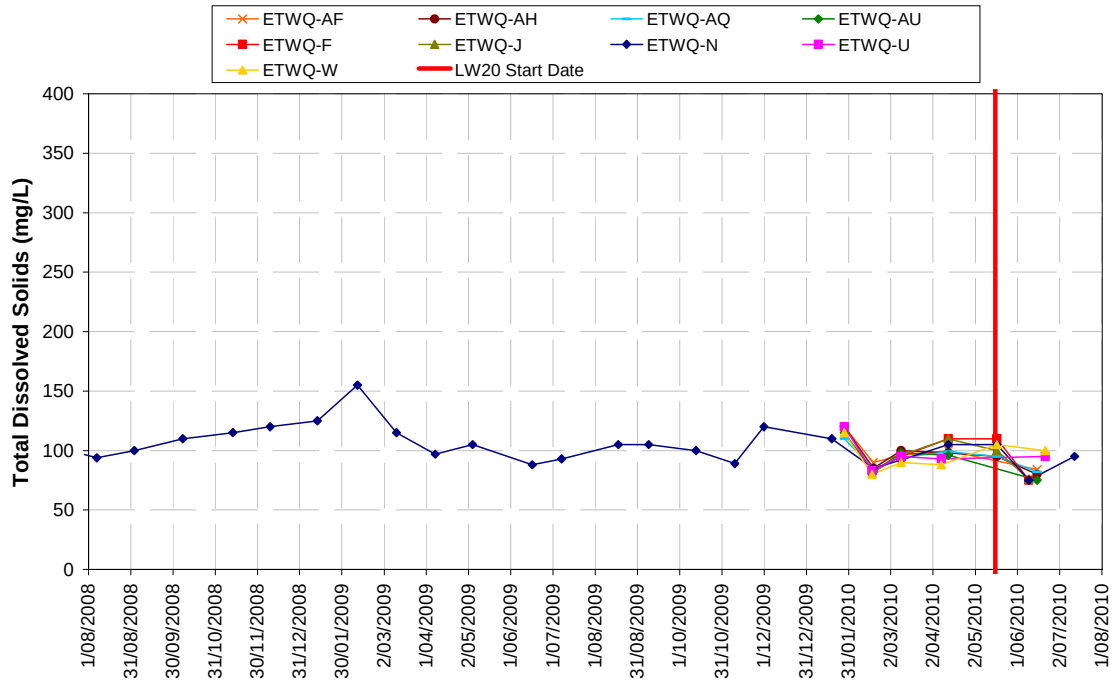

Chart A53 **Total Dissolved Solids (mg/L) Eastern Tributary**

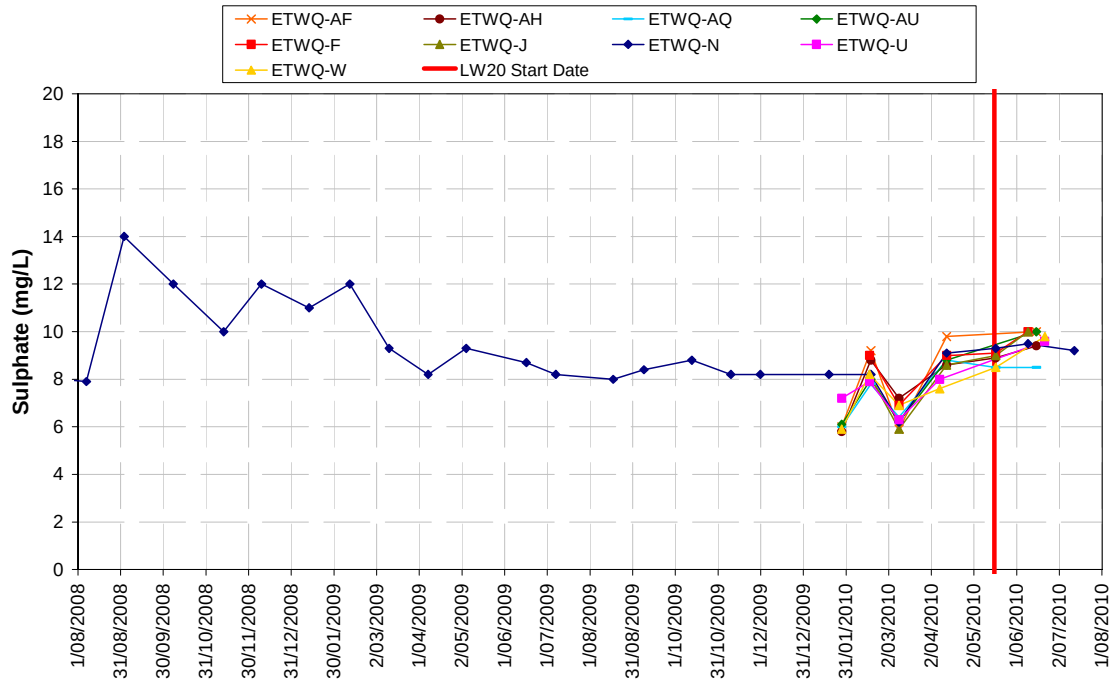

Chart A54 **Sulphate (mg/L) Eastern Tributary**

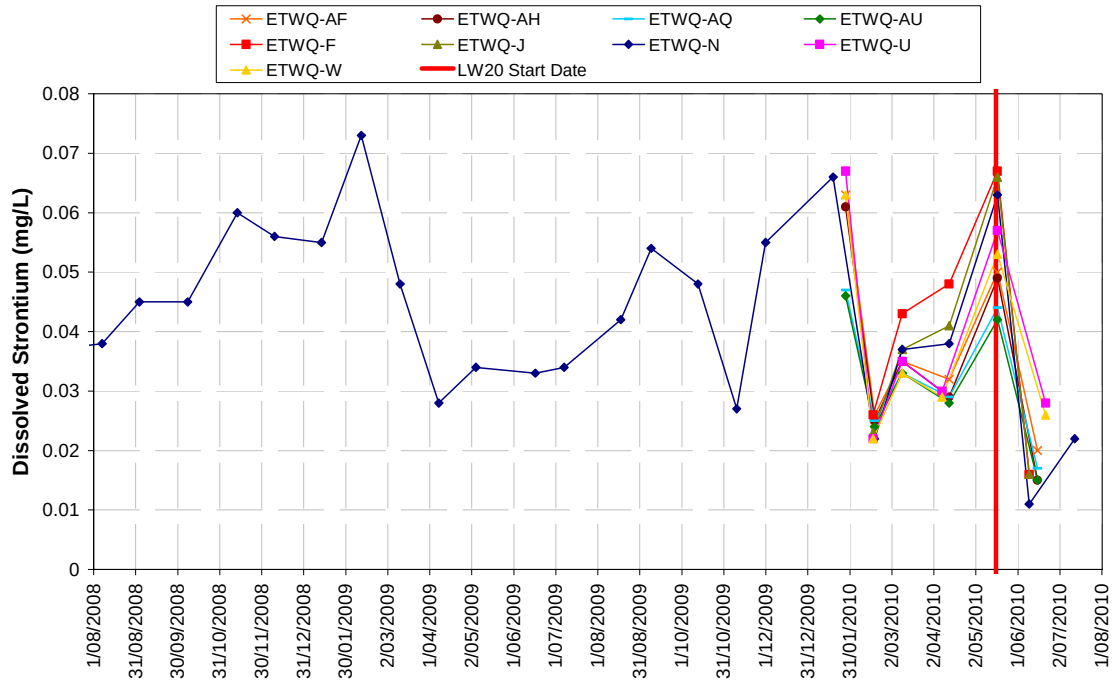

Chart A55 Dissolved Strontium (mg/L) Eastern Tributary

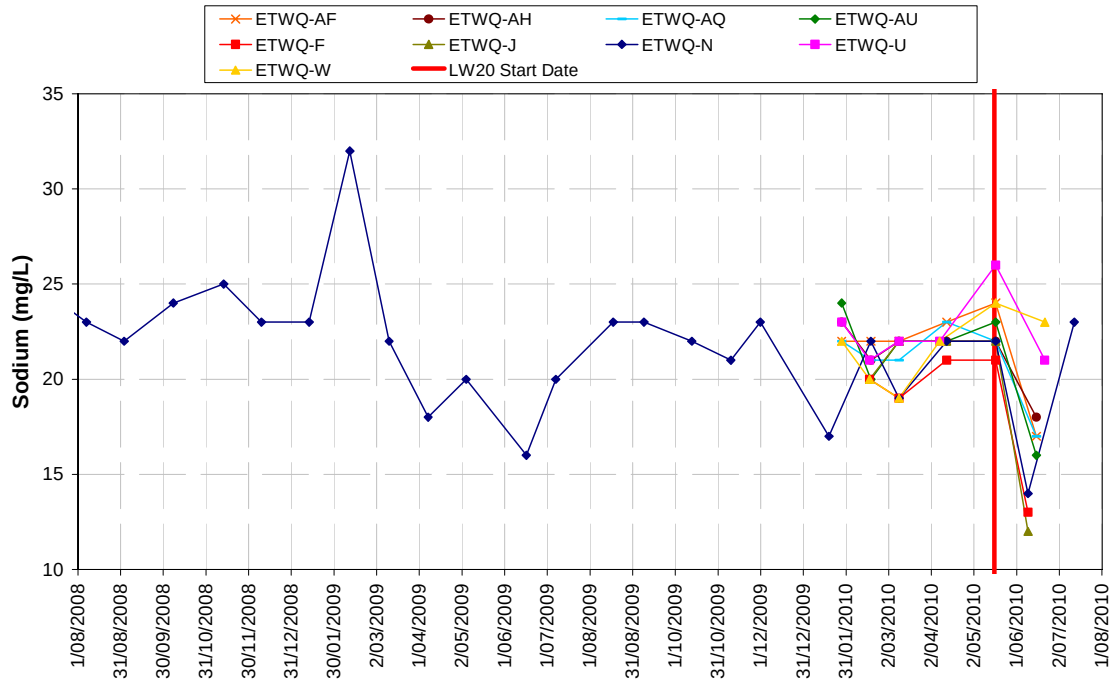

Chart A56 Sodium (mg/L) Eastern Tributary

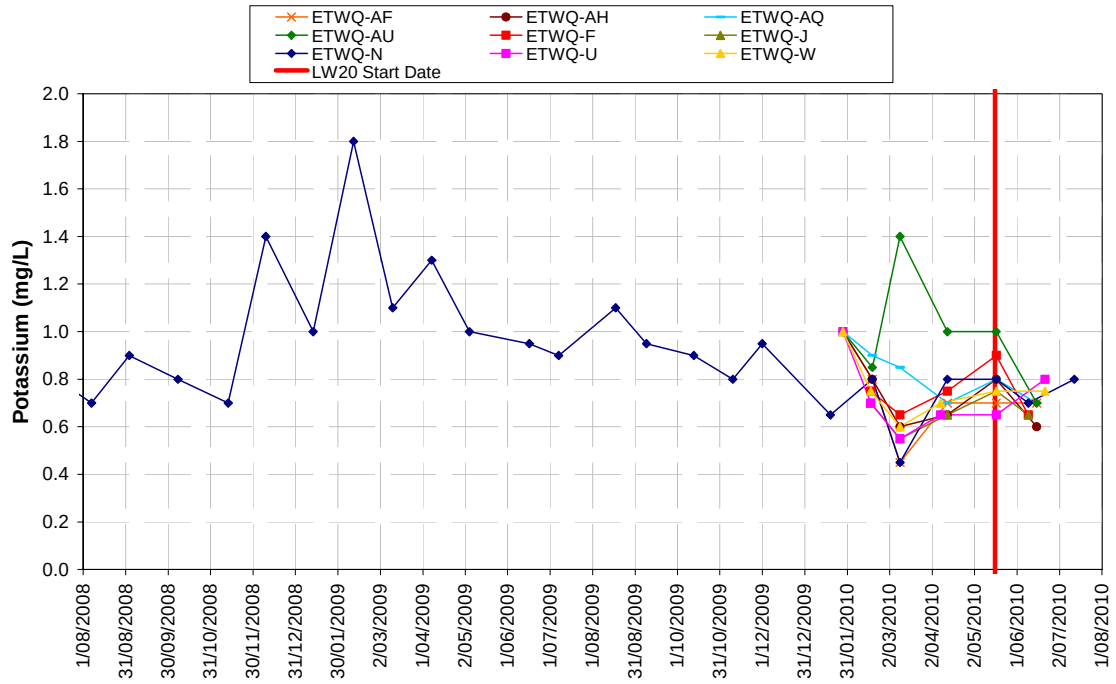

Chart A57 **Potassium (mg/L) Eastern Tributary**

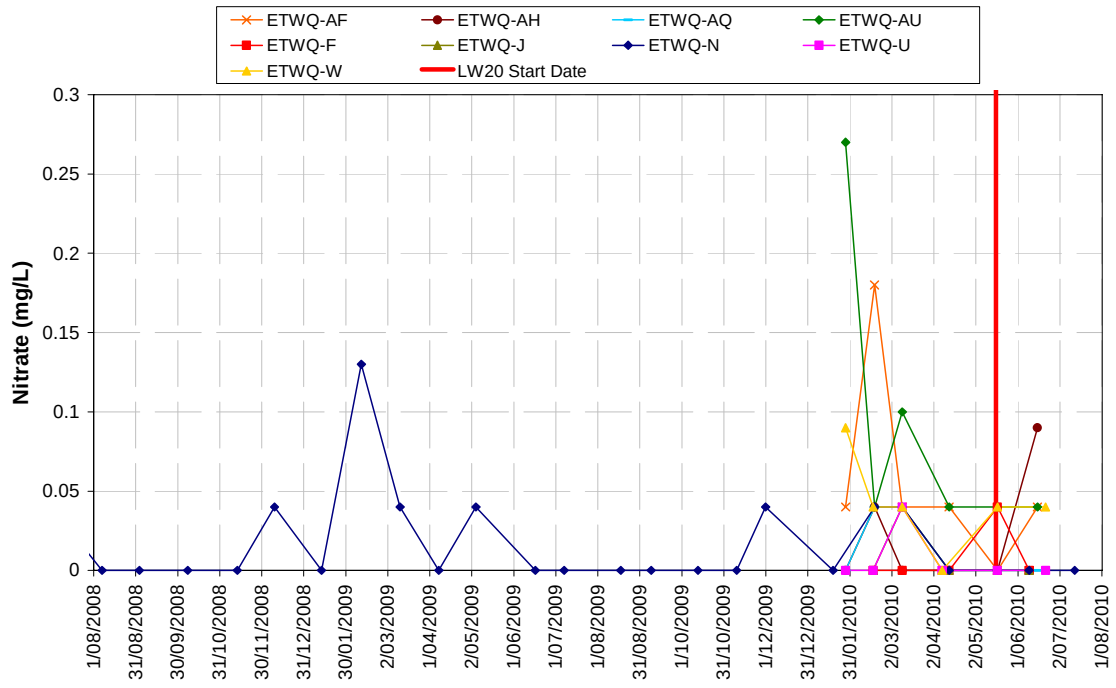

Chart A58 **Nitrate (mg/L) Eastern Tributary**

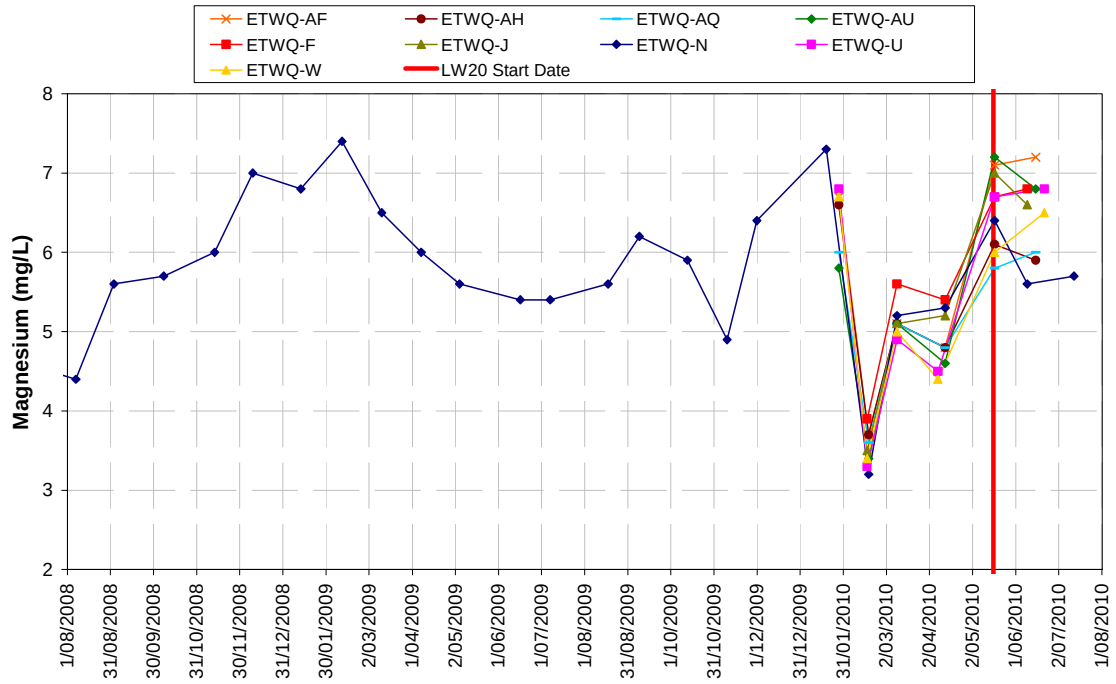

Chart A59 Magnesium (mg/L) Eastern Tributary

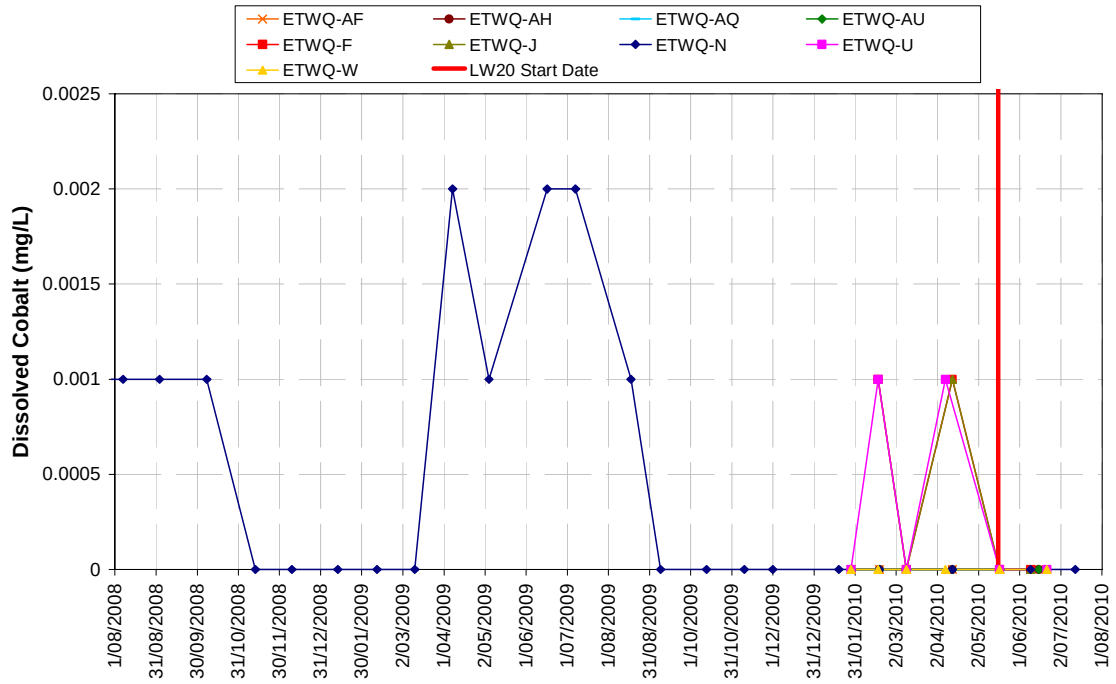

Chart A60 Dissolved Cobalt (mg/L) Eastern Tributary

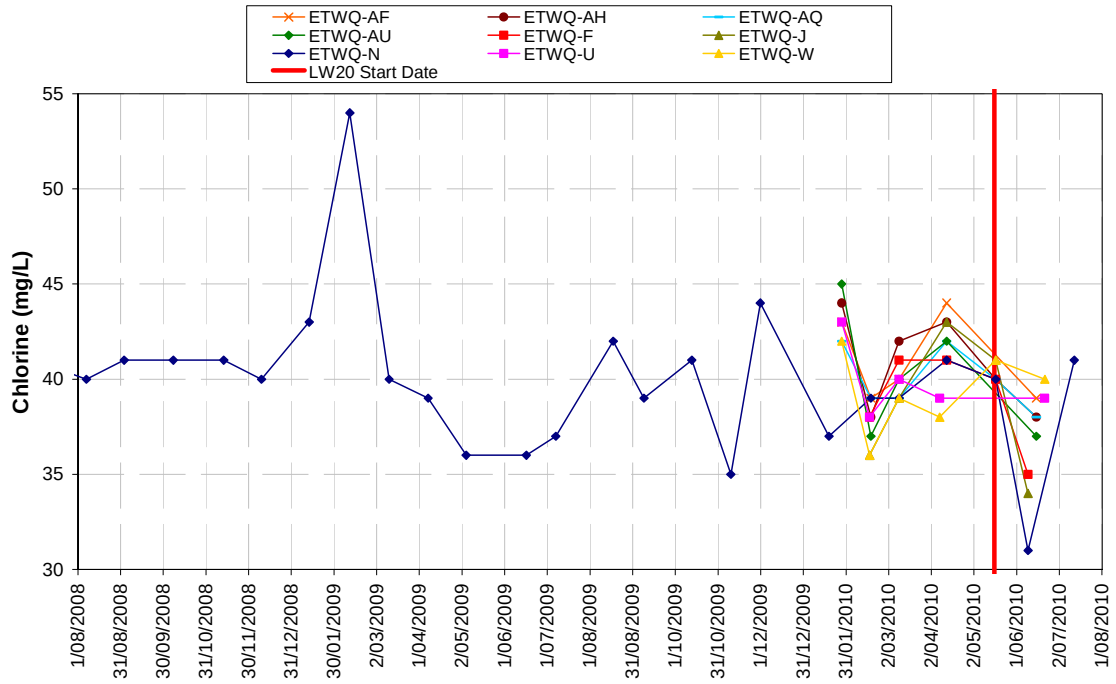

Chart A61 Chlorine (mg/L) Eastern Tributary

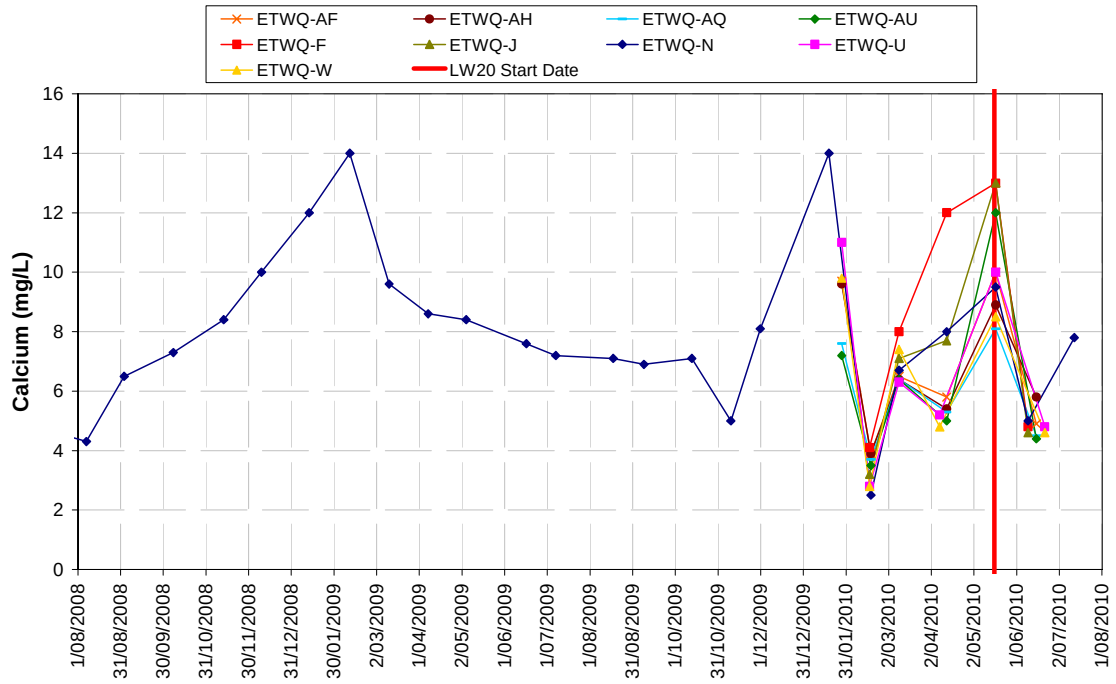

Chart A62 Calcium (mg/L) Eastern Tributary

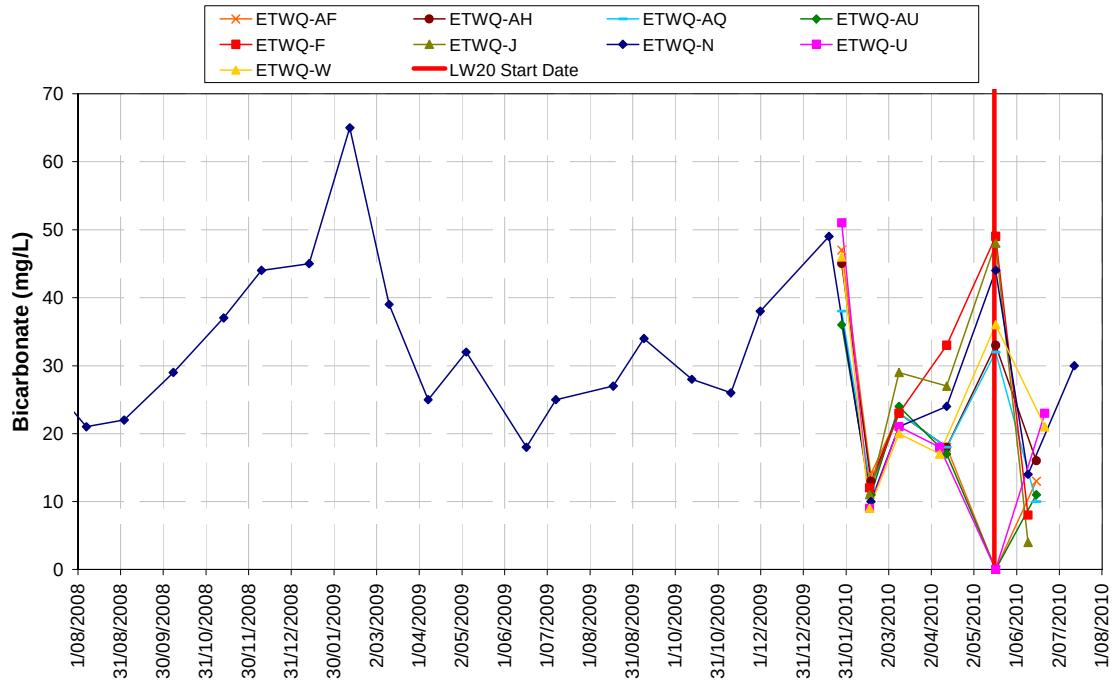

Chart A63 Bicarbonate (mg/L) Eastern Tributary

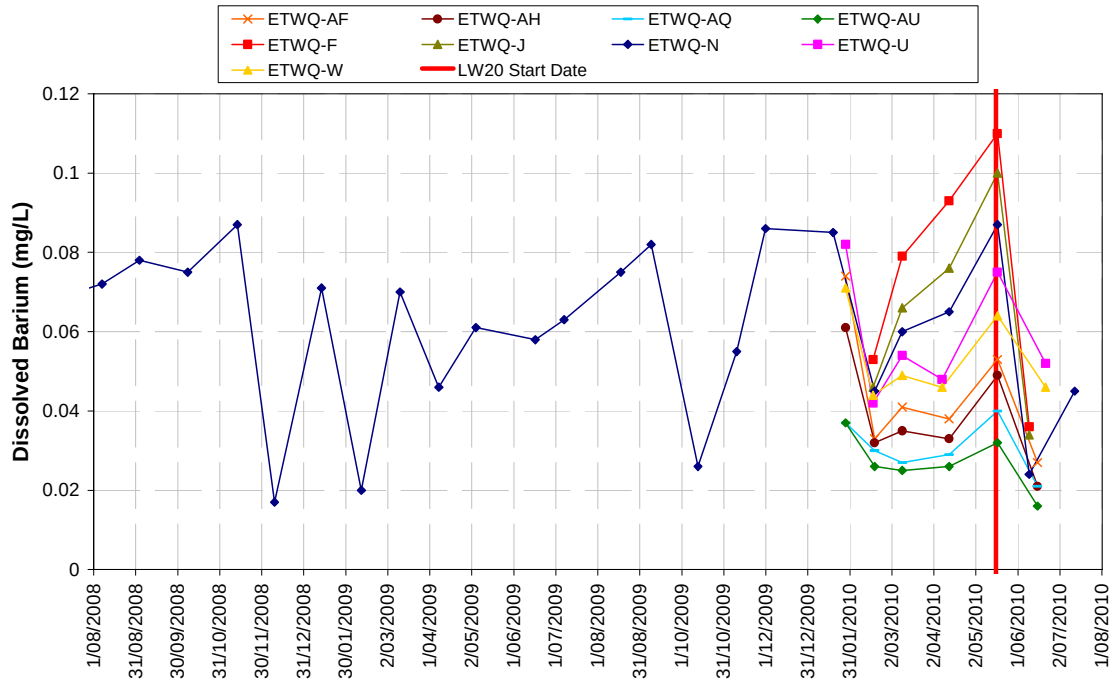

Chart A64 Dissolved Barium (mg/L) Eastern Tributary

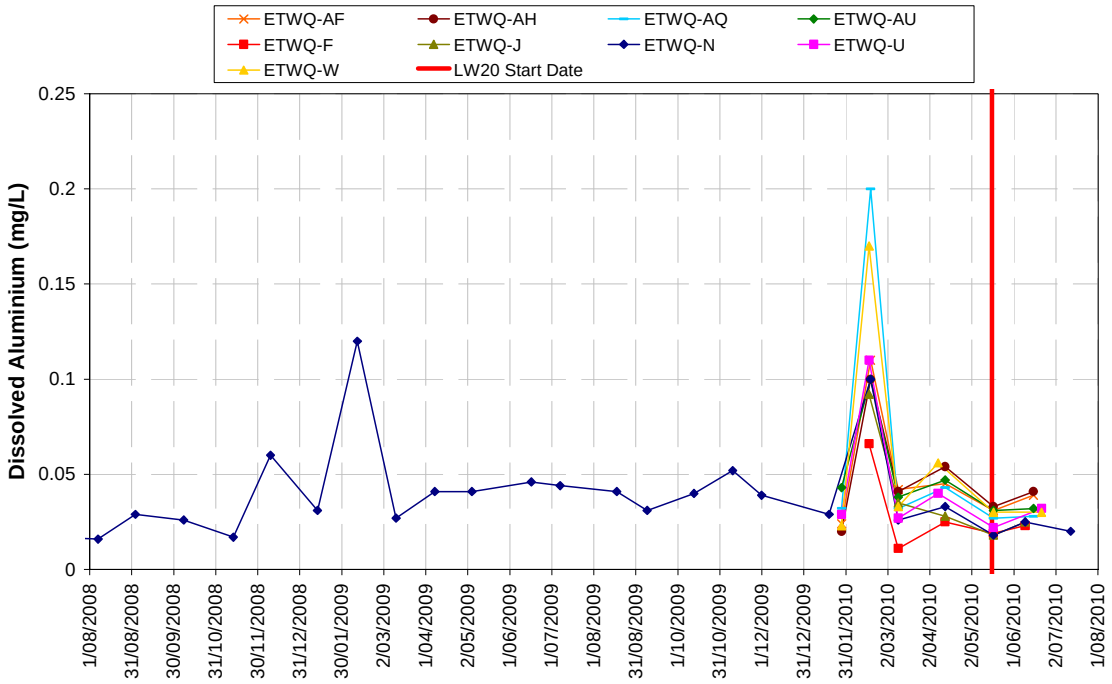

Chart A65 **Dissolved Aluminium (mg/L) Eastern Tributary**

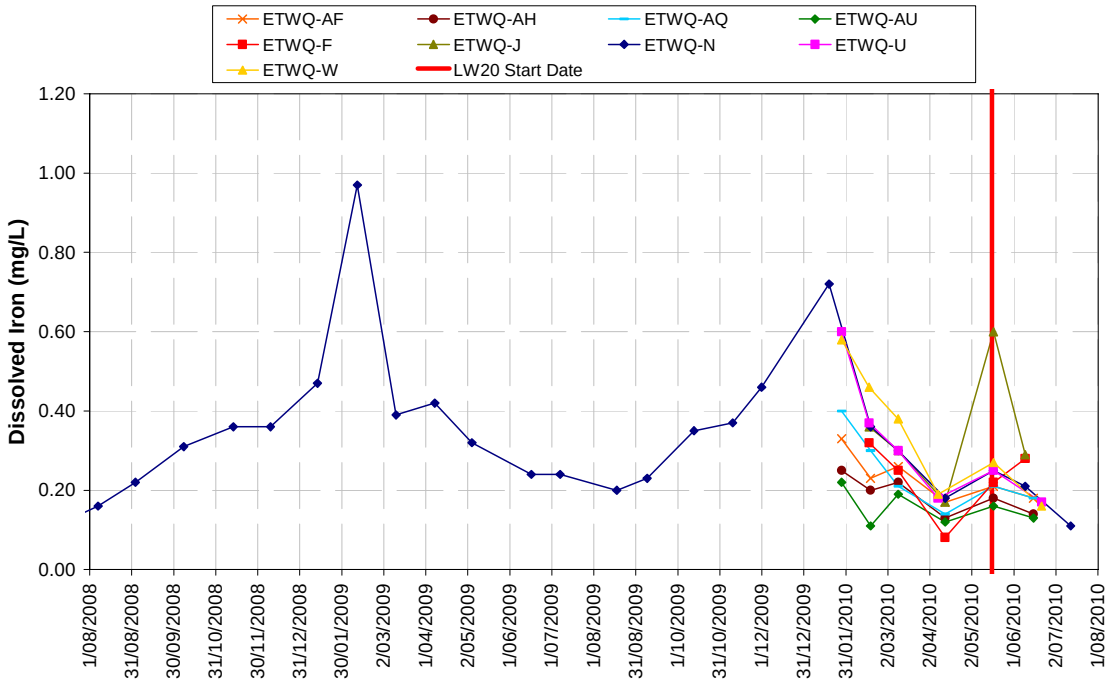

Chart A66 **Dissolved Iron (mg/L) Eastern Tributary**

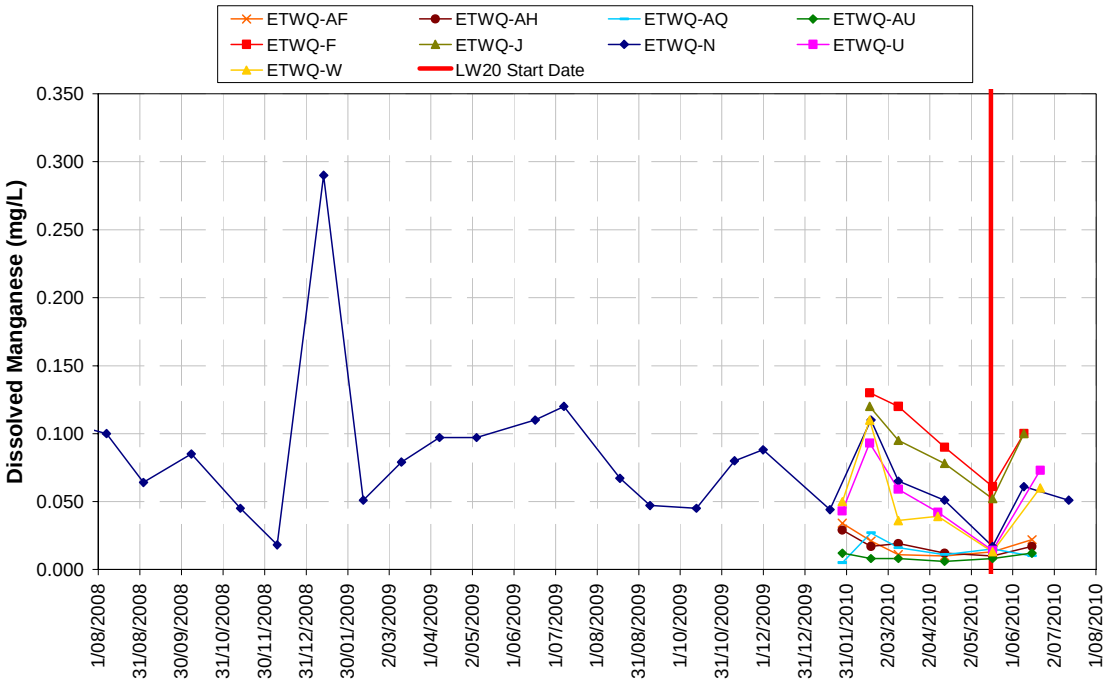

Chart A67 **Dissolved Manganese (mg/L) Eastern Tributary**

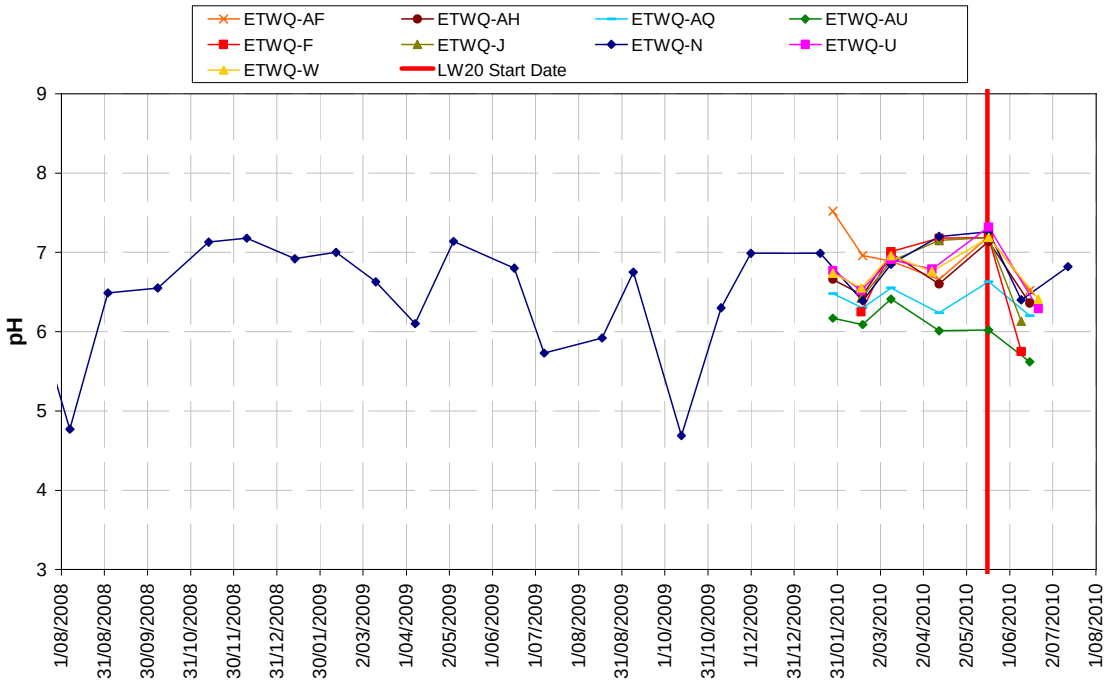

Chart A68 **pH (Field) Eastern Tributary**

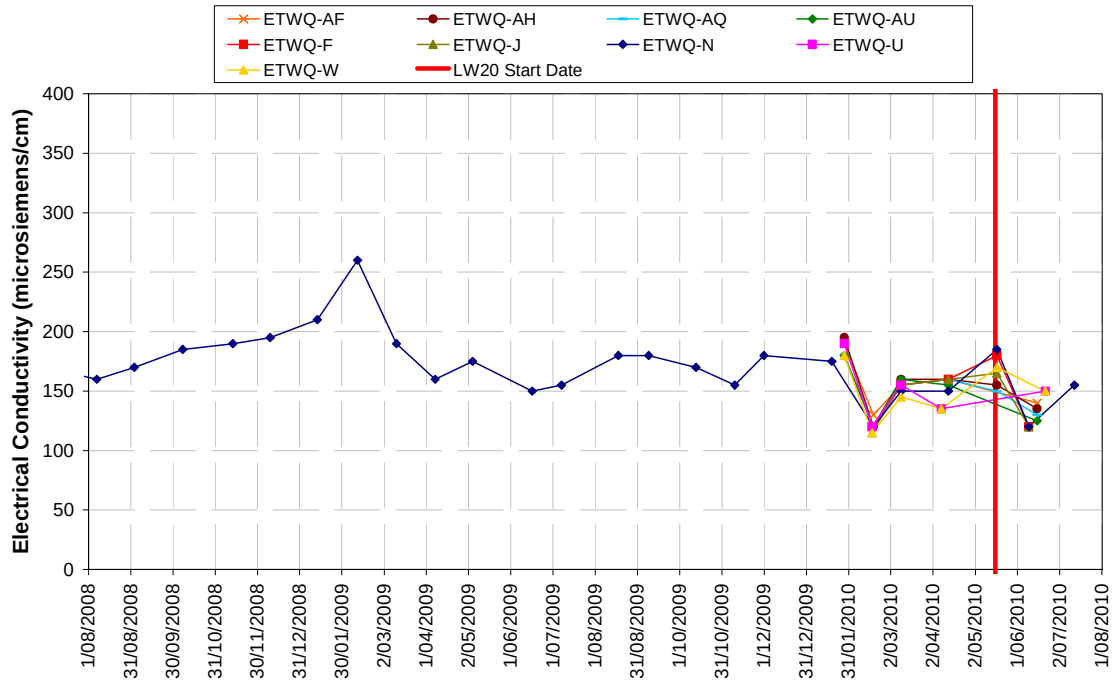

Chart A69 Electrical Conductivity (µSiemens/cm) Eastern Tributary

Graphical Plots of Water Quality Monitoring Results for Woronora River

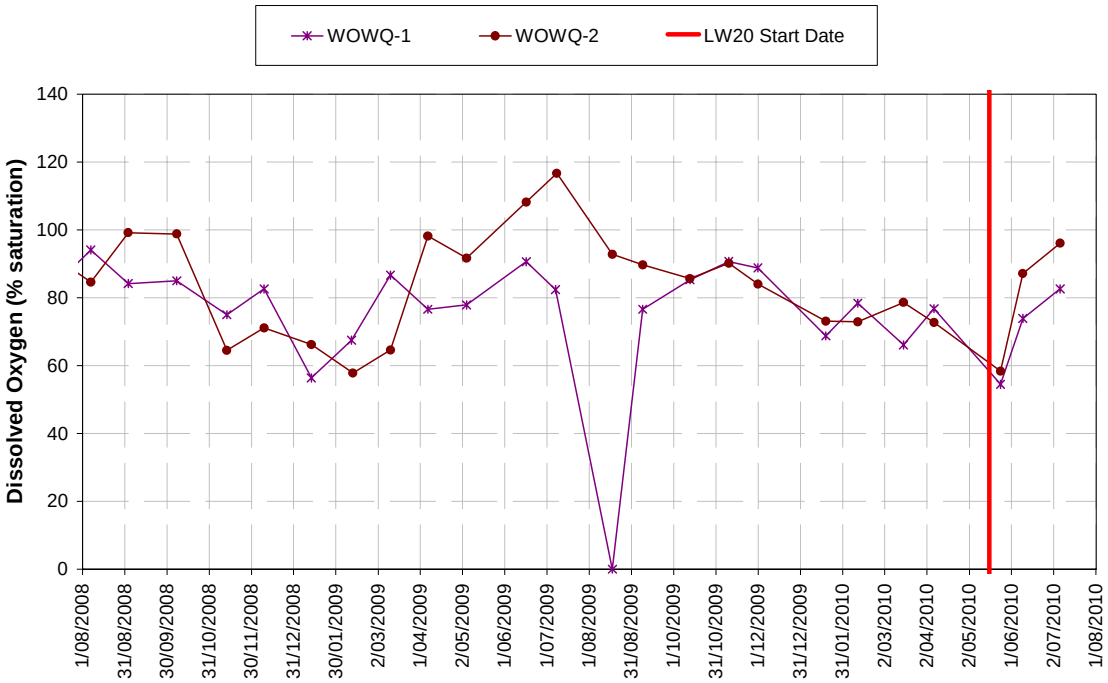

Chart A70 **Dissolved Oxygen (% Saturation) Woronora River**

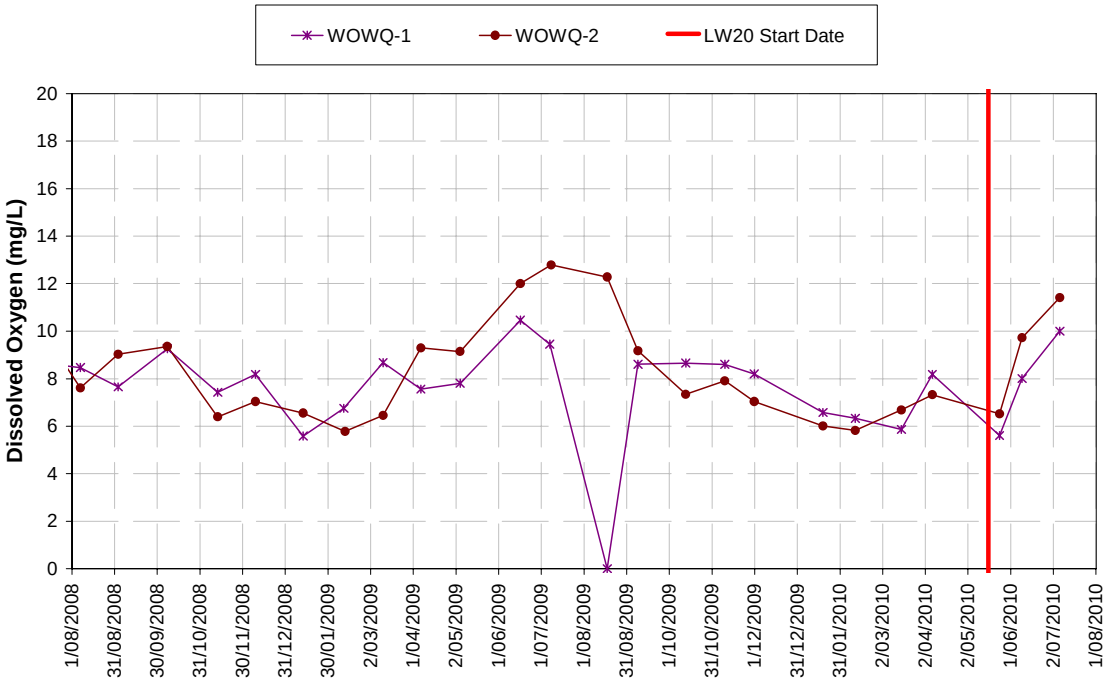

Chart A71 **Dissolved Oxygen (mg/L) Woronora River**

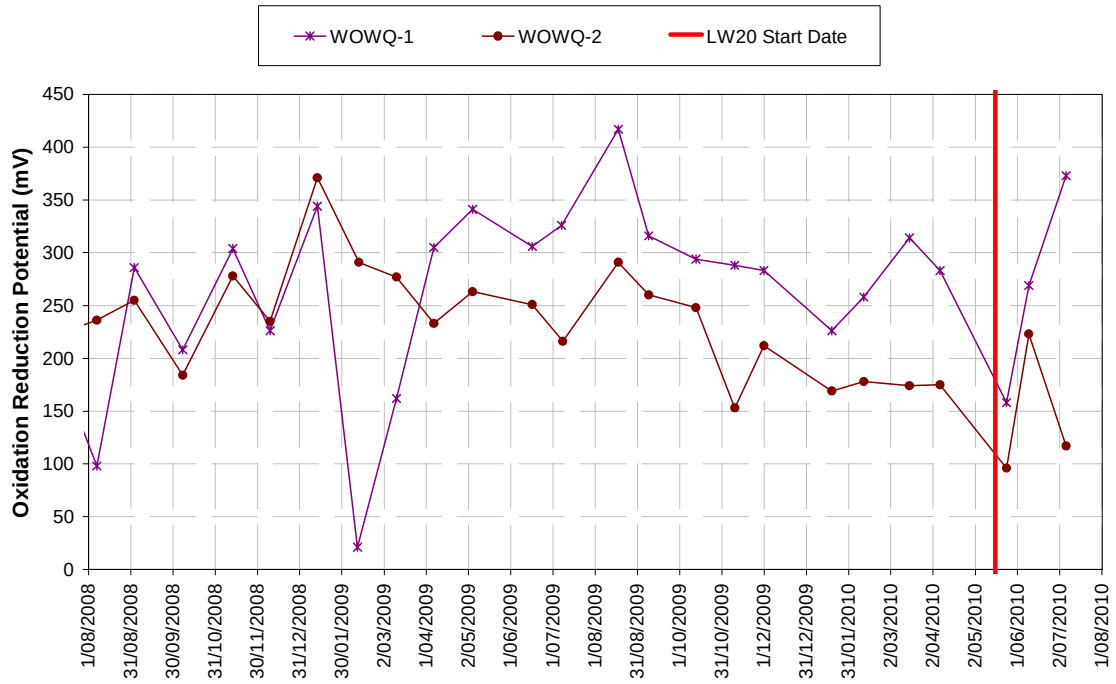

Chart A72 Oxidation Reduction Potential (mV) Woronora River

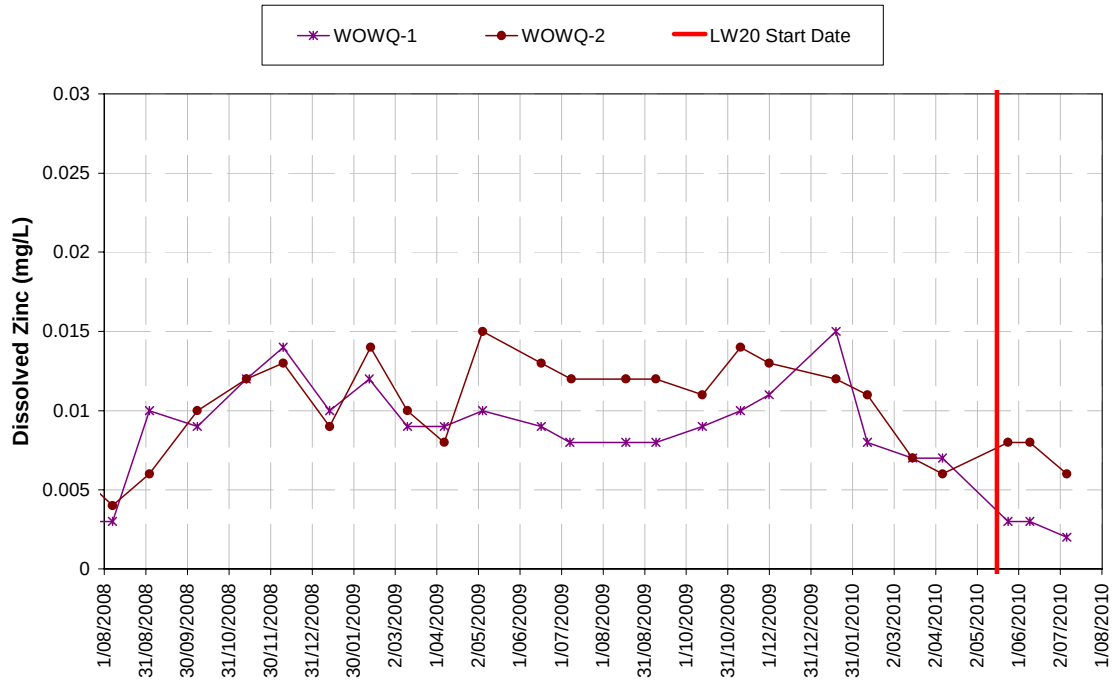

Chart A73 Dissolved Zinc (mg/L) Woronora River

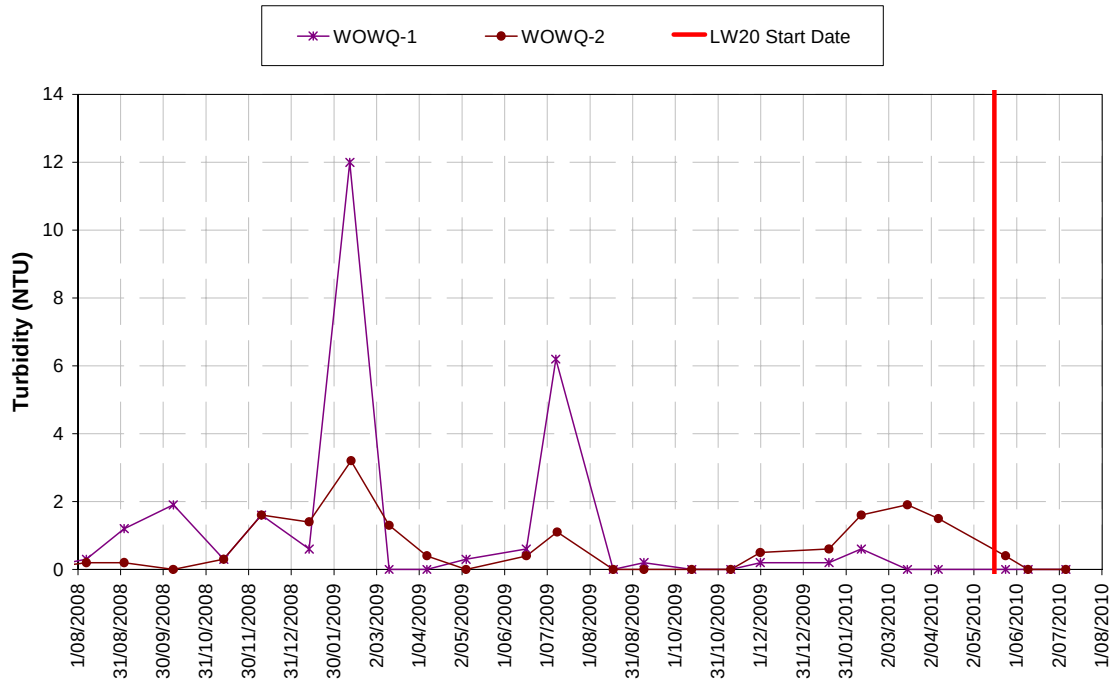

Chart A74 Turbidity (NTU Field) Woronora River

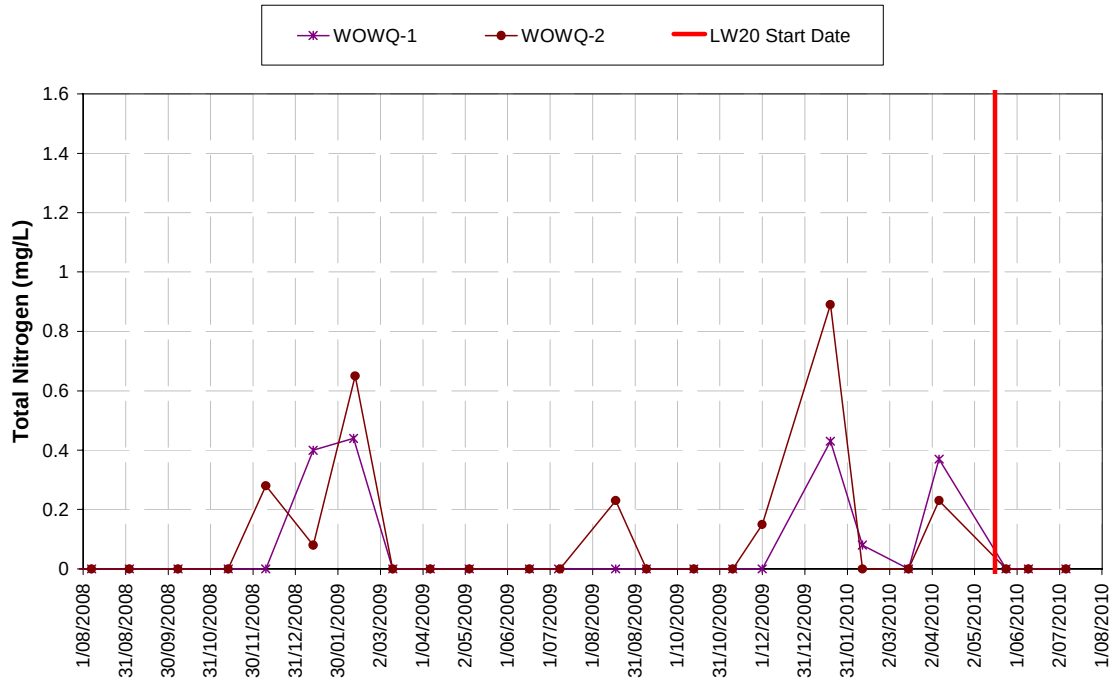

Chart A75 Total Nitrogen (mg/L) Woronora River

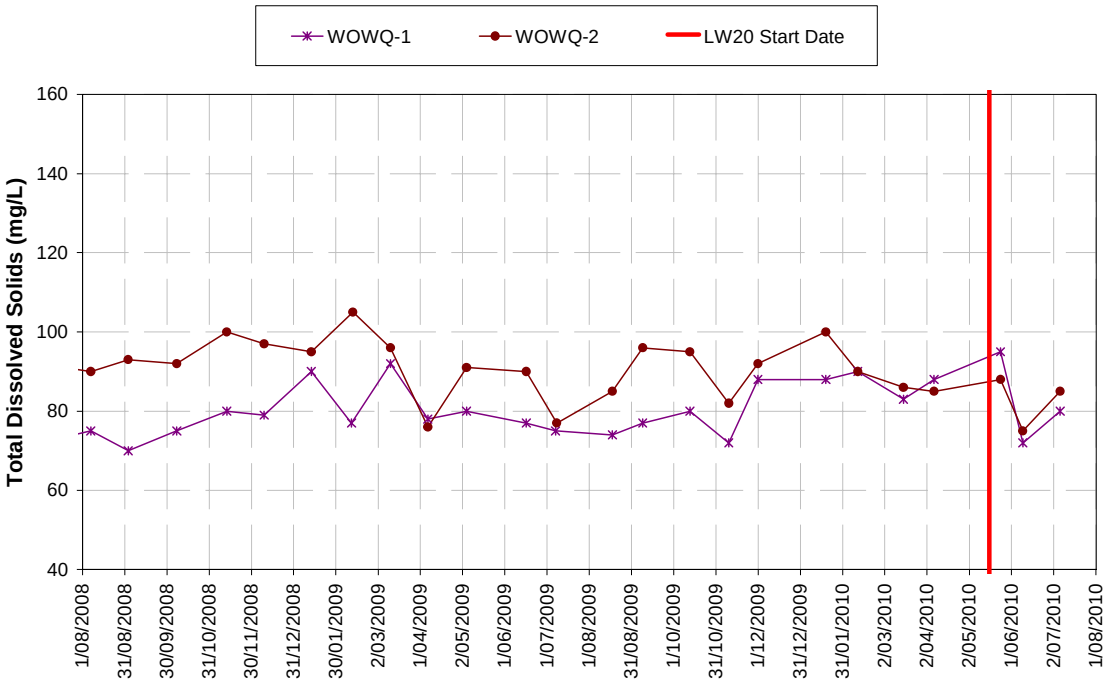

Chart A76 Total Dissolved Solids (mg/L) Woronora River

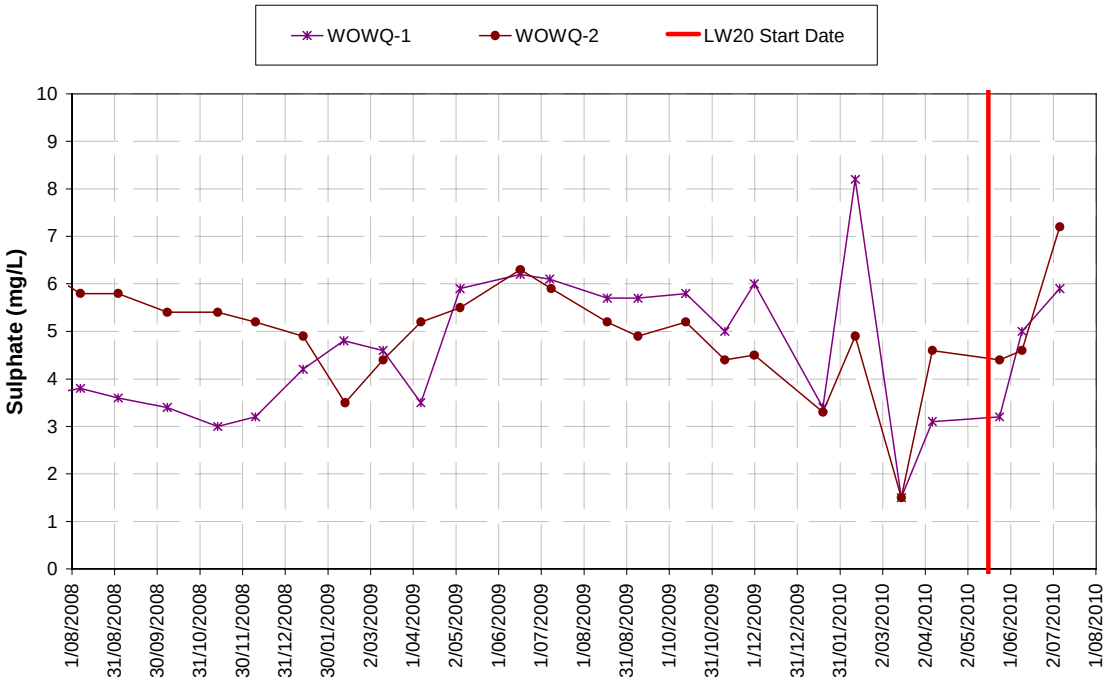

Chart A77 Sulphate (mg/L) Woronora River

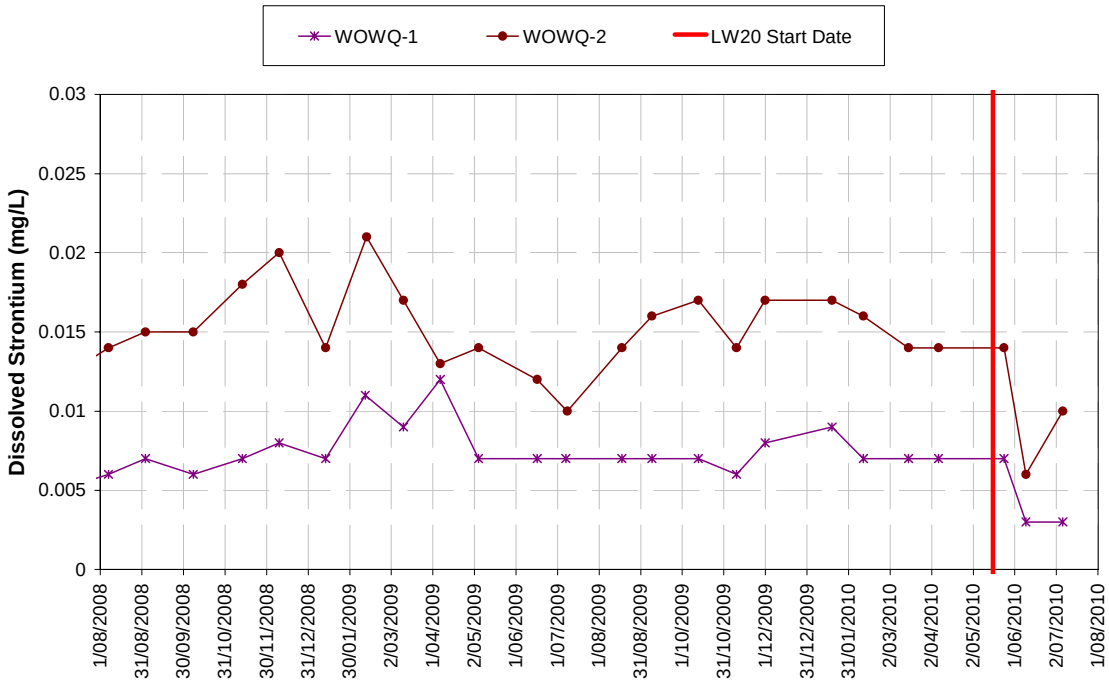

Chart A78 Dissolved Strontium (mg/L) Woronora River

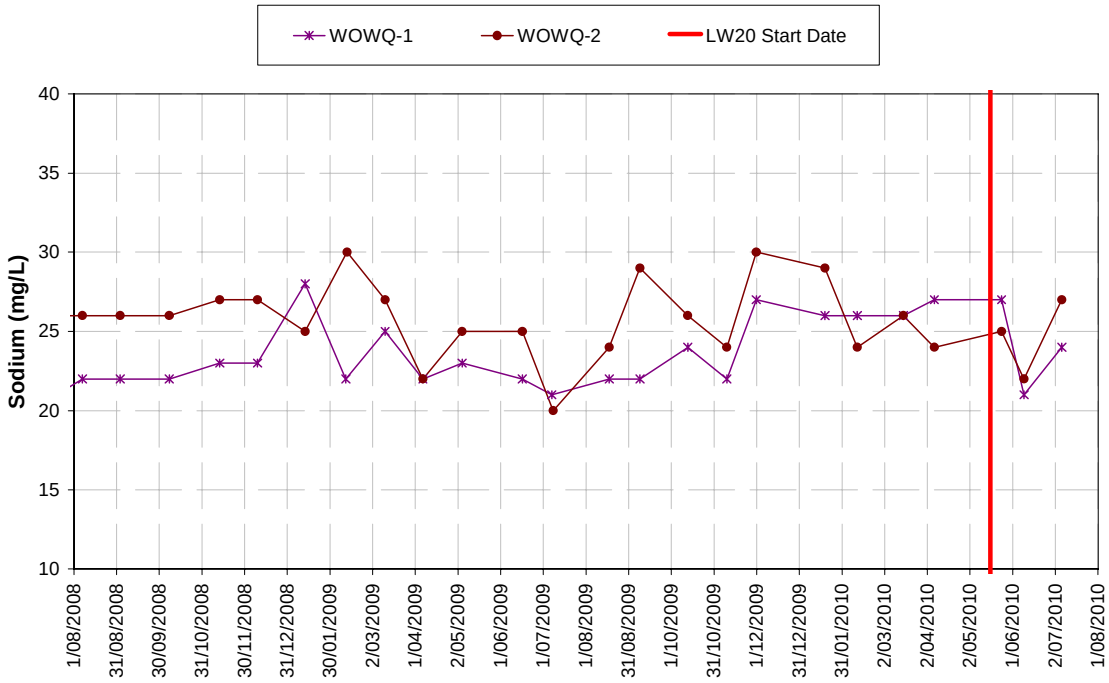

Chart A79 Sodium (mg/L) Woronora River

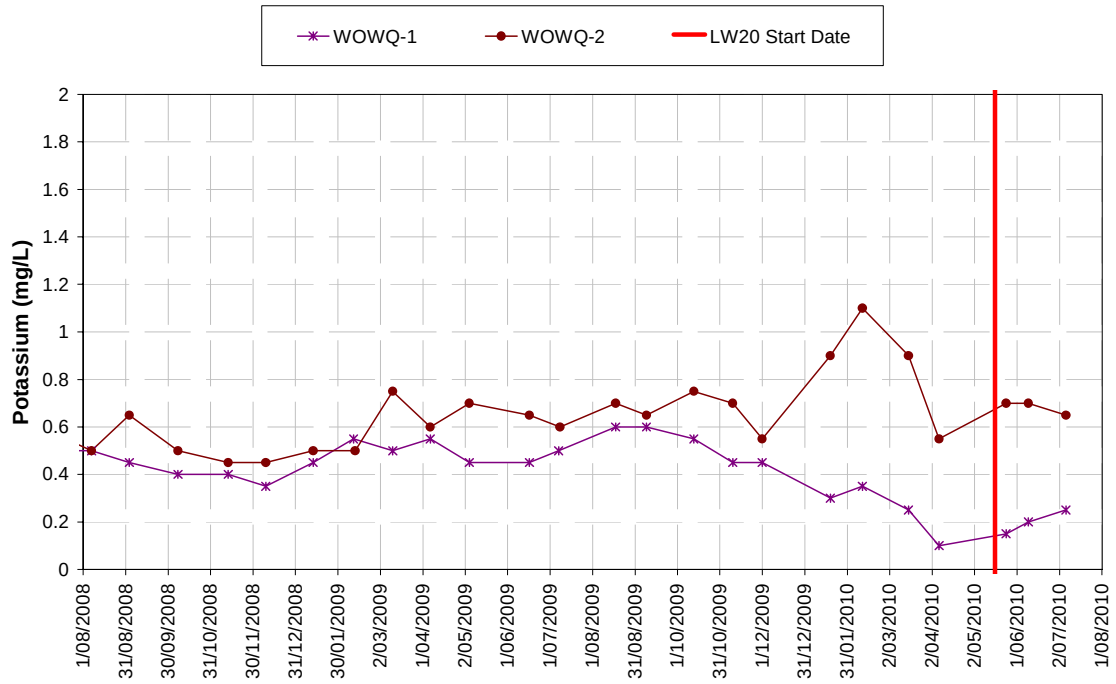

Chart A80 Potassium (mg/L) Woronora River

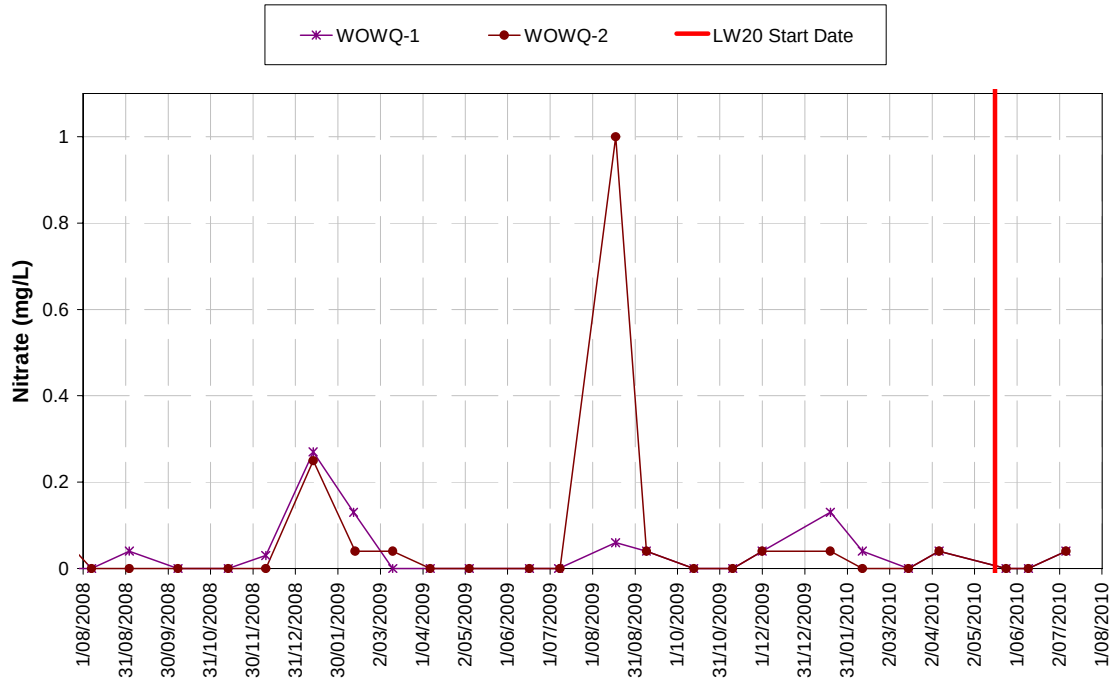

Chart A81 Nitrate (mg/L) Woronora River

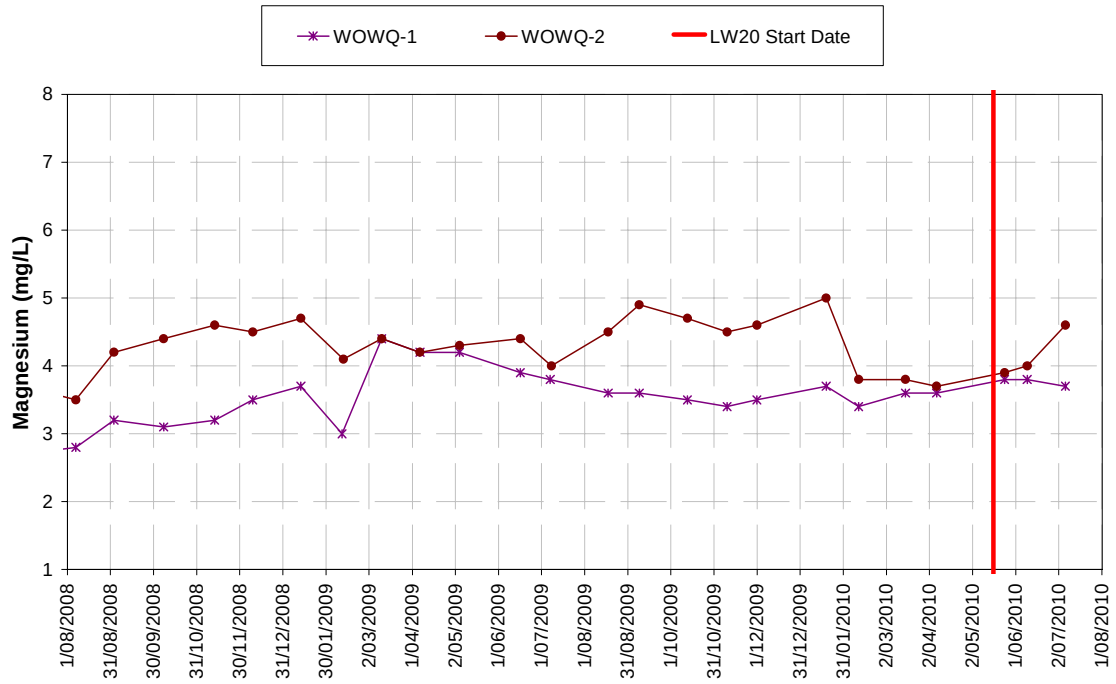

Chart A82 Magnesium (mg/L) Woronora River

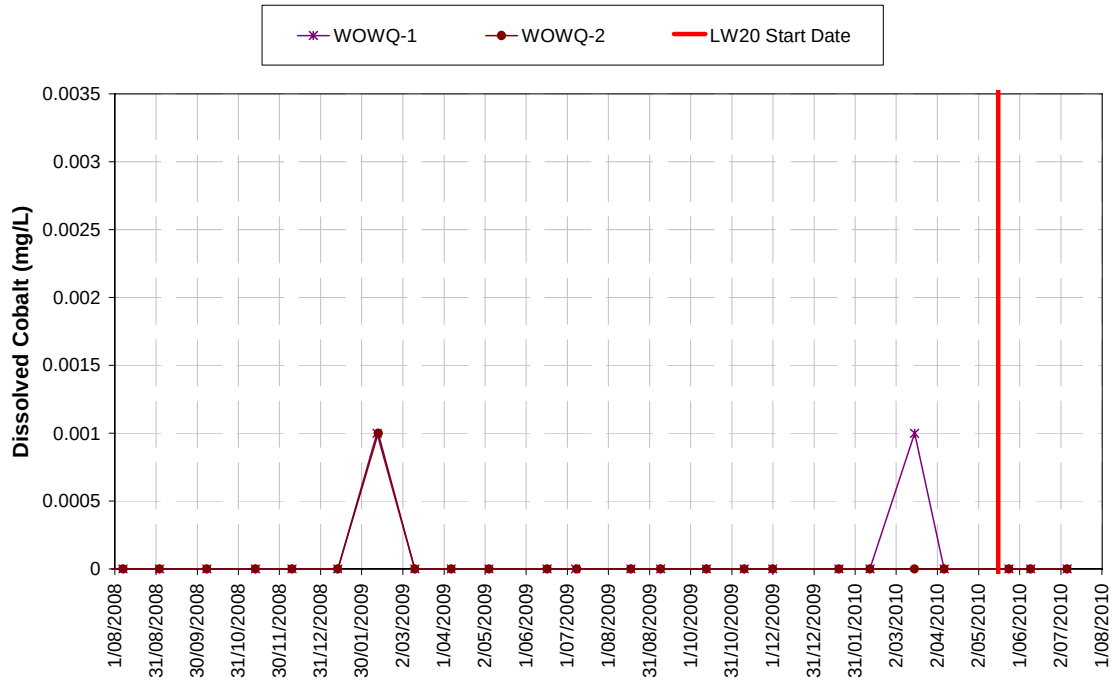

Chart A83 Dissolved Cobalt (mg/L) Woronora River

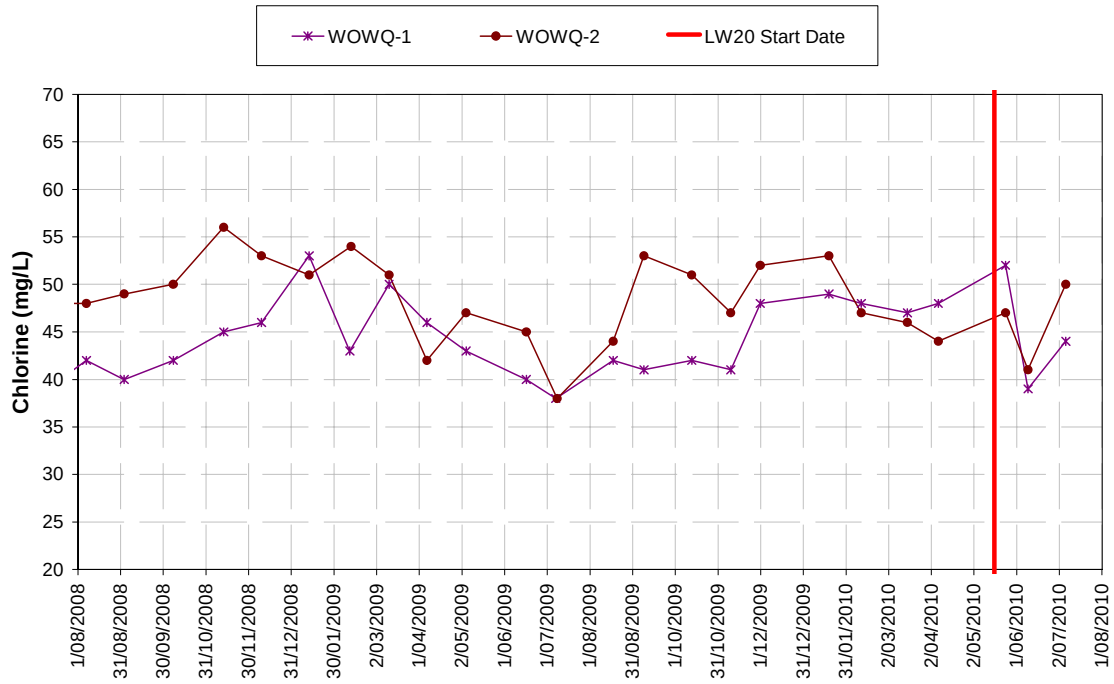

Chart A84 Chlorine (mg/L) Woronora River

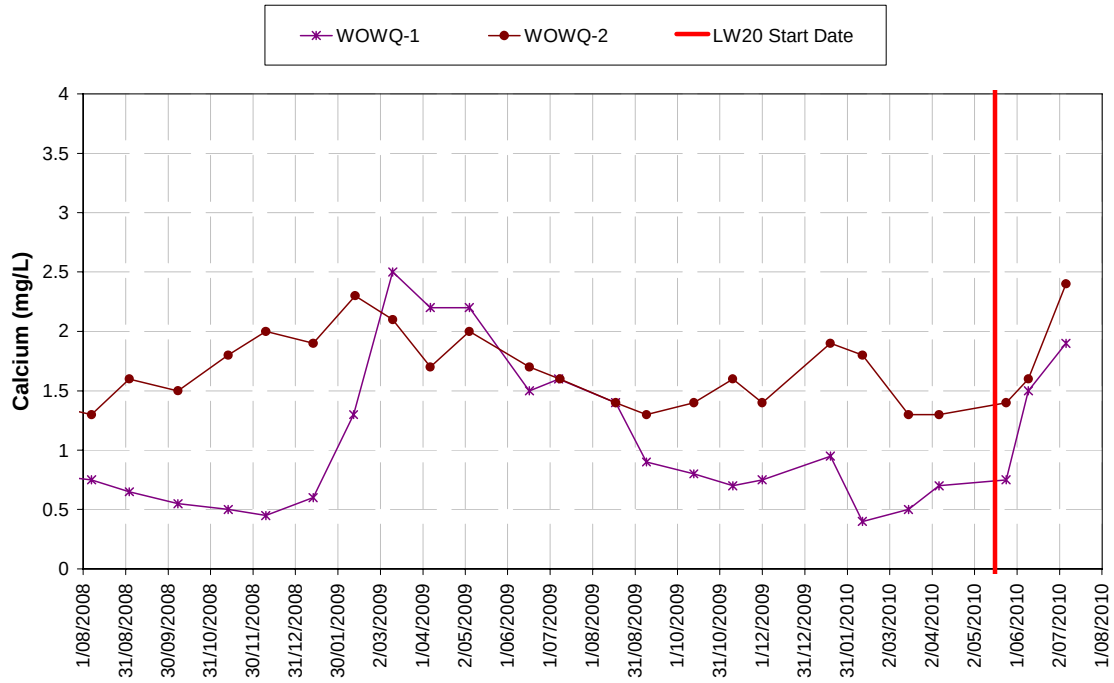

Chart A85 Calcium (mg/L) Woronora River

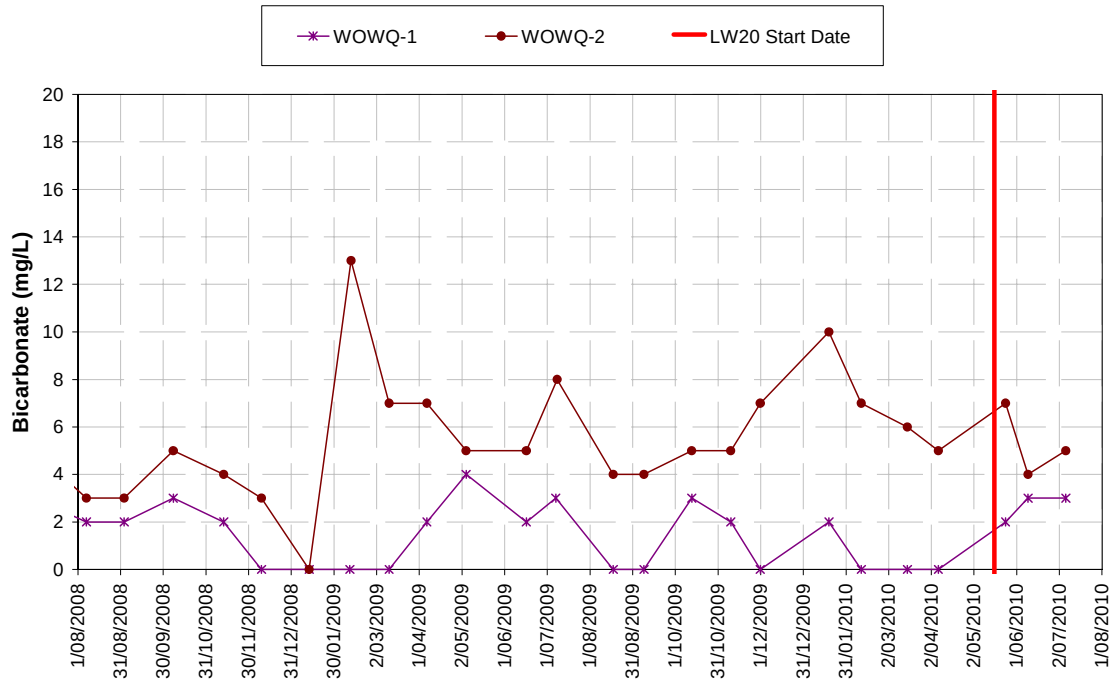

Chart A86 Bicarbonate (mg/L) Woronora River

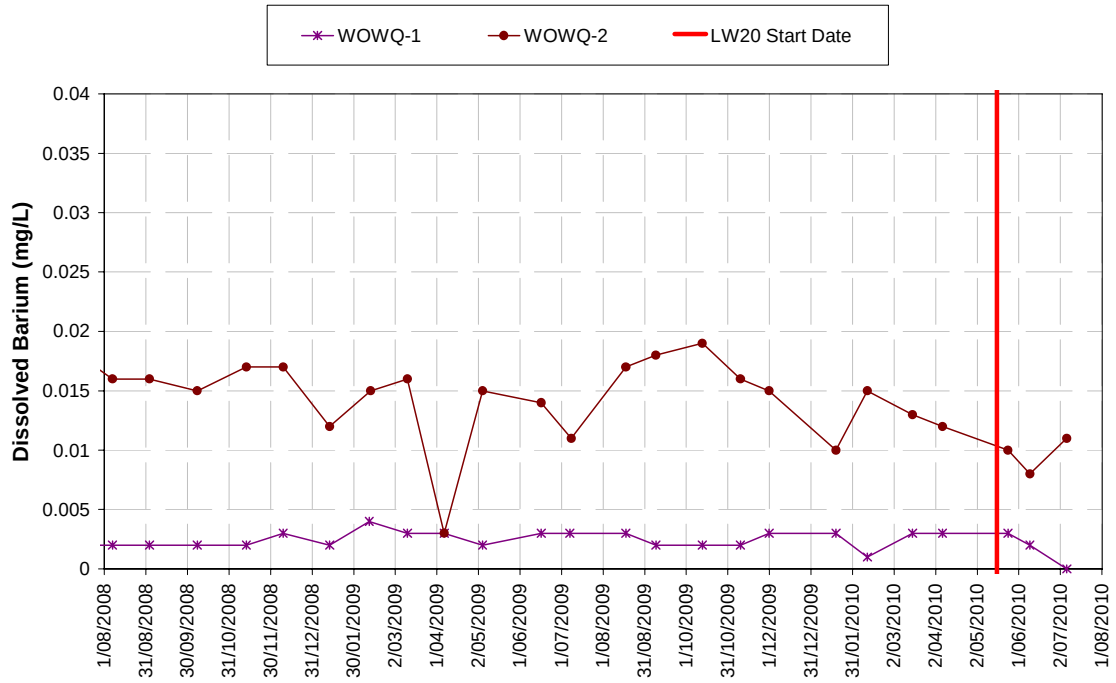

Chart A87 Dissolved Barium (mg/L) Woronora River

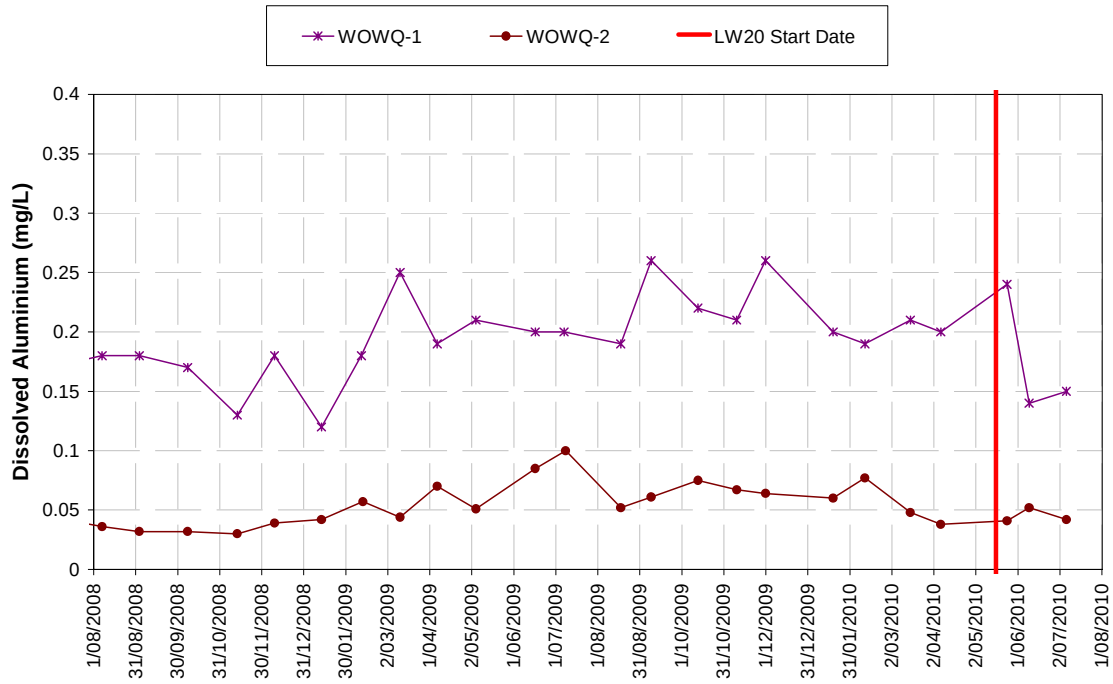

Chart A88 Dissolved Aluminium (mg/L) Woronora River

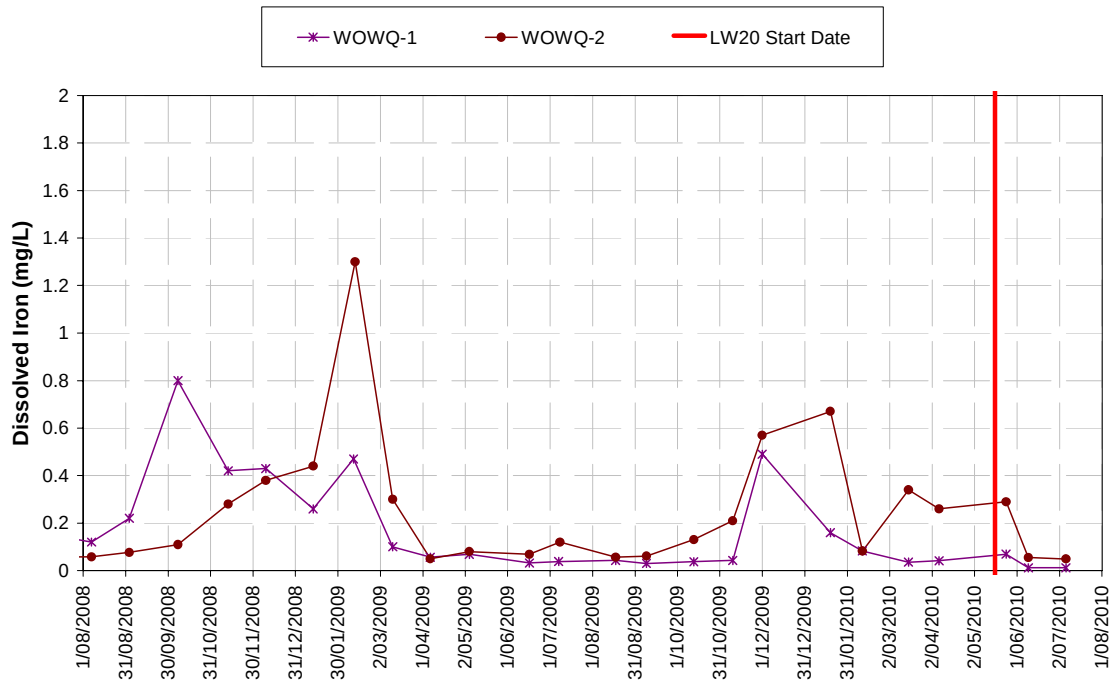

Chart A89 Dissolved Iron (mg/L) Woronora River

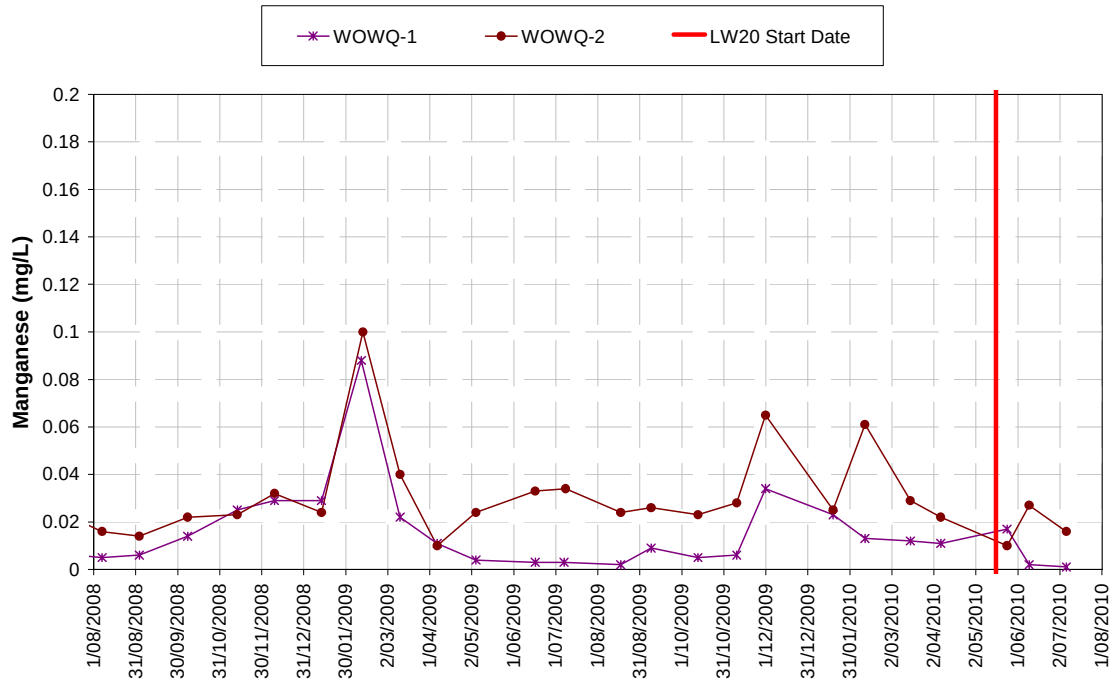

Chart A89 Manganese (mg/L) Woronora River

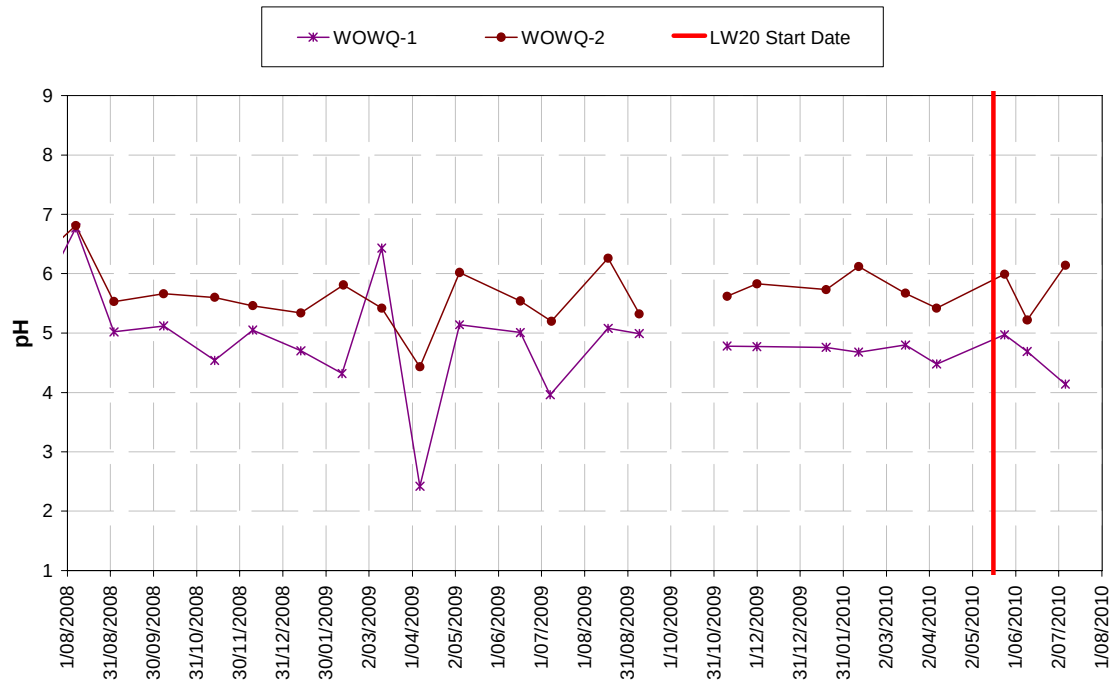

Chart A90 pH (Field) Woronora River

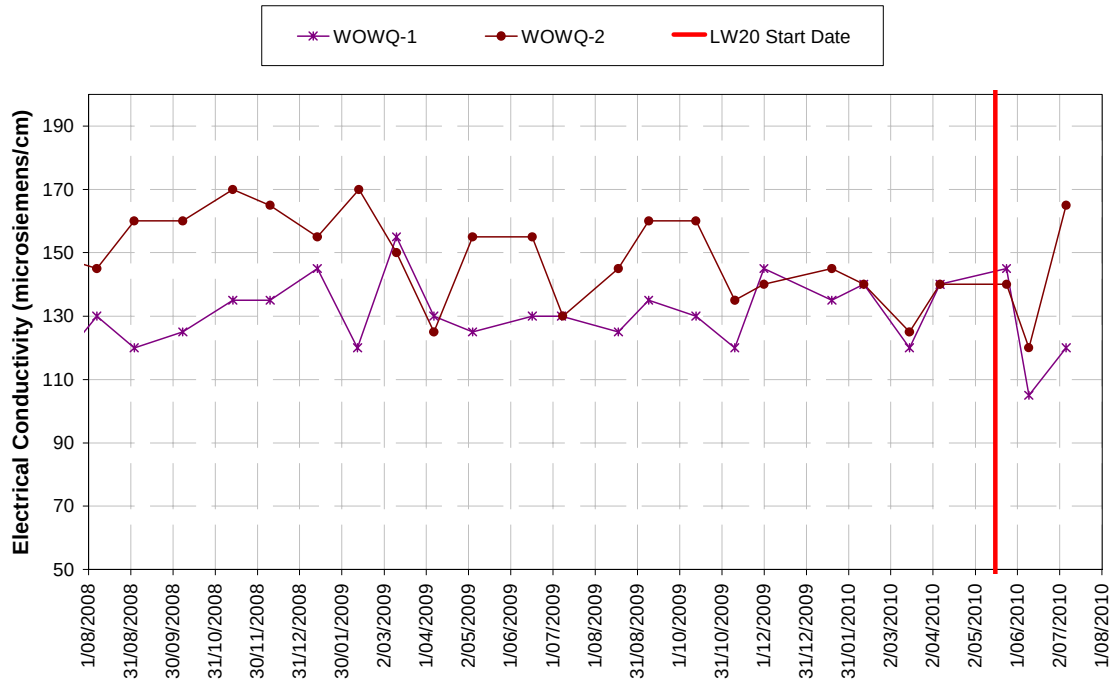

Chart A91 Electrical Conductivity (µSiemens/cm) Woronora River

Graphical Plots of Water Quality Monitoring Results for Tributary B

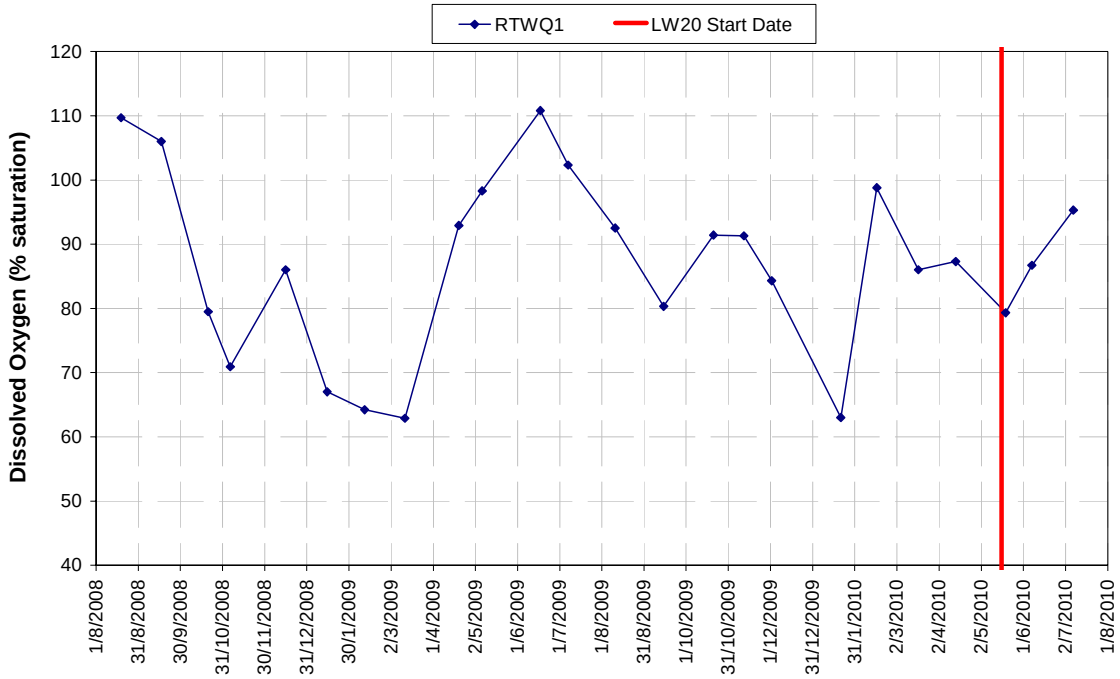

Chart A92 **Dissolved Oxygen (% Saturation) Tributary B**

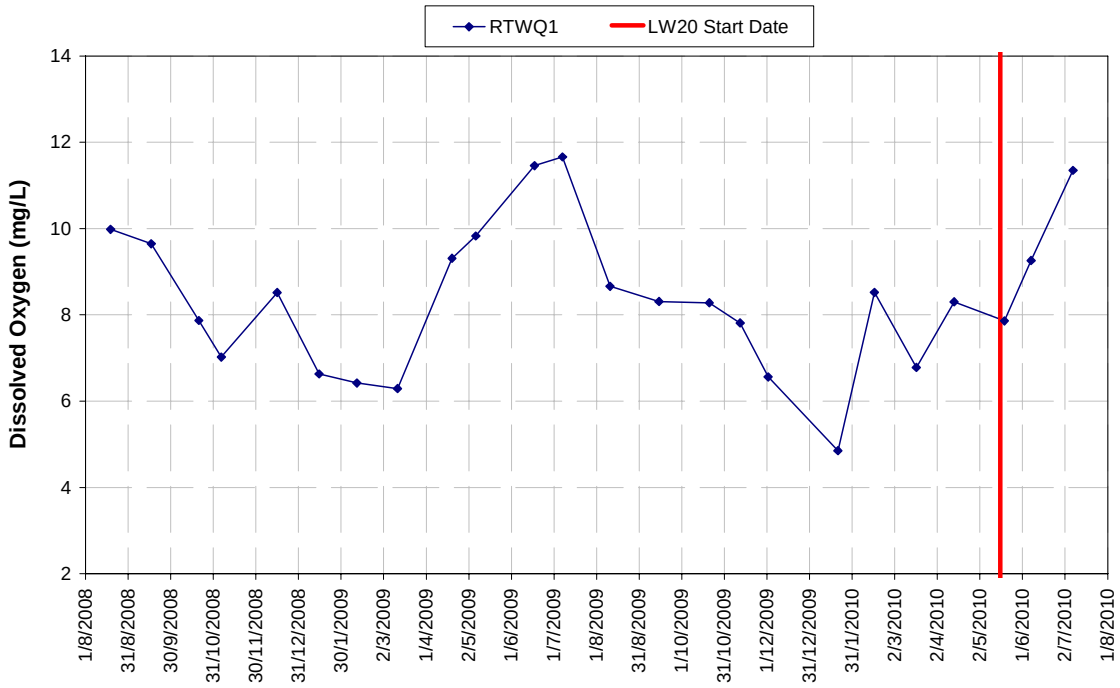

Chart A93 **Dissolved Oxygen (mg/L) Tributary B**

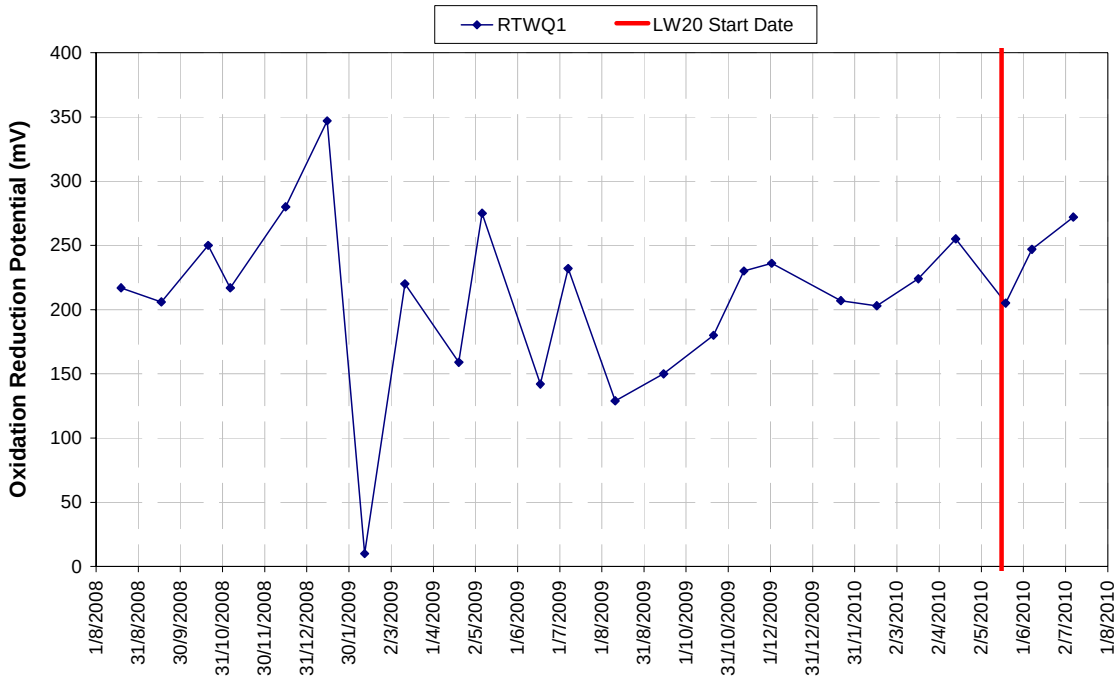

Chart A94 Oxidation Reduction Potential (mV) Tributary B

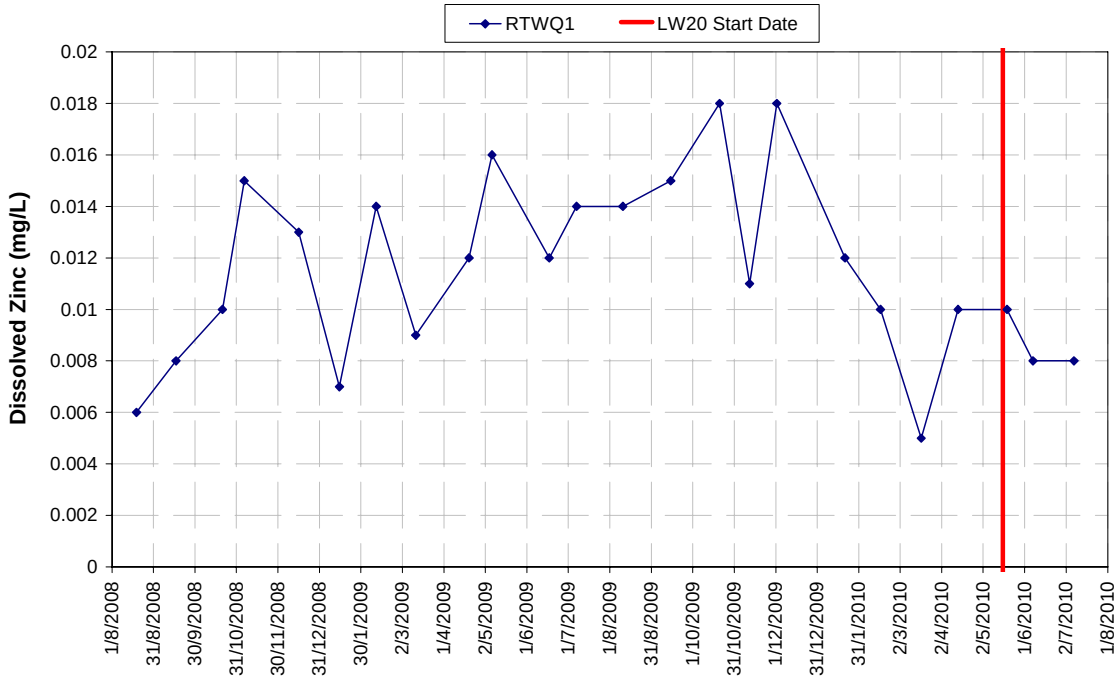

Chart A95 Dissolved Zinc (mg/L) Tributary B

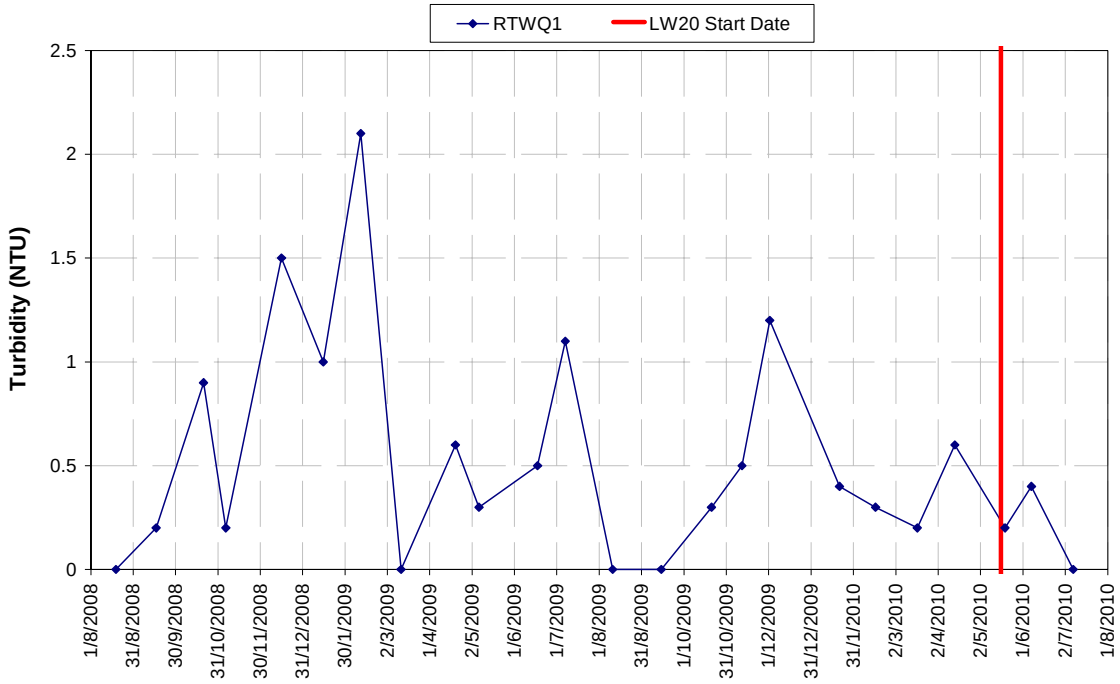

Chart A96 Turbidity (NTU) Tributary B

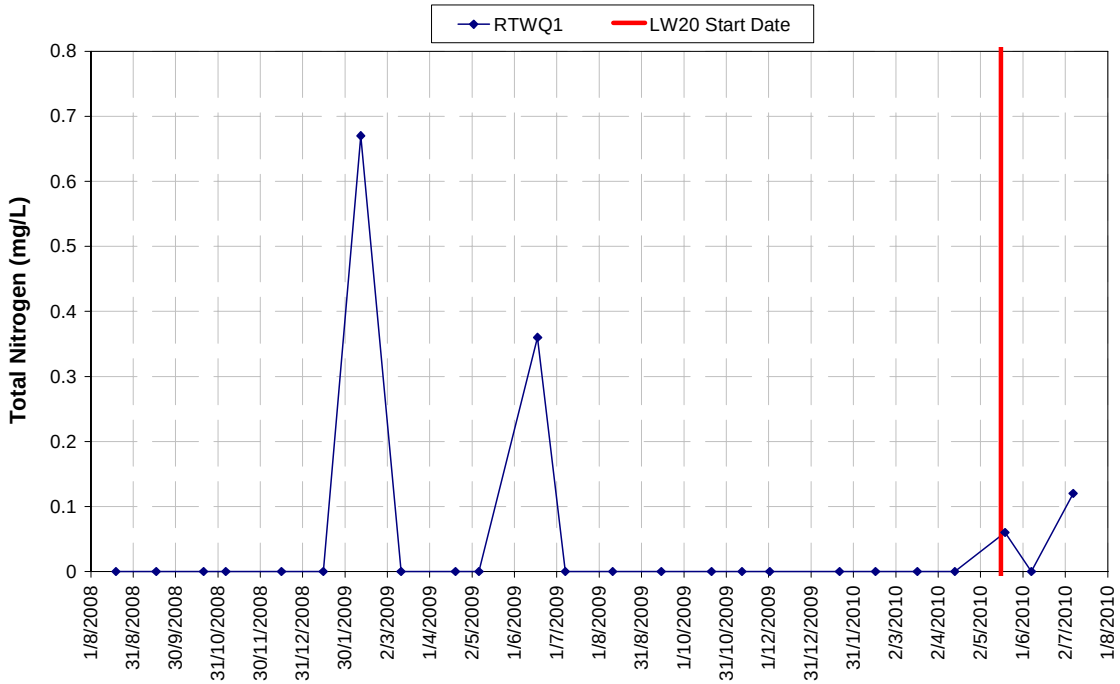

Chart A97 Total Nitrogen (mg/L) Tributary B

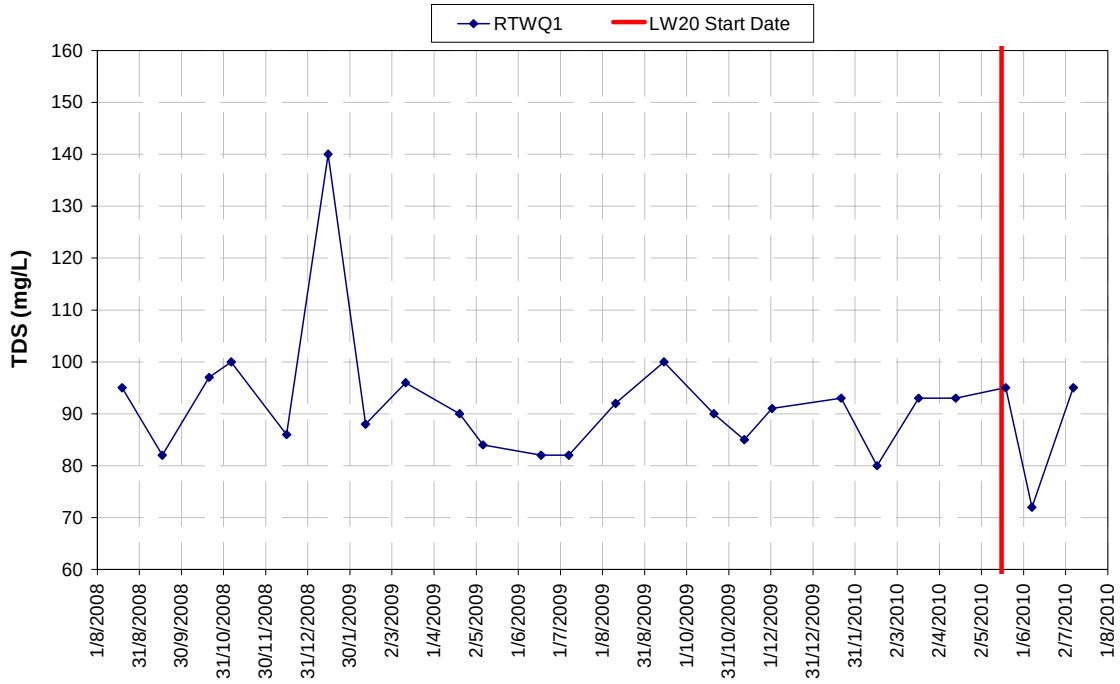

Chart A98 **Total Dissolved Solids (mg/L) Tributary B**

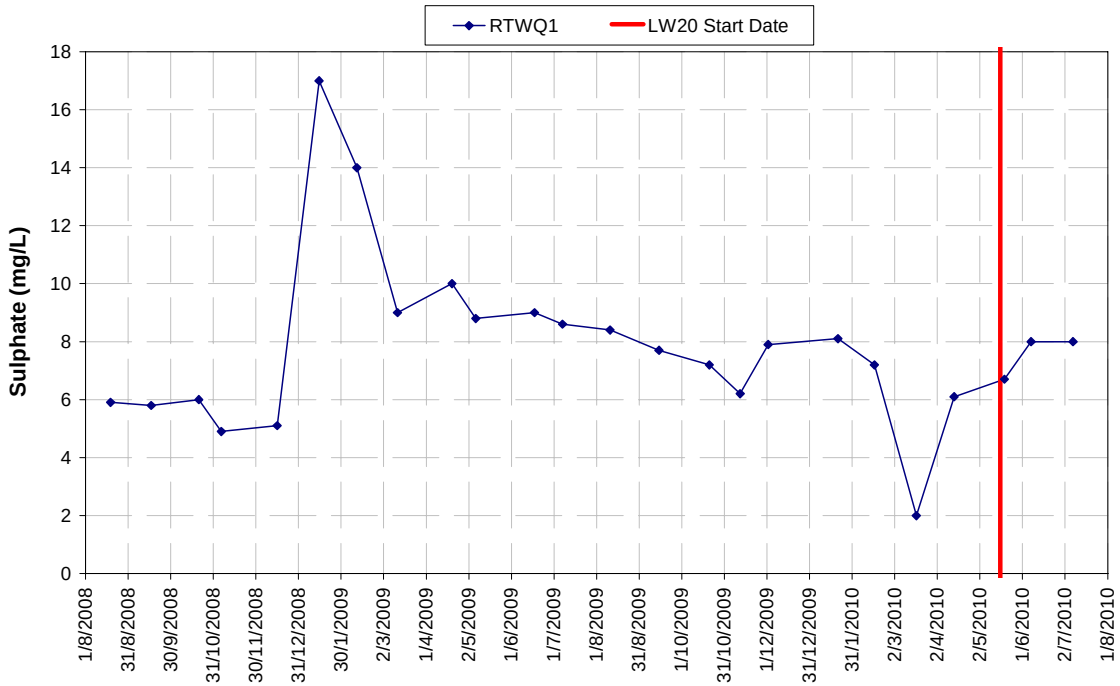

Chart A99 **Sulphate (mg/L) Tributary B**

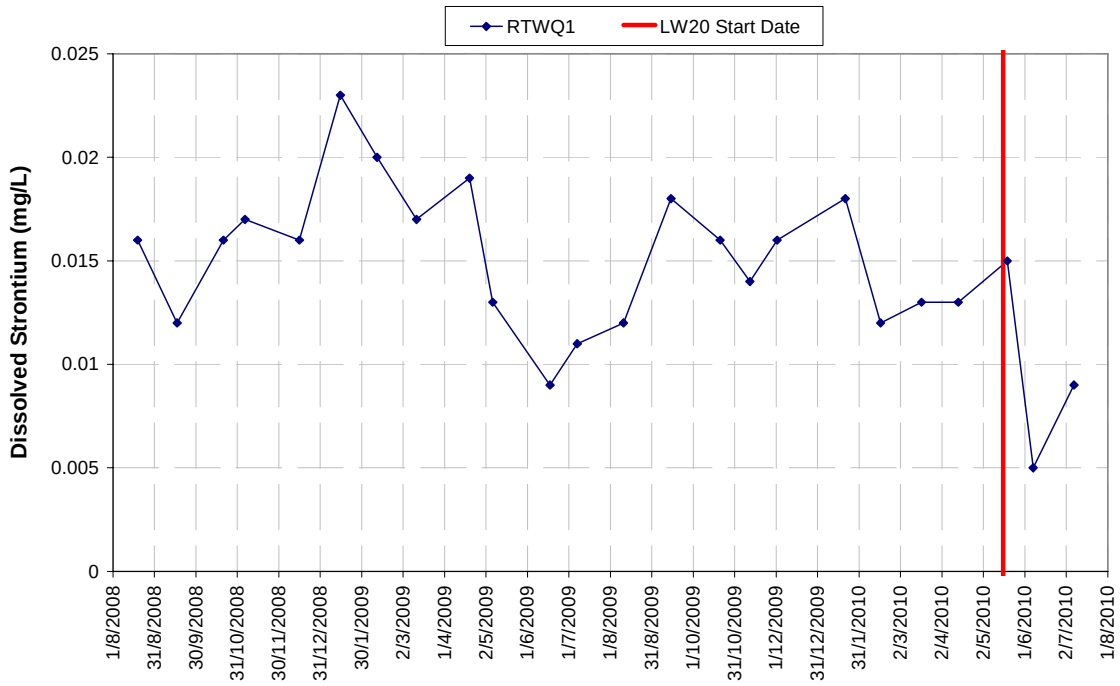

Chart A100 Dissolved Strontium (mg/L) Tributary B

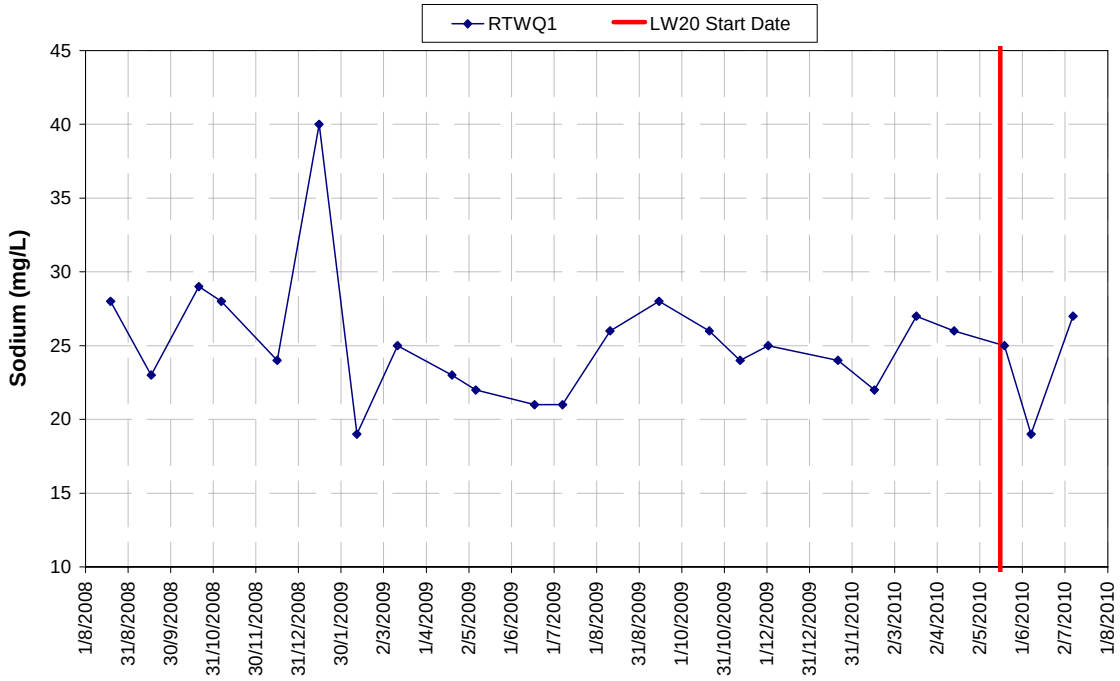

Chart A101 Sodium (mg/L) Tributary B

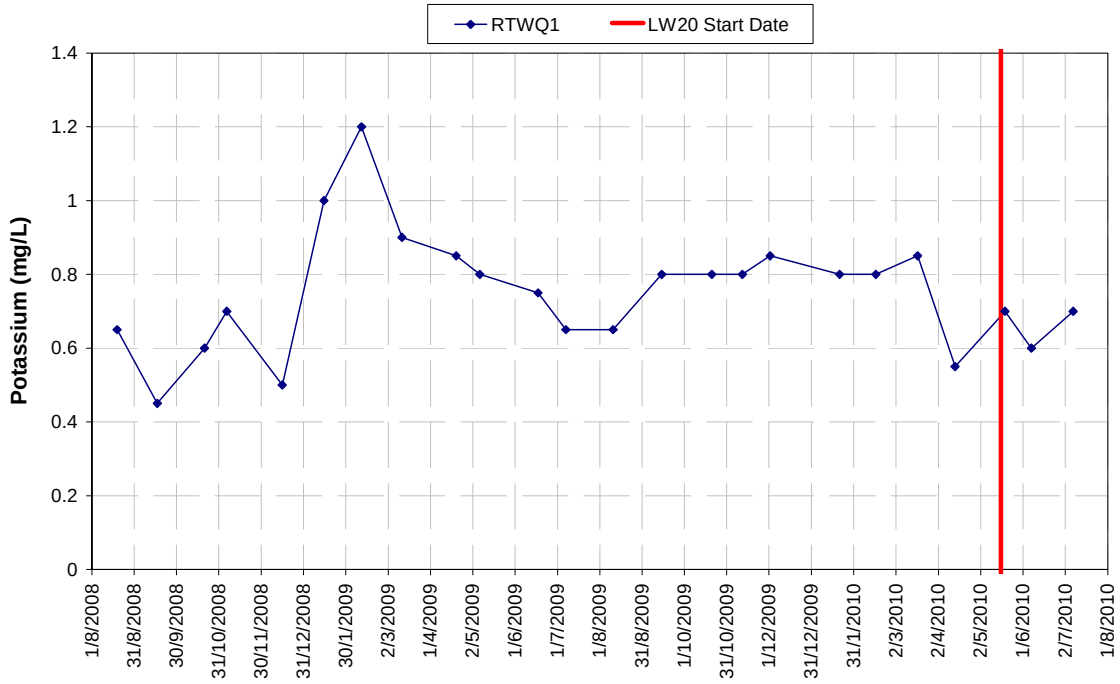

Chart A102 Potassium (mg/L) Tributary B

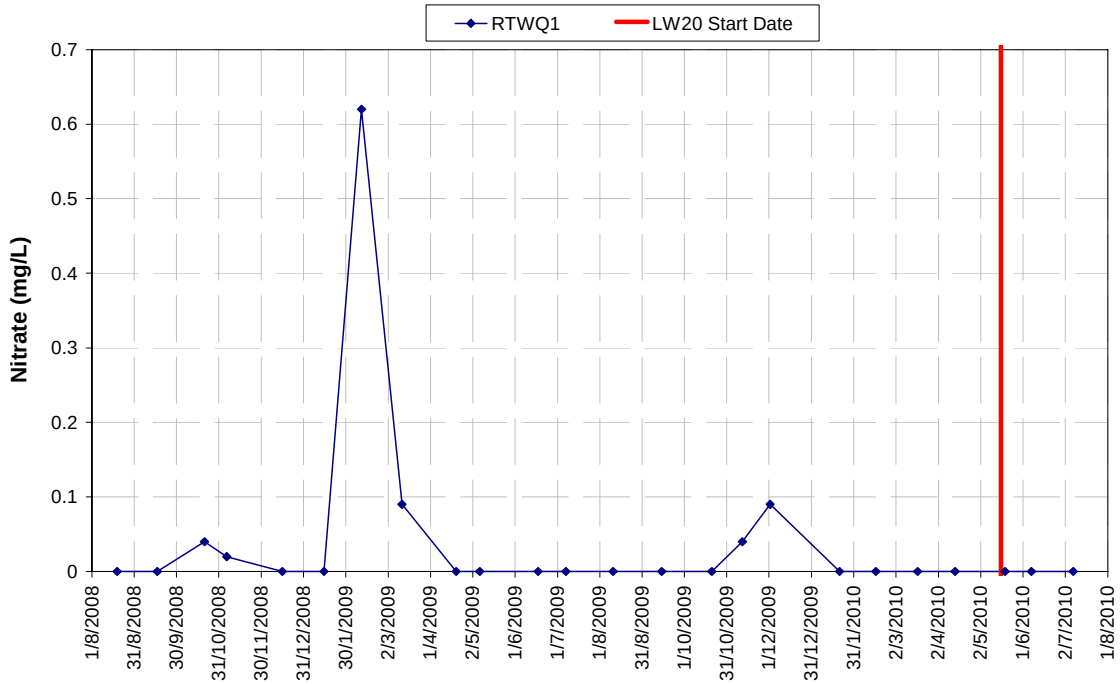

Chart A103 Nitrate (mg/L) Tributary B

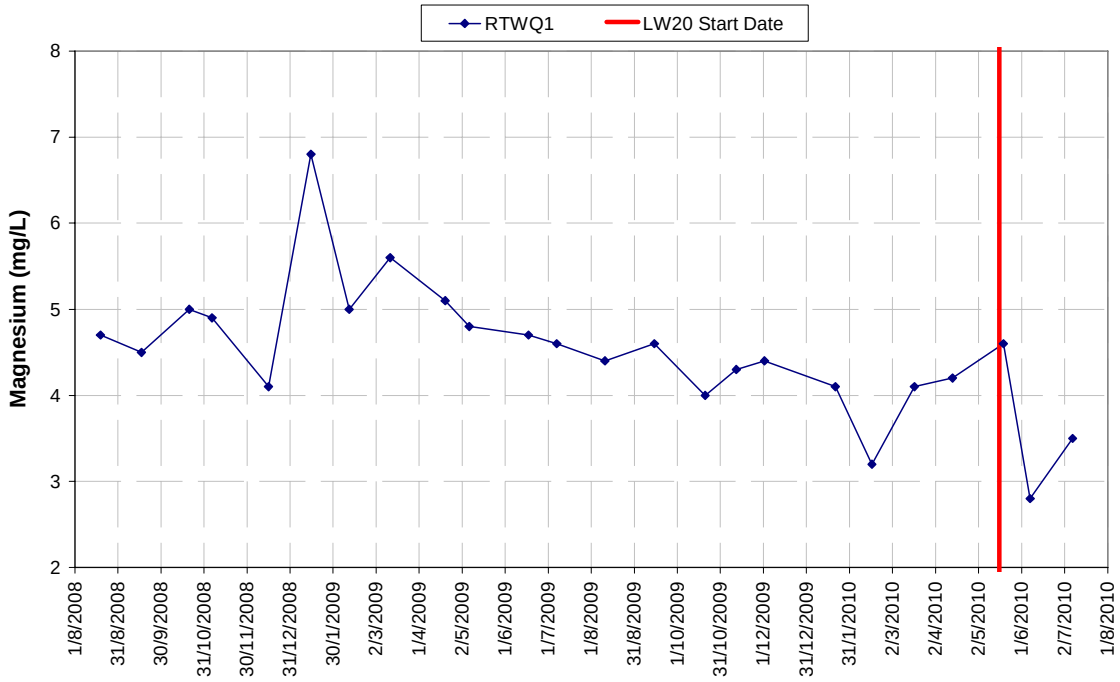

Chart A104 Magnesium (mg/L) Tributary B

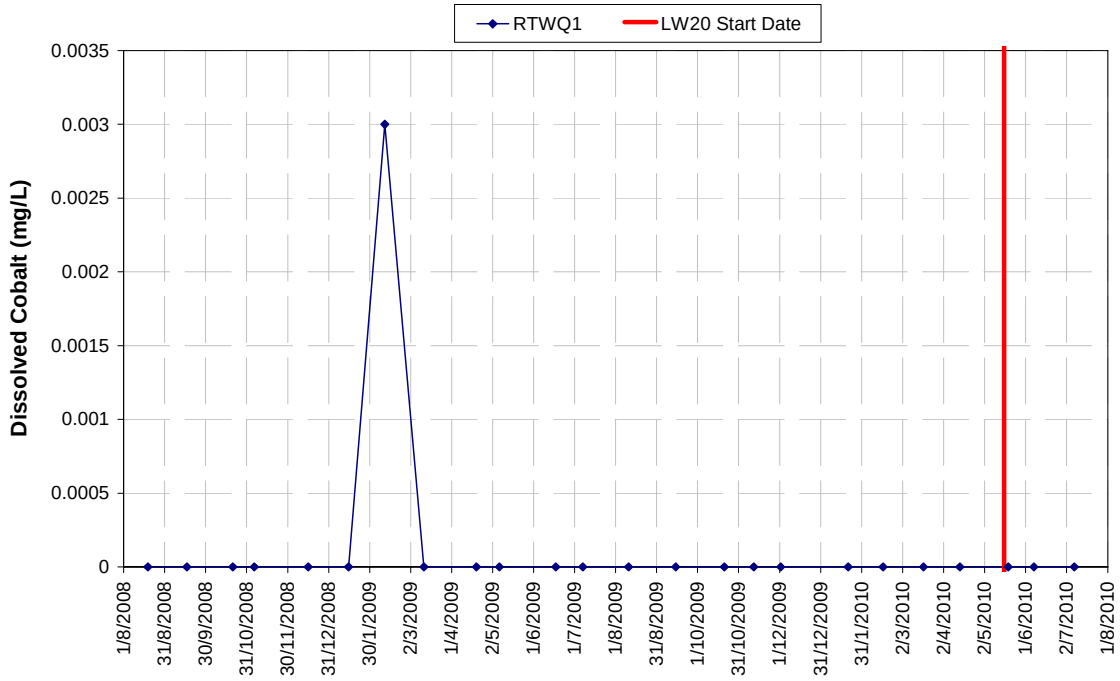

Chart A105 Dissolved Cobalt (mg/L) Tributary B

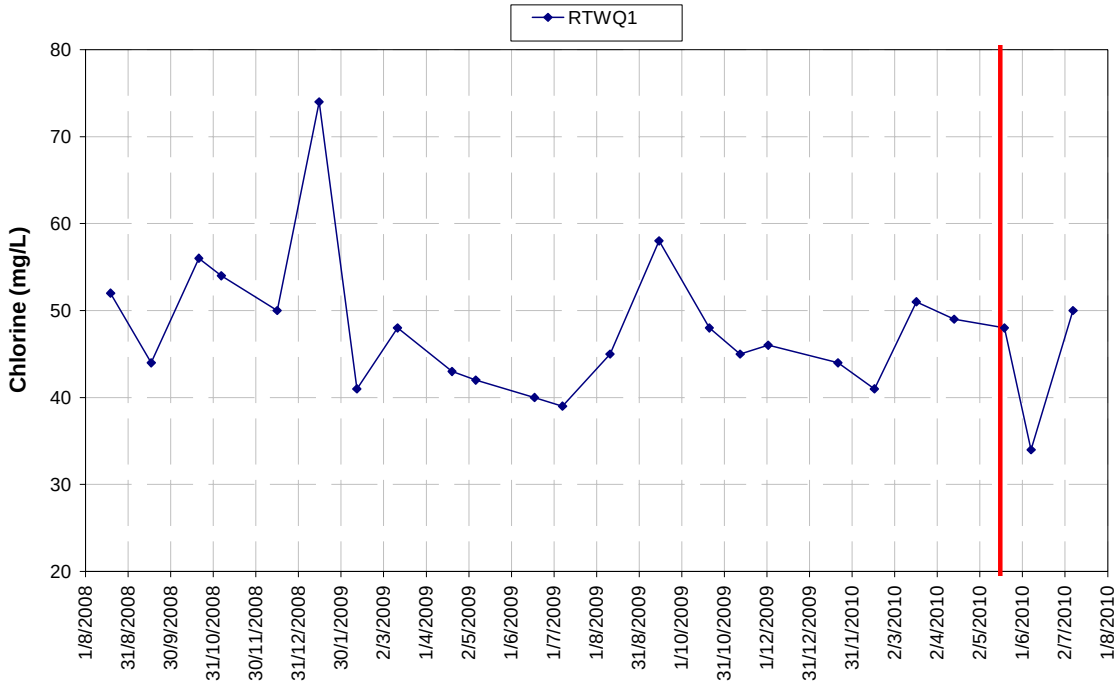

Chart A106 Chlorine (mg/L) Tributary B

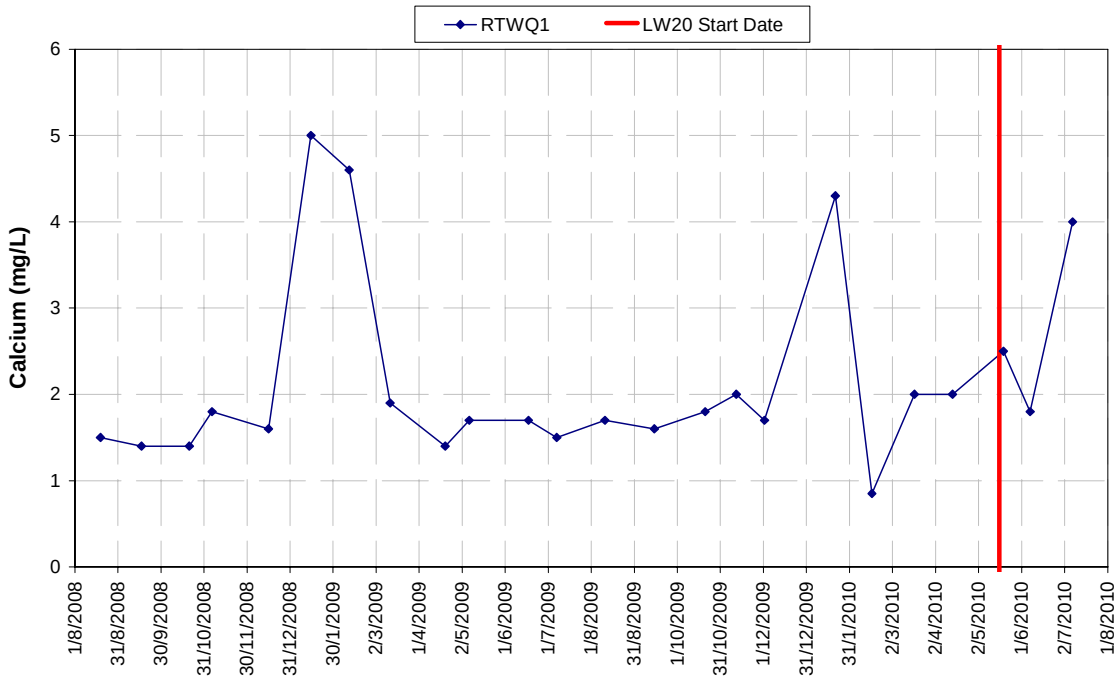

Chart A107 Calcium (mg/L) Tributary B

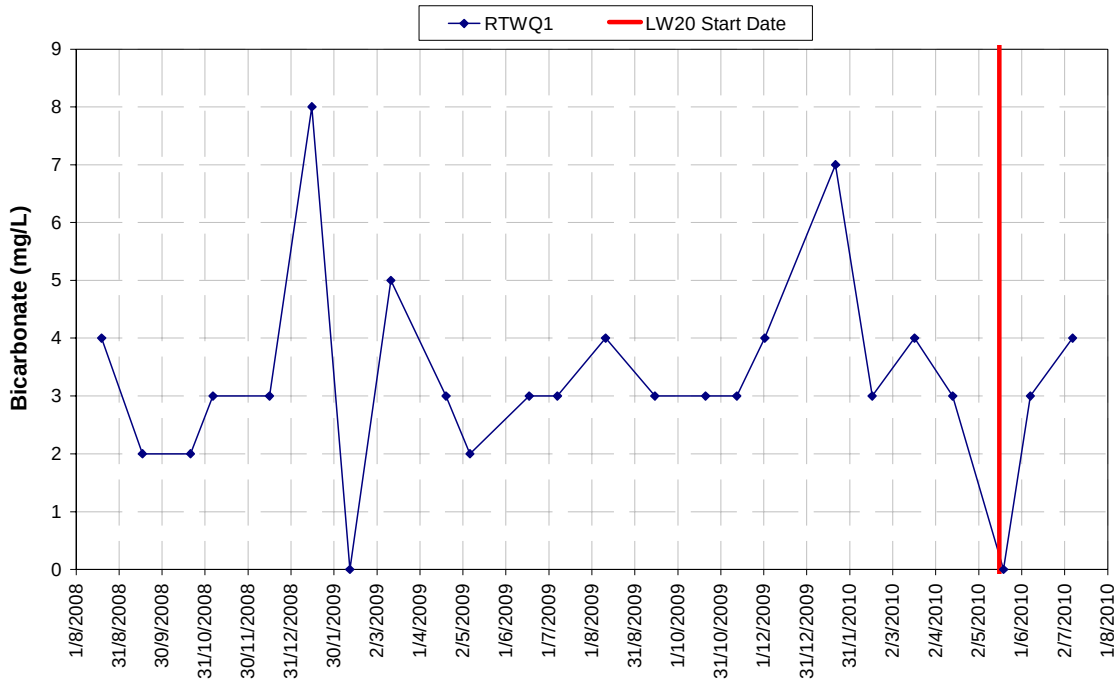

Chart A108 Bicarbonate (mg/L) Tributary B

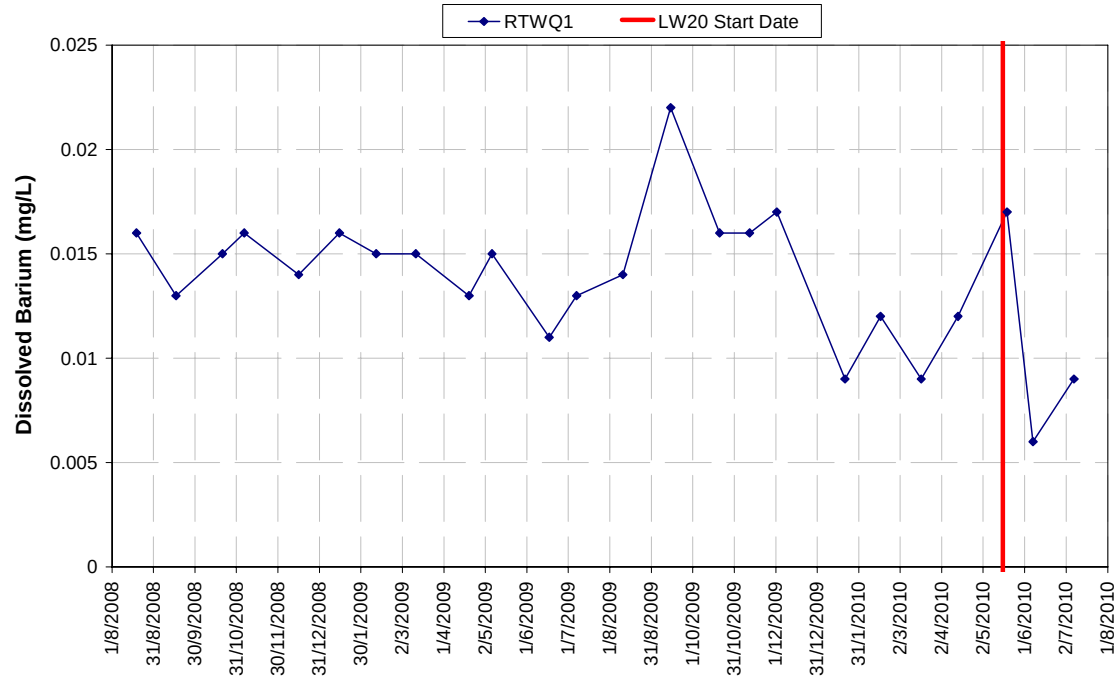

Chart A109 Dissolved Barium (mg/L) Tributary B

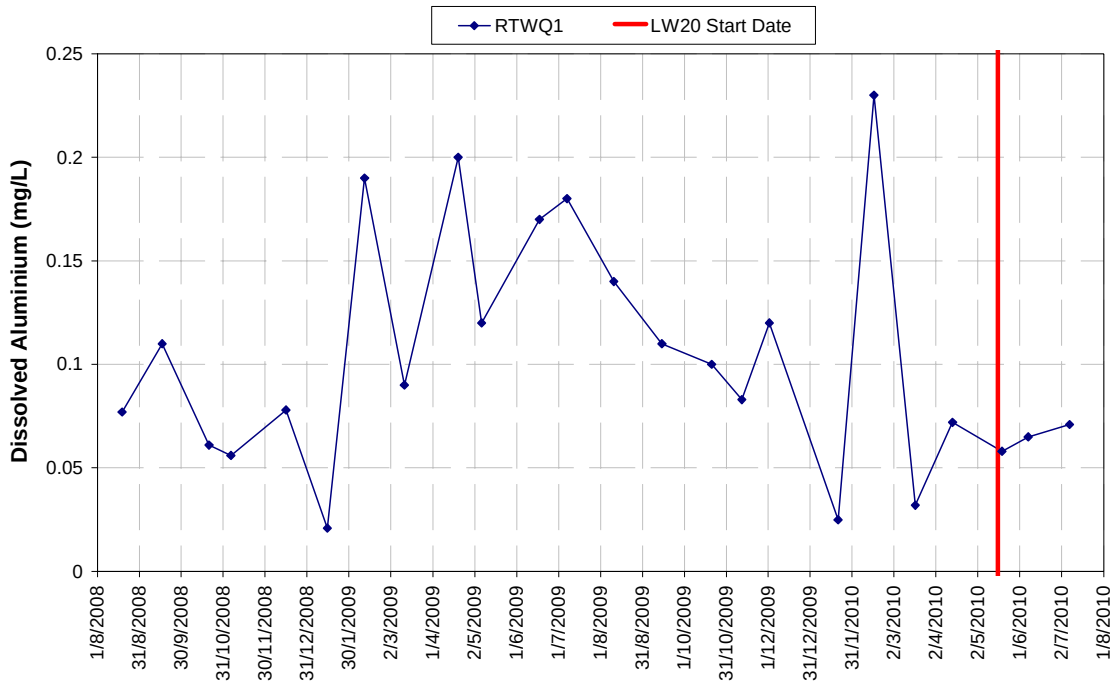

Chart A110 Dissolved Aluminium (mg/L) Tributary B

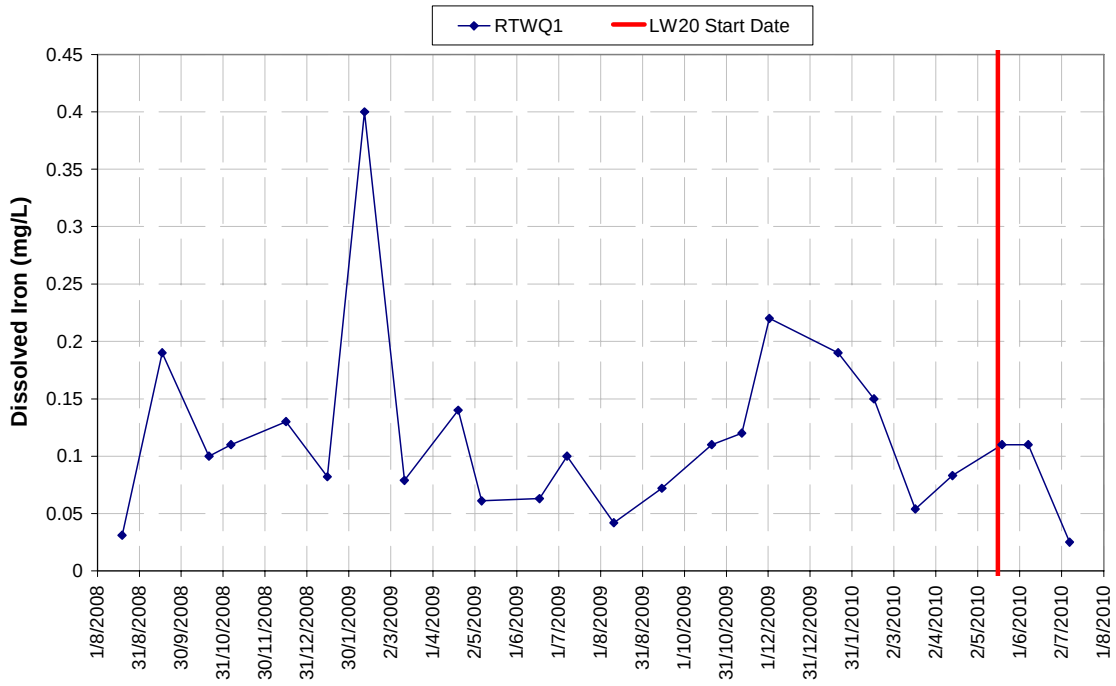

Chart A111 Dissolved Iron (mg/L) Tributary B

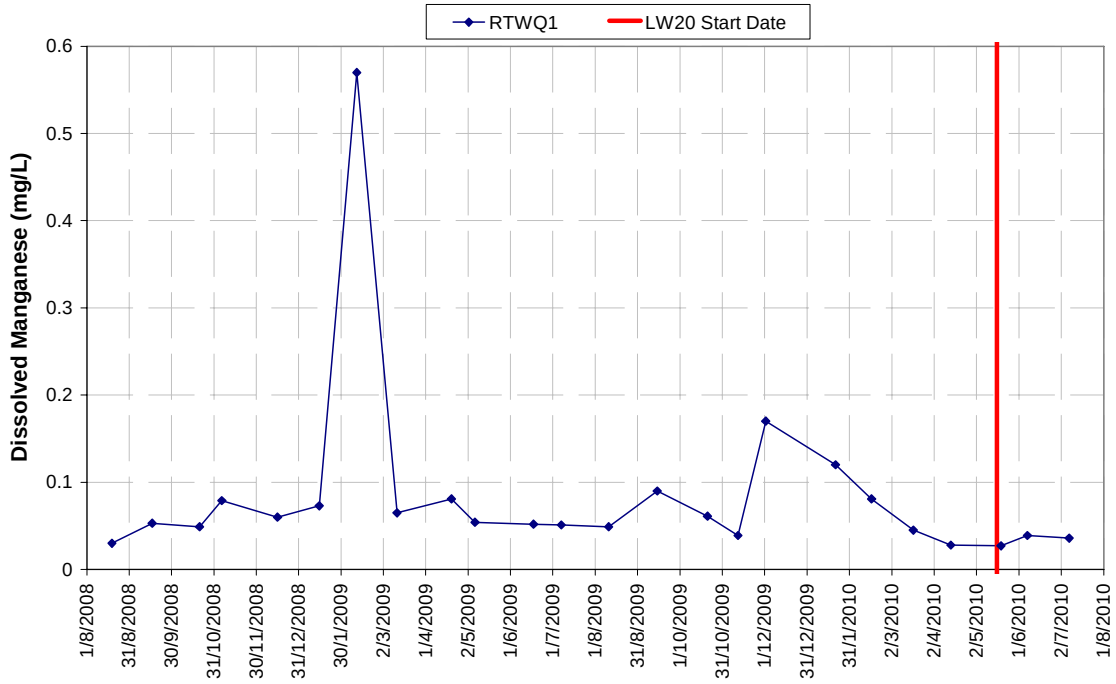

Chart A112 Dissolved Manganese (mg/L) Tributary B

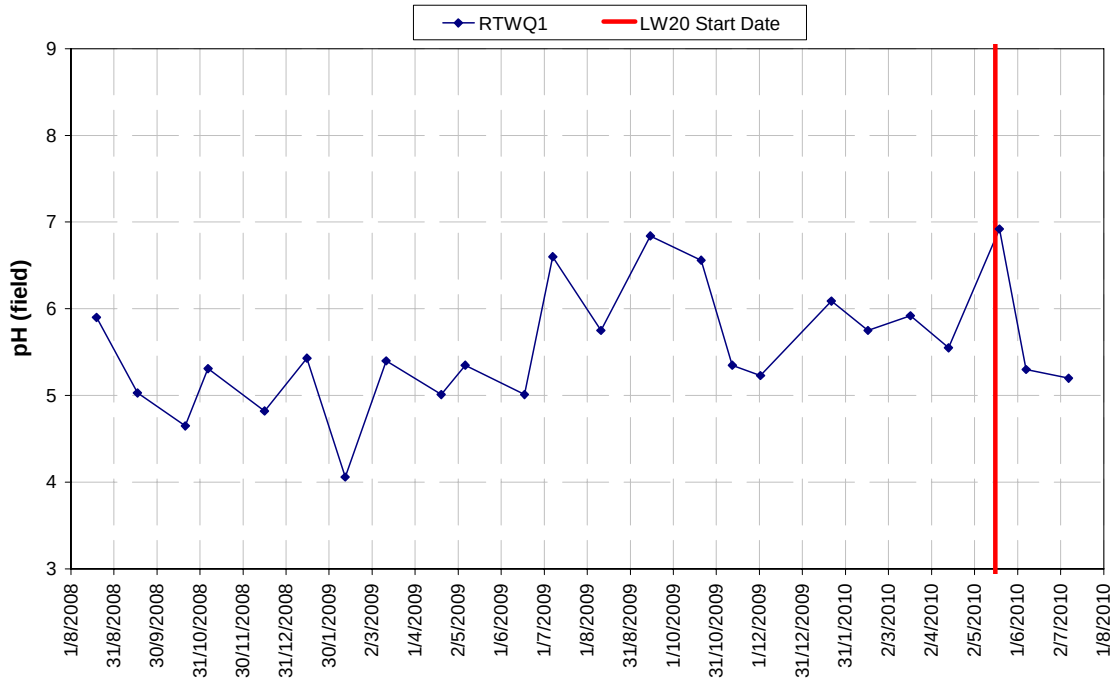

Chart A113 pH (Field) Tributary B

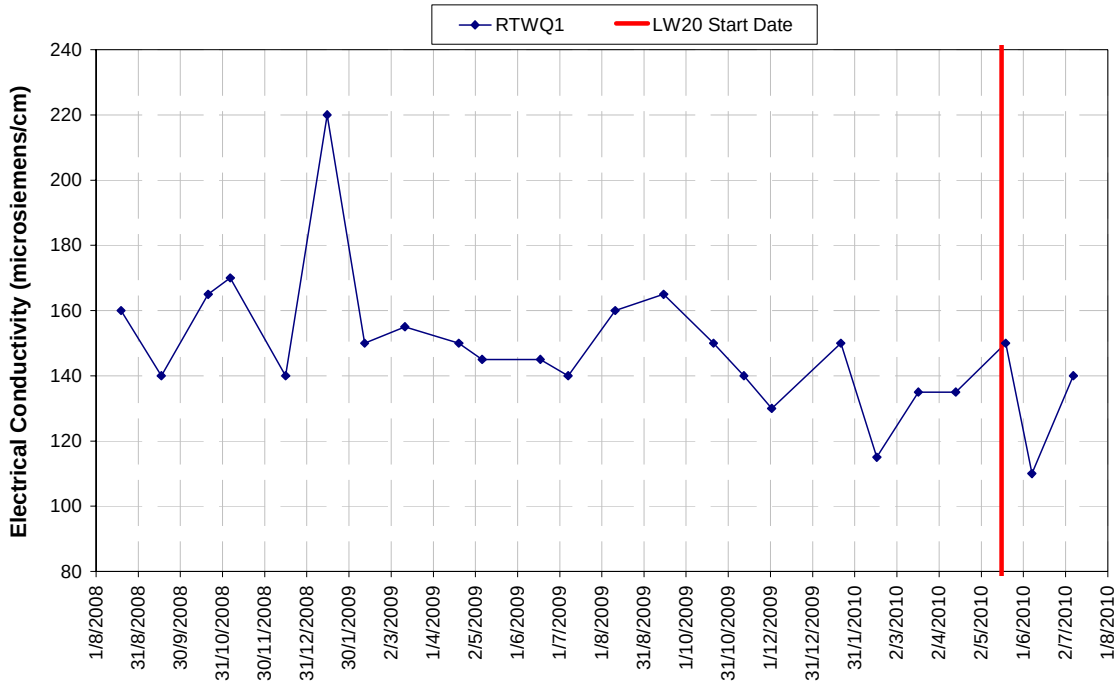

Chart A114 Electrical Conductivity (micro-Siemens/cm) Tributary B

Graphical Plots of Water Quality Monitoring Results for Tributary D

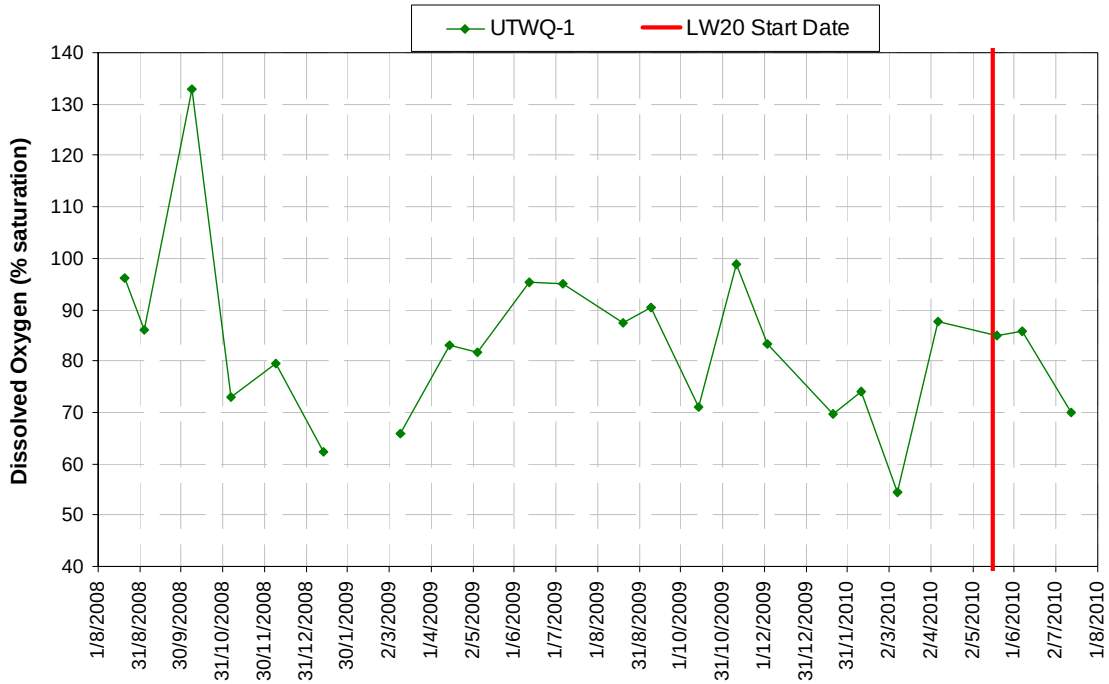

Chart A115 Dissolved Oxygen (% Saturation) Tributary D

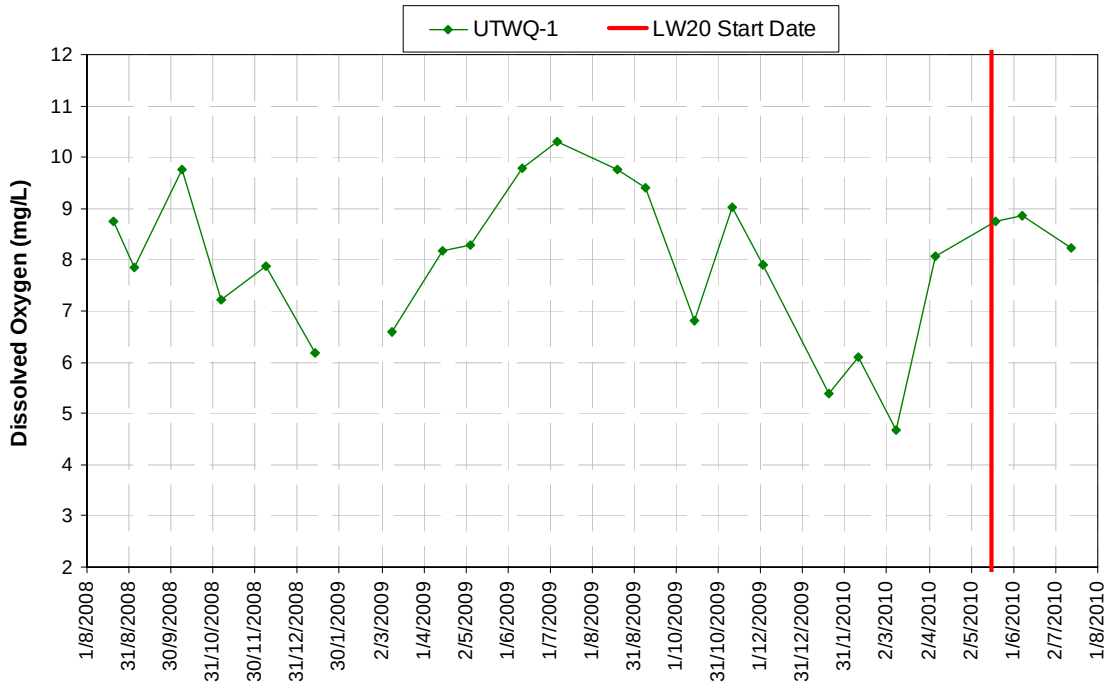

Chart A116 Dissolved Oxygen (mg/L) Tributary D

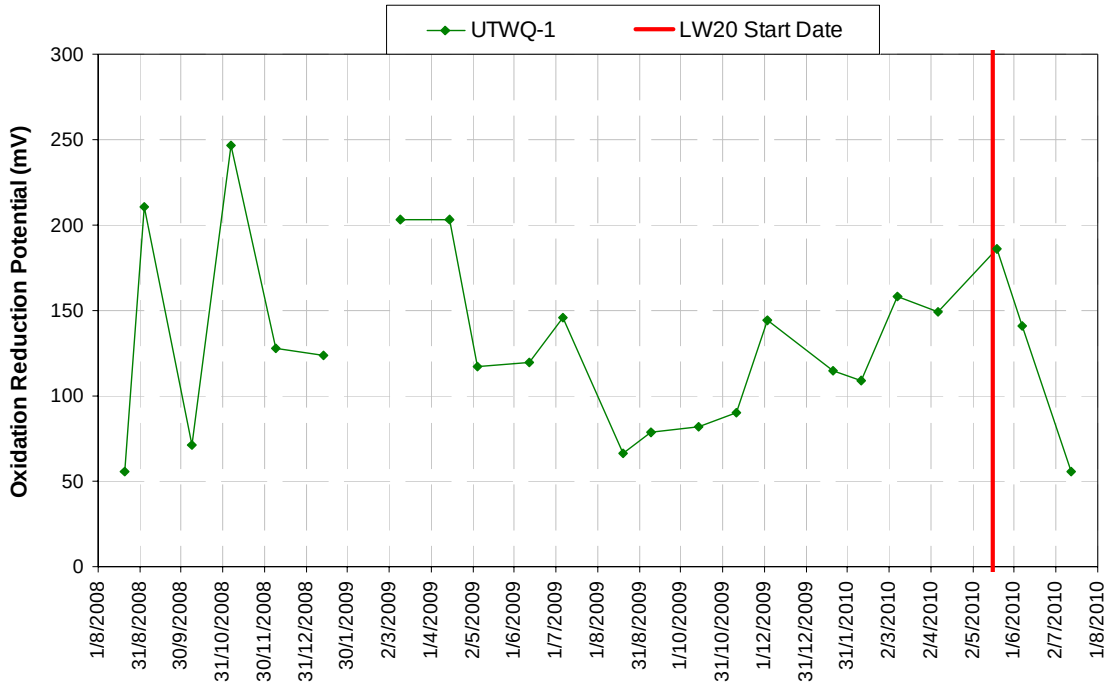

Chart A117 Oxidation Reduction Potential (mV) Tributary D

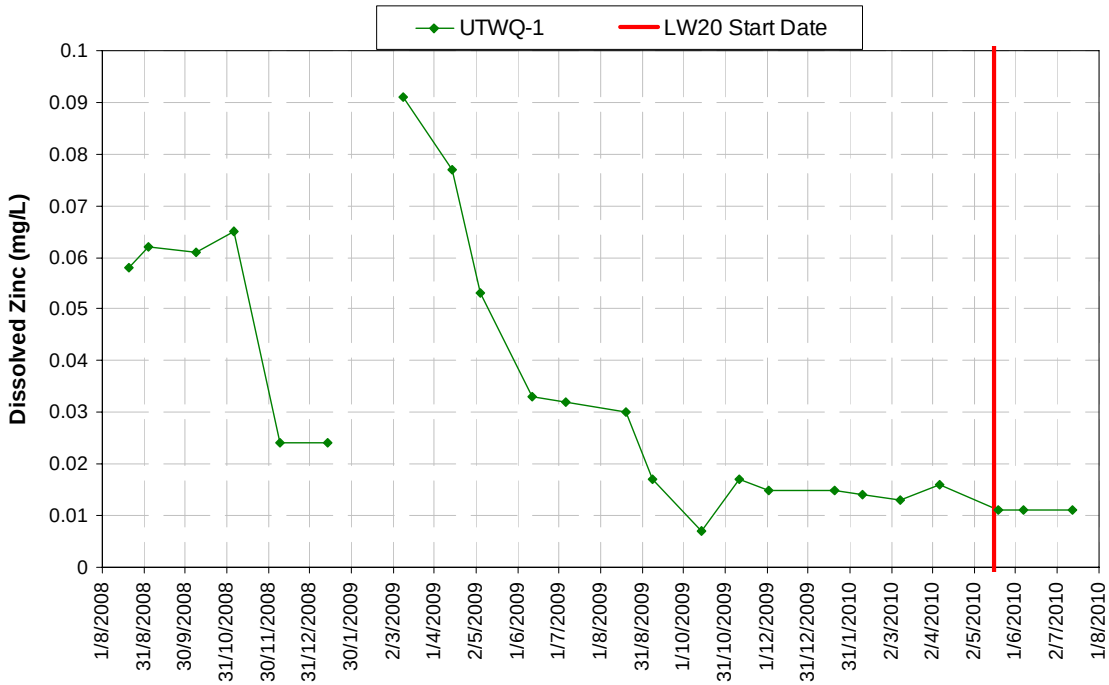

Chart A118 Dissolved Zinc (mg/L) Tributary D

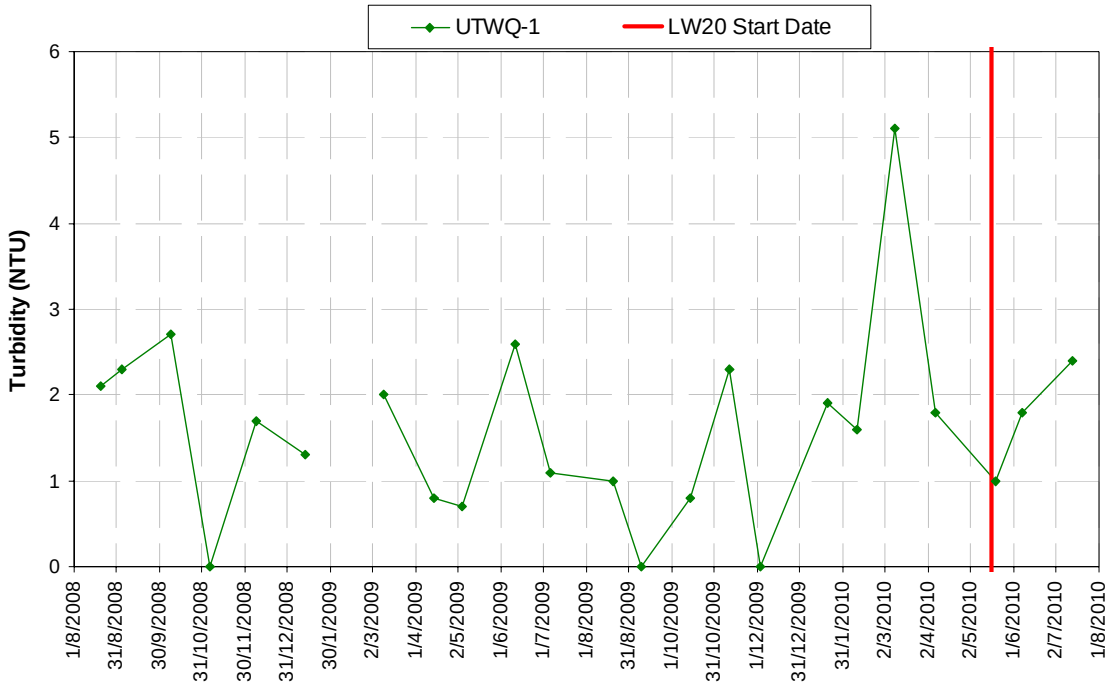

Chart A119 Turbidity (NTU) Tributary D

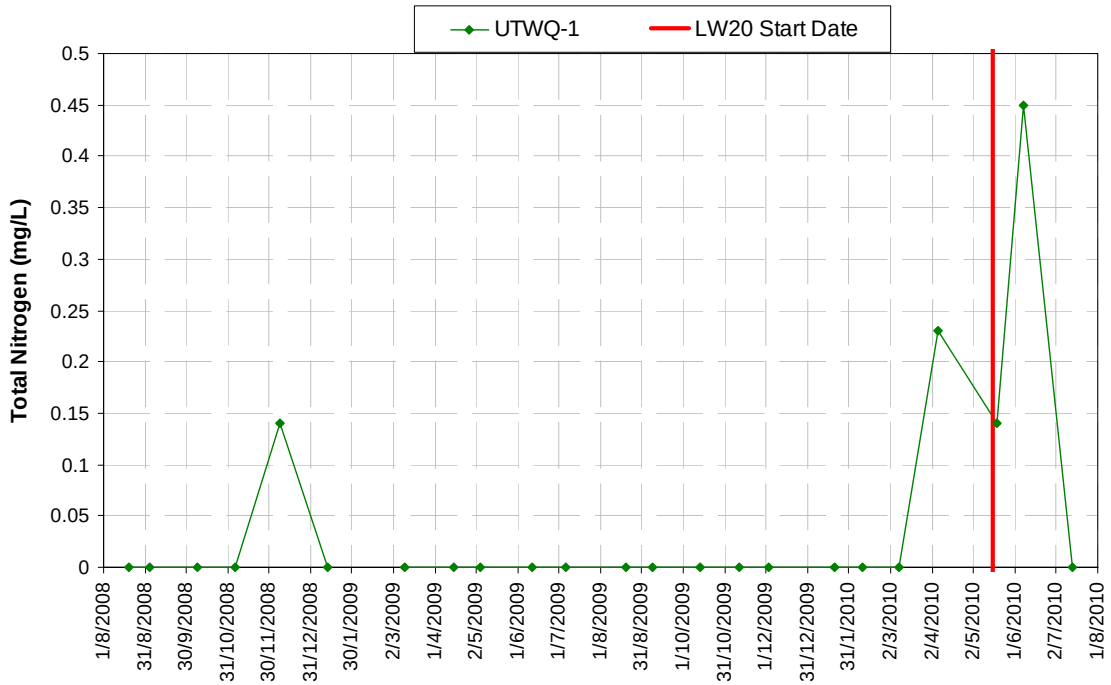

Chart A120 Total Nitrogen (mg/L) Tributary D

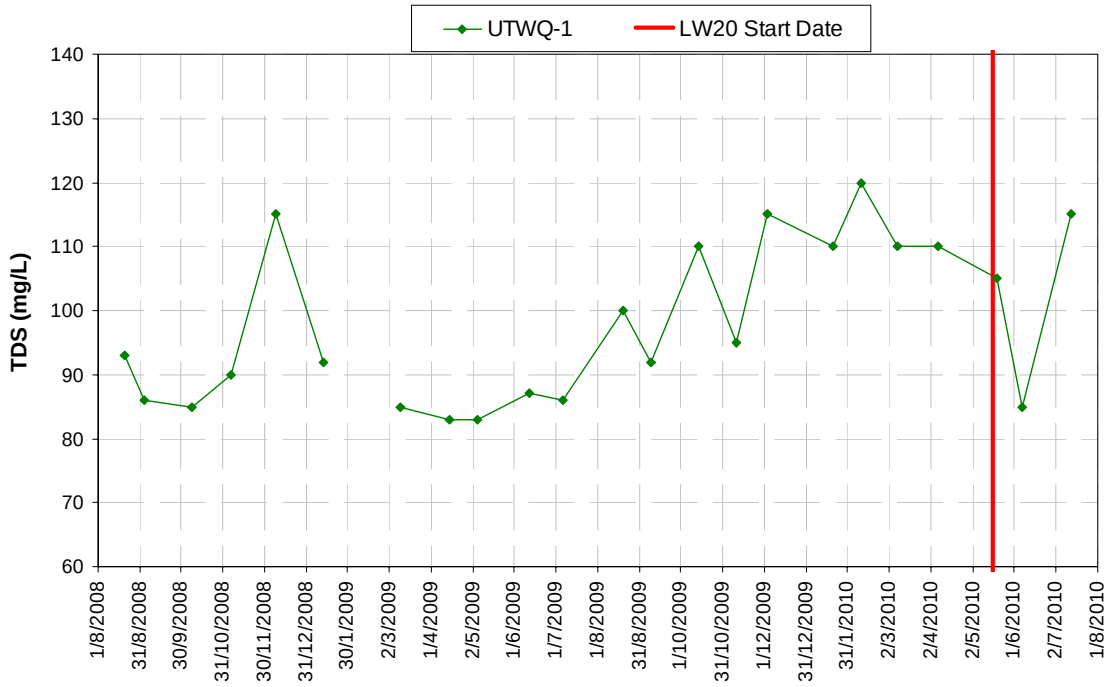

Chart A121 Total Dissolved Solids (mg/L) Tributary D

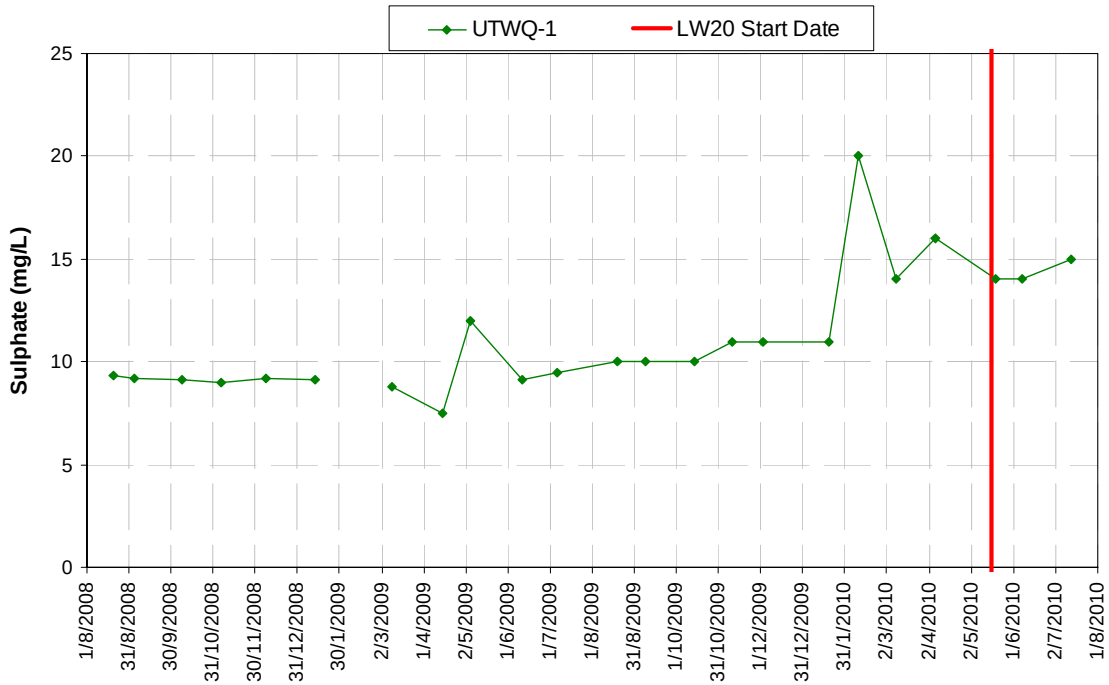

Chart A122 Sulphate (mg/L) Tributary D

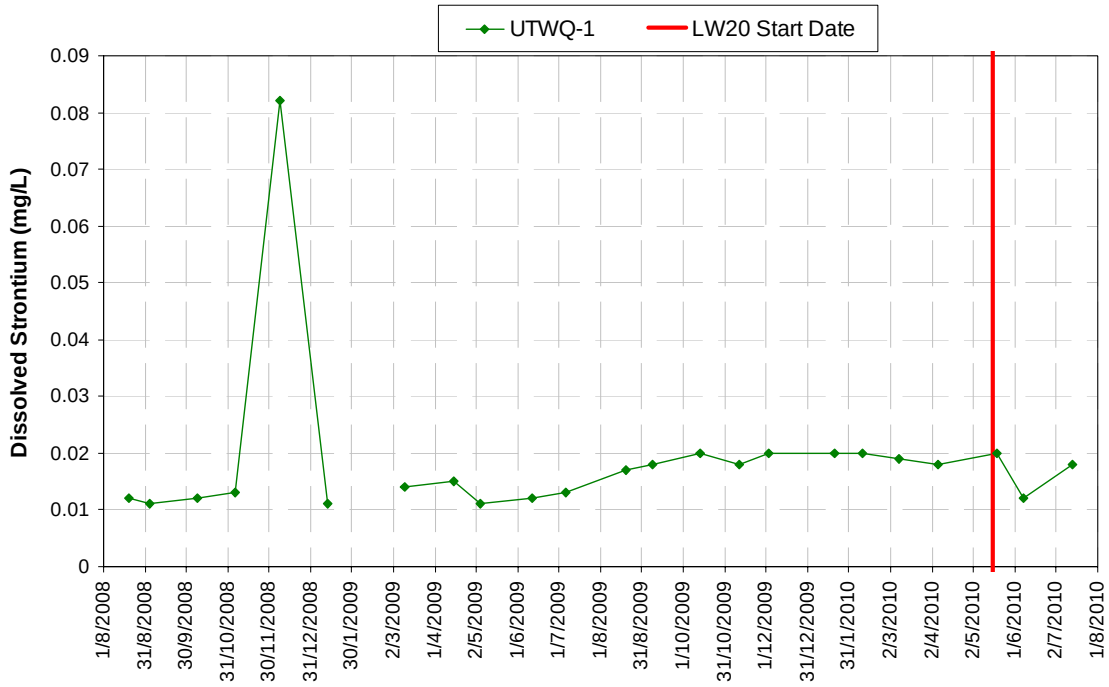

Chart A123 Dissolved Strontium (mg/L) Tributary D

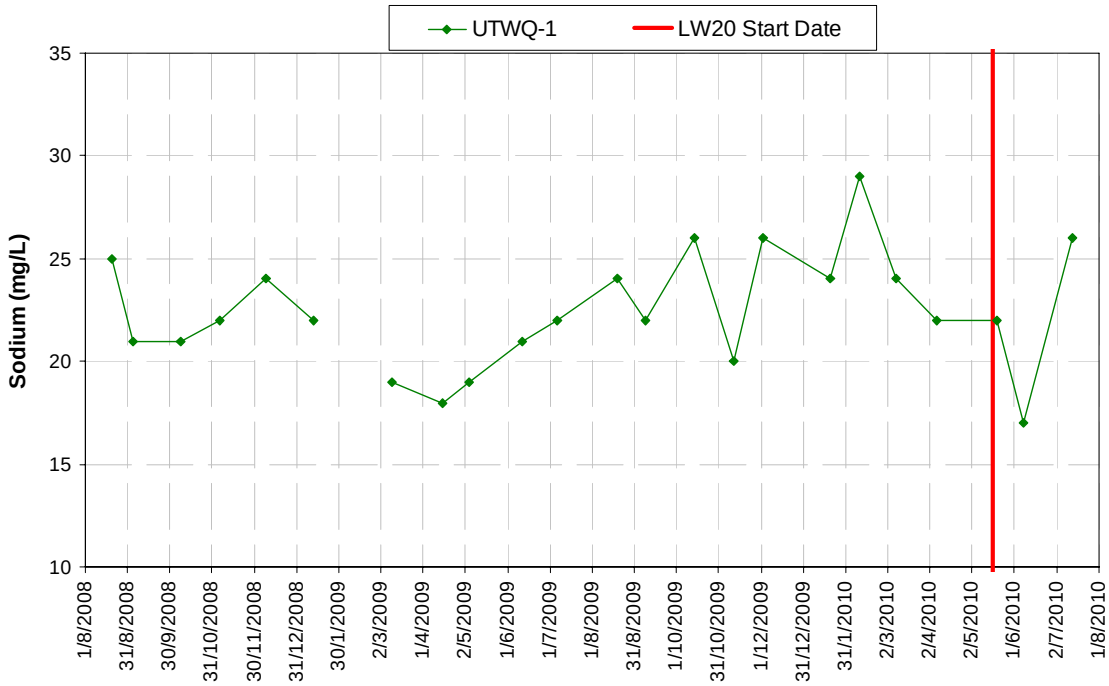

Chart A124 Sodium (mg/L) Tributary D

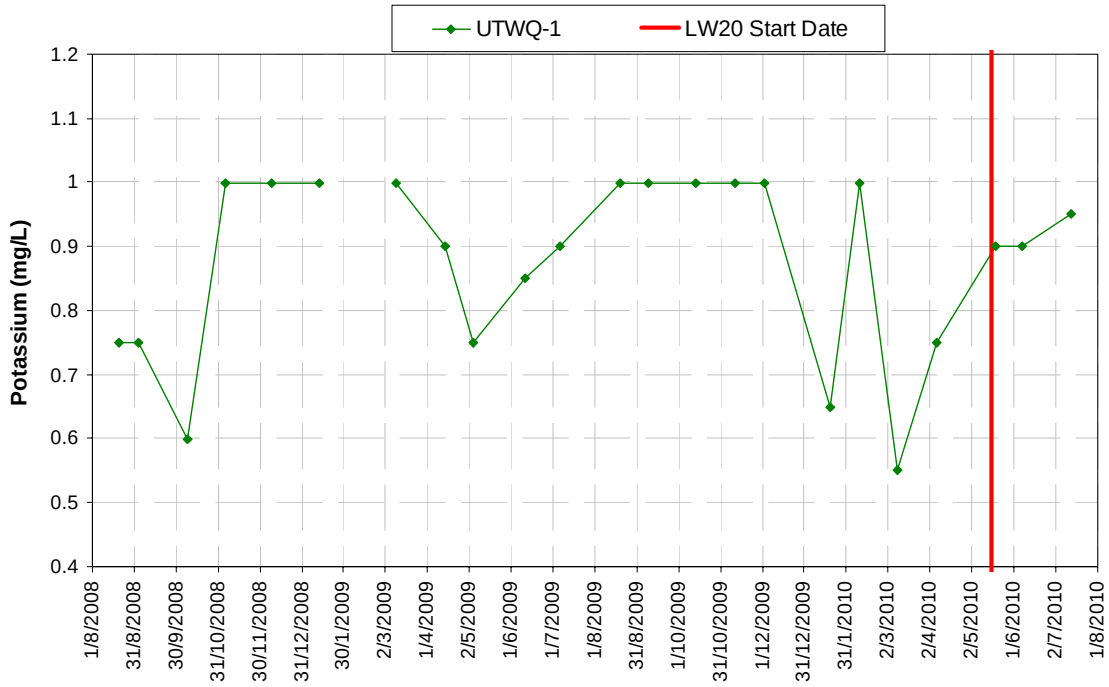

Chart A125 Potassium (mg/L) Tributary D

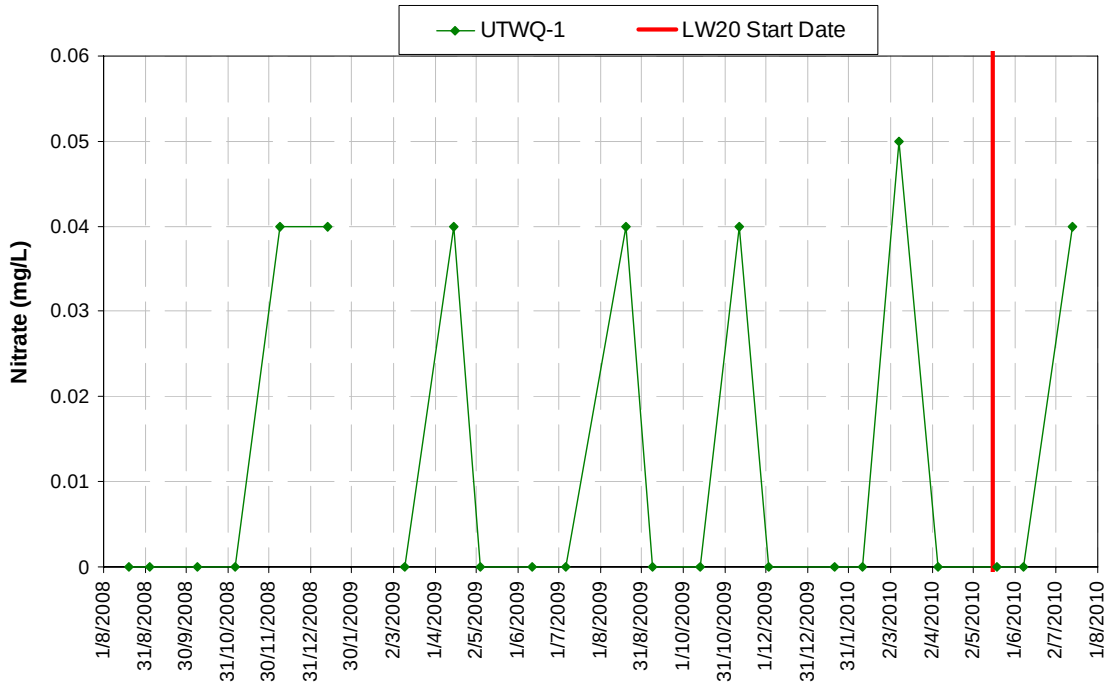

Chart A126 Nitrate (mg/L) Tributary D

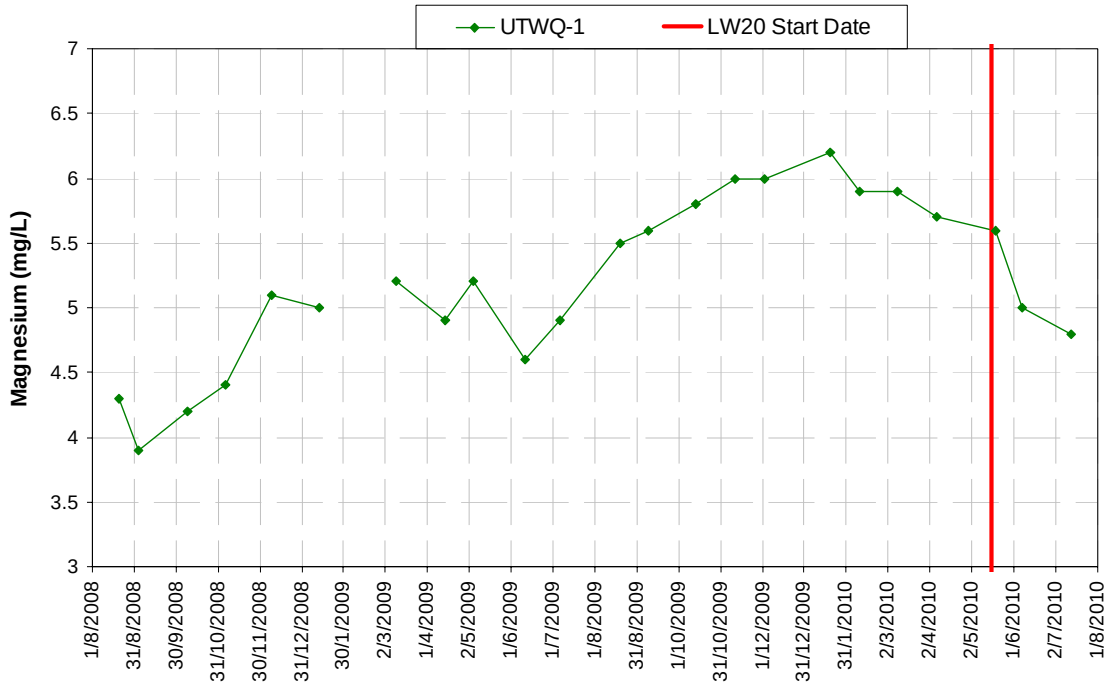

Chart A127 Magnesium (mg/L) Tributary D

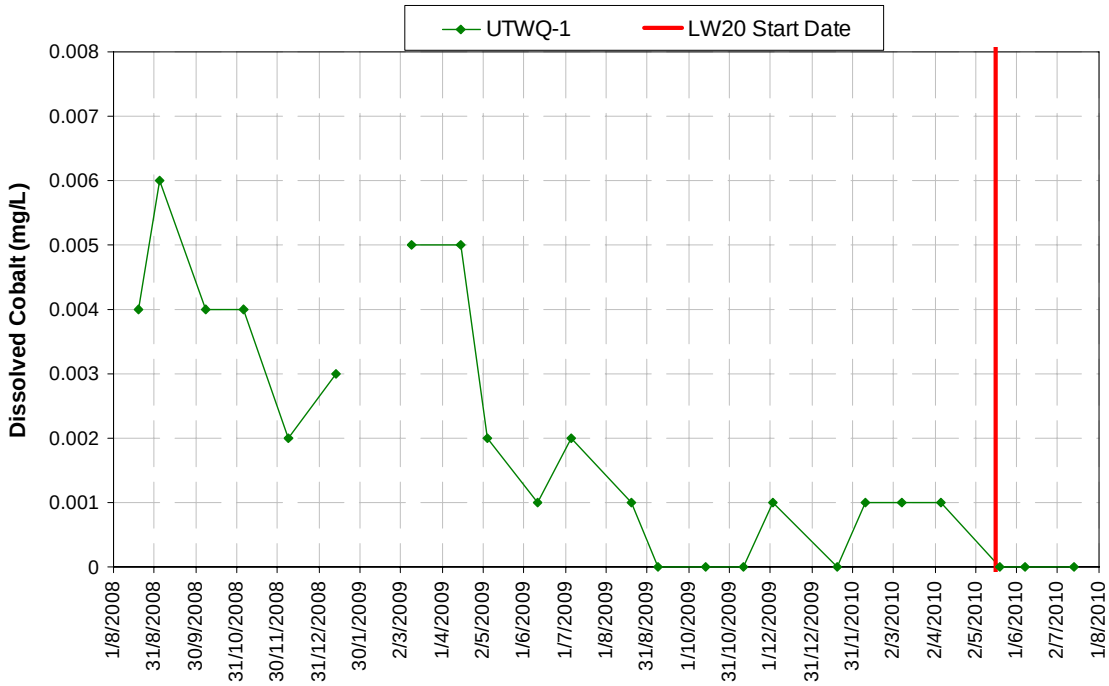

Chart A128 Dissolved Cobalt (mg/L) Tributary D

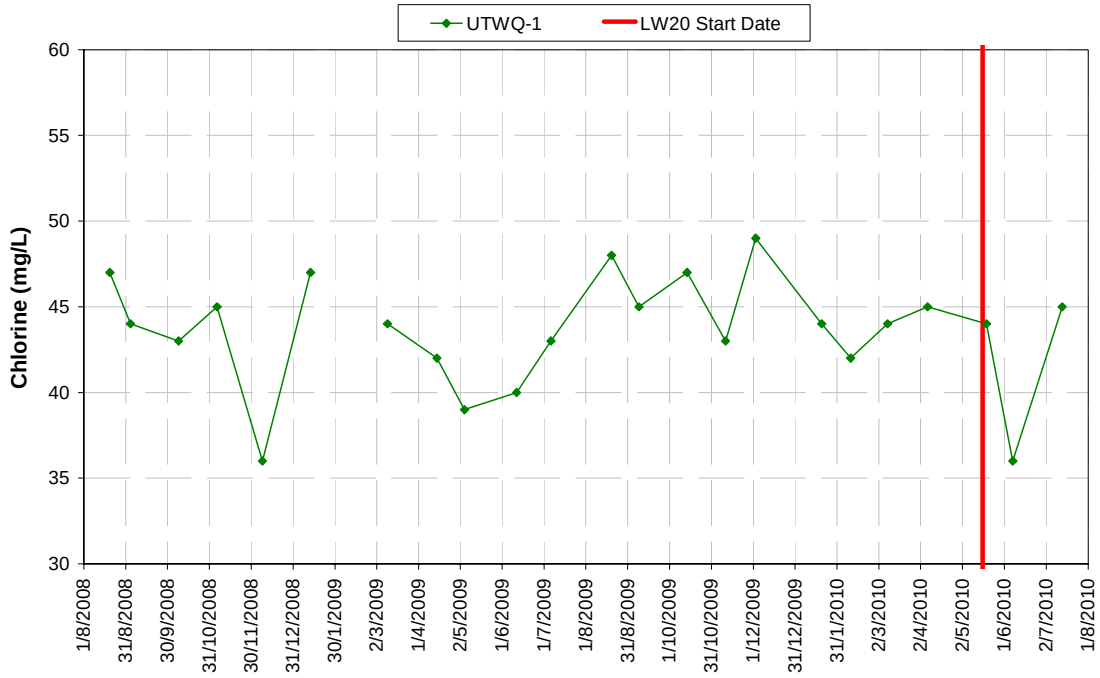

Chart A129 Chlorine (mg/L) Tributary D

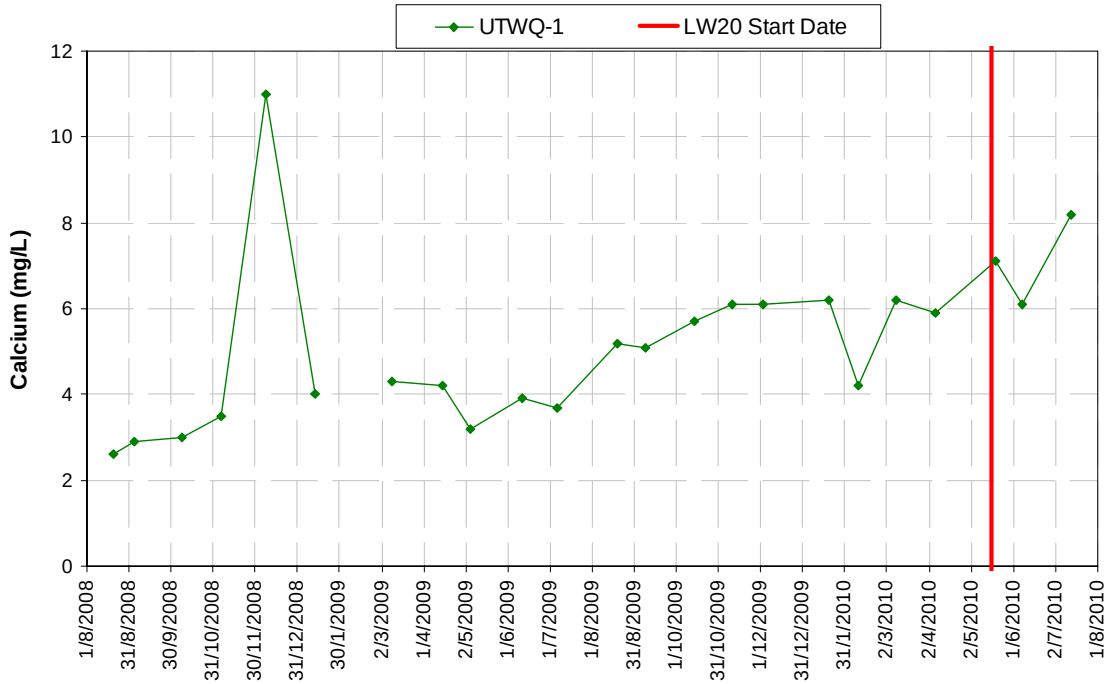

Chart A130 Calcium (mg/L) Tributary D

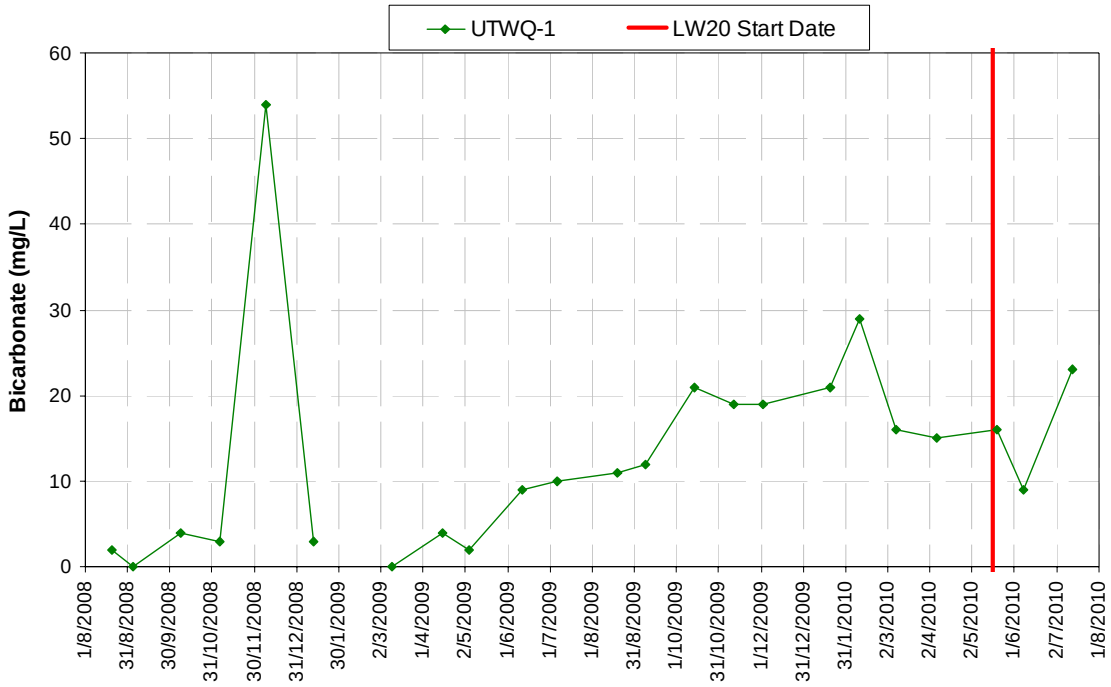

Chart A131 Bicarbonate (mg/L) Tributary D

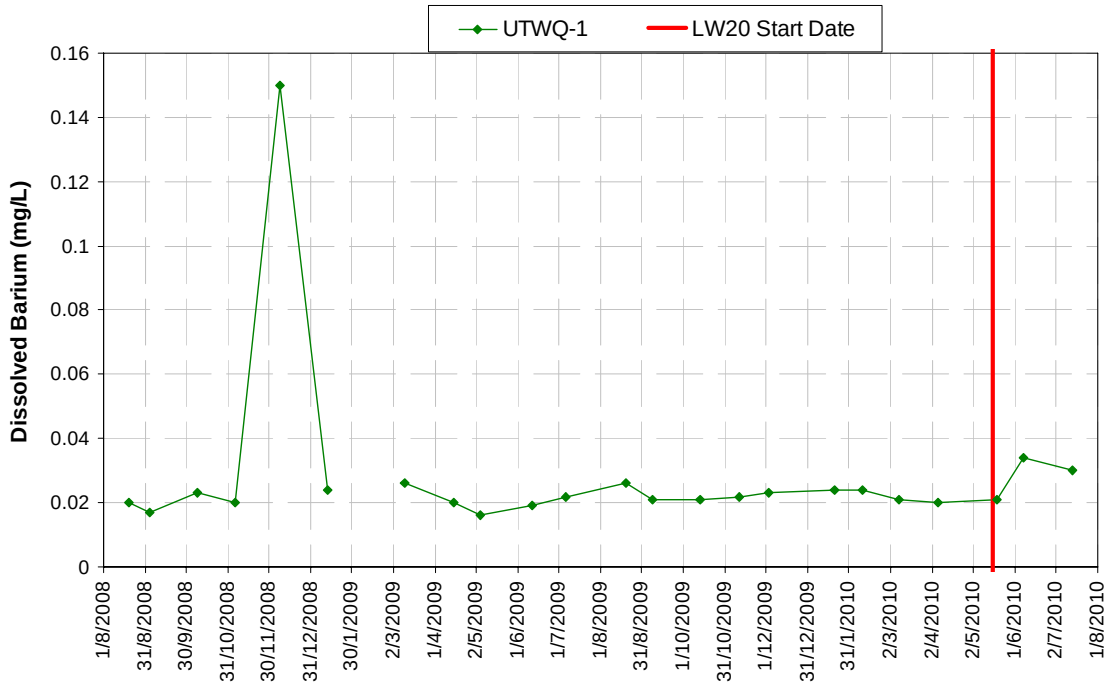

Chart A132 Dissolved Barium (mg/L) Tributary D

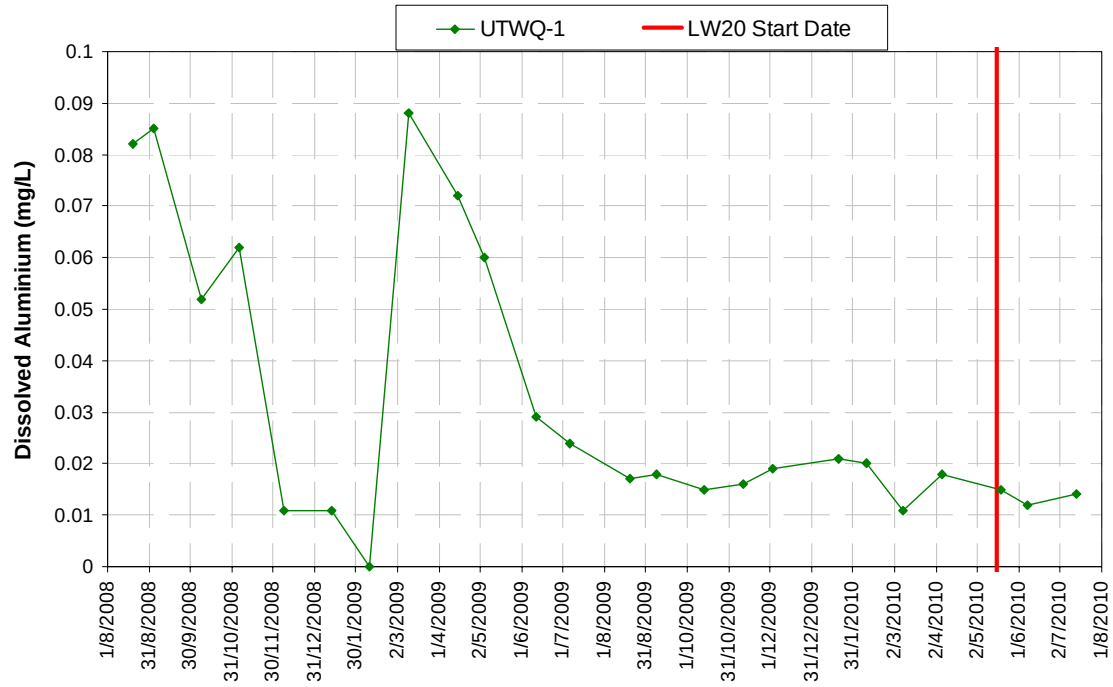

Chart A133 Dissolved Aluminium (mg/L) Tributary D

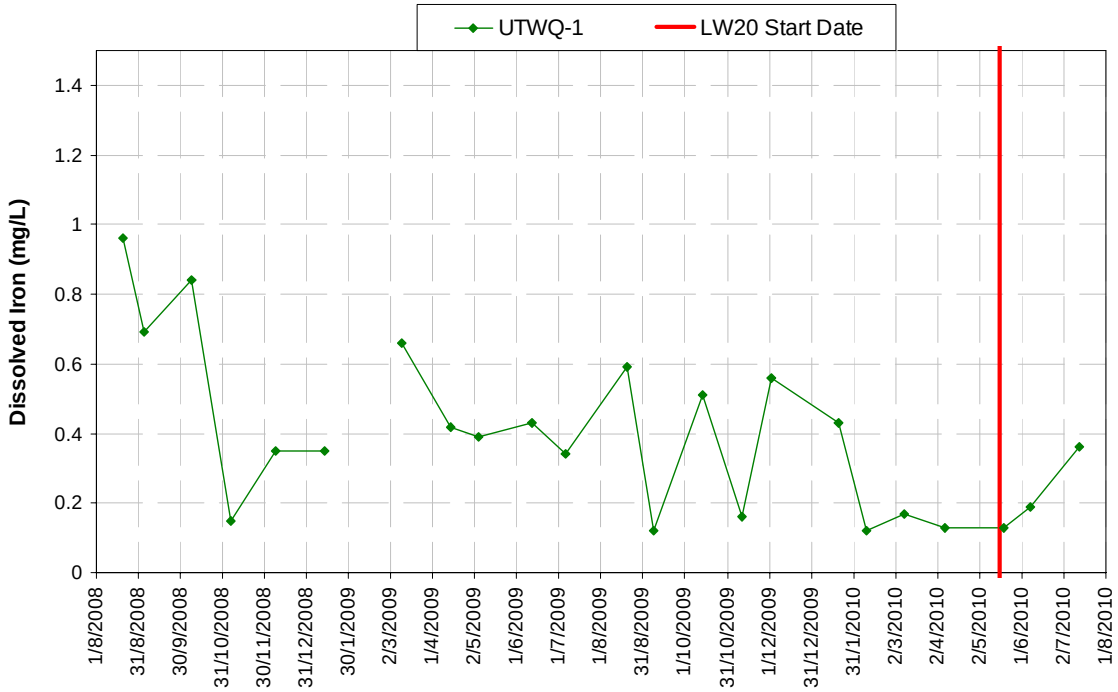

Chart A134 Dissolved Iron (mg/L) Tributary D

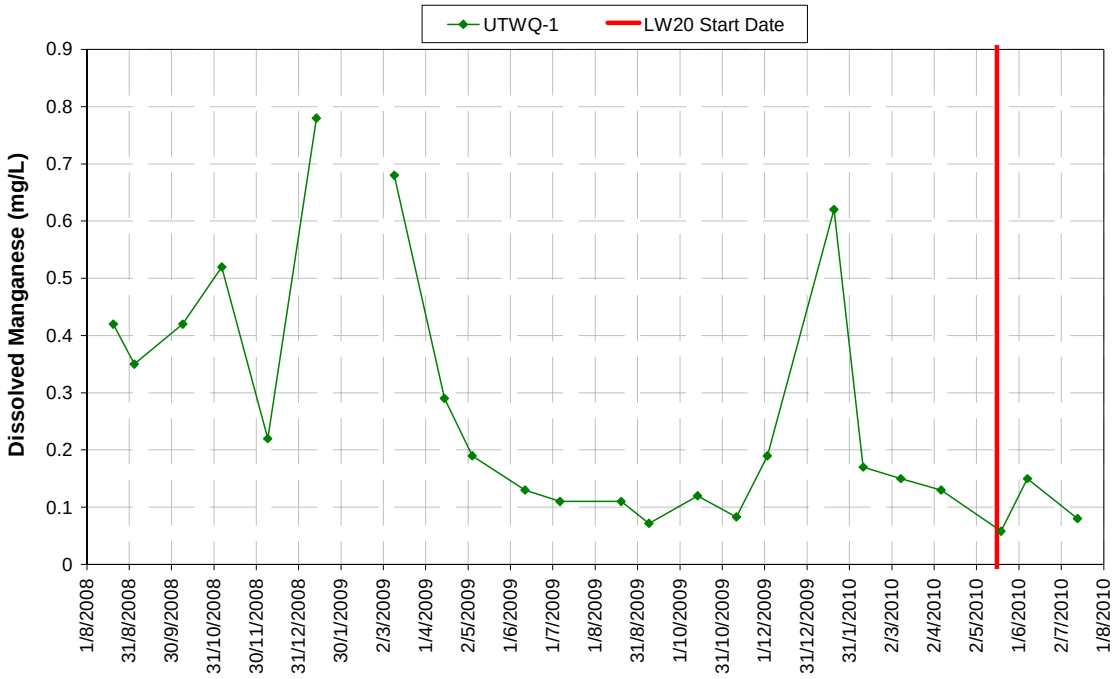

Chart A135 Dissolved Manganese (mg/L) Tributary D

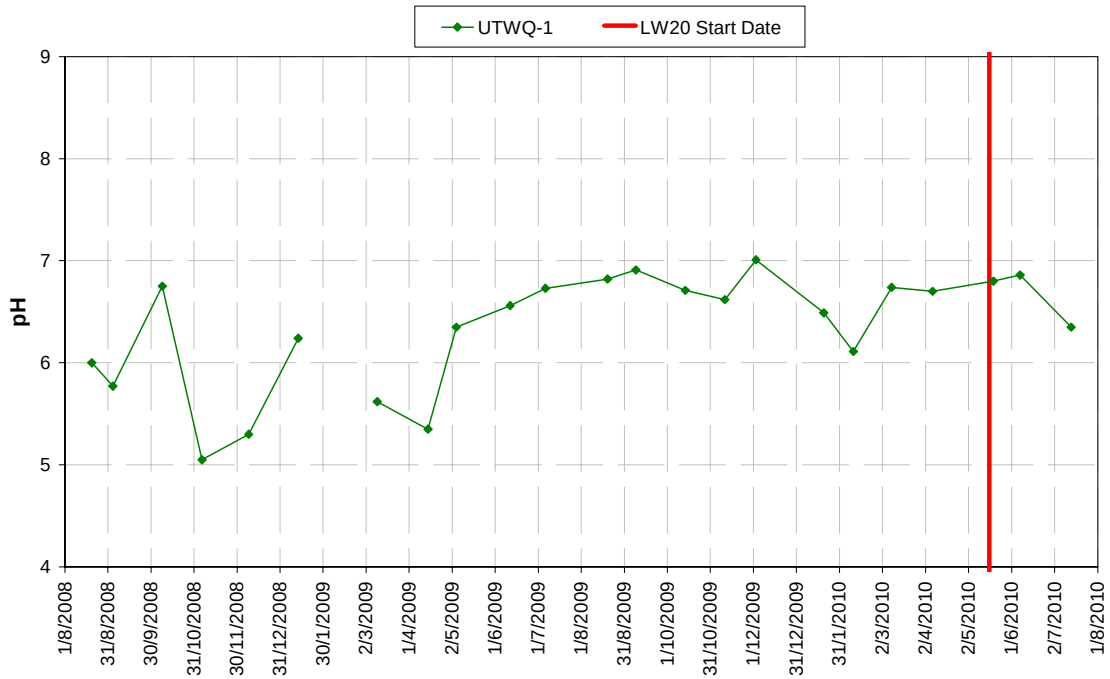

Chart A136 pH (Field)) Tributary D

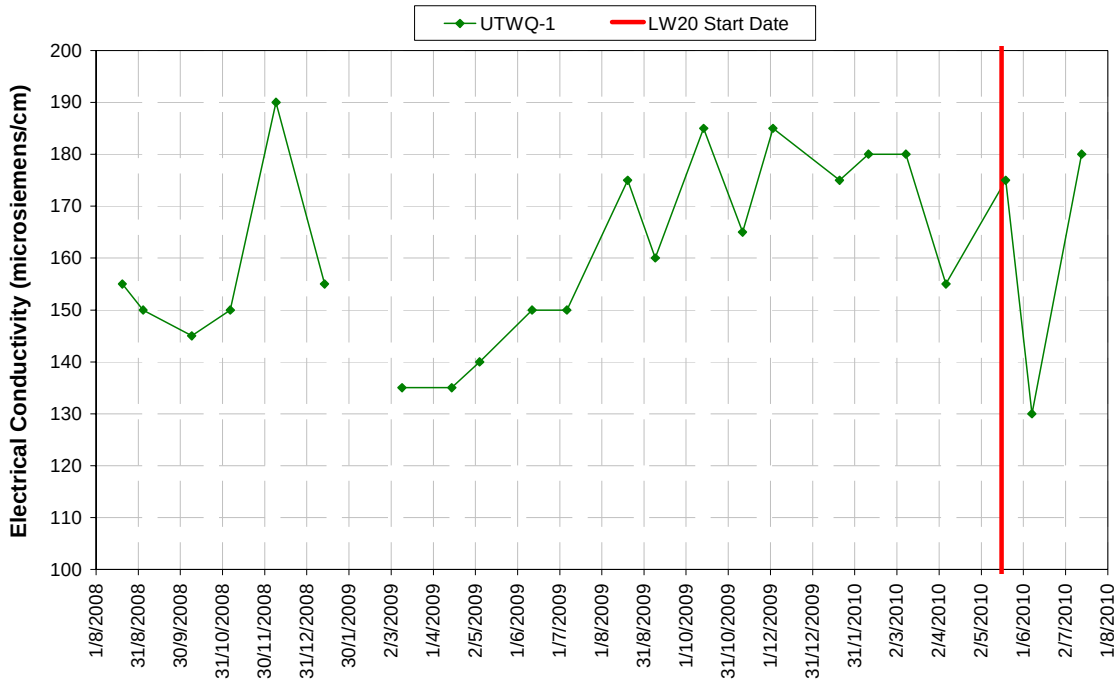

Chart A137 Electrical Conductivity (micro-Siemens/cm) Tributary D

Graphical Plots of Water Quality Monitoring Results for Far Eastern Tributary

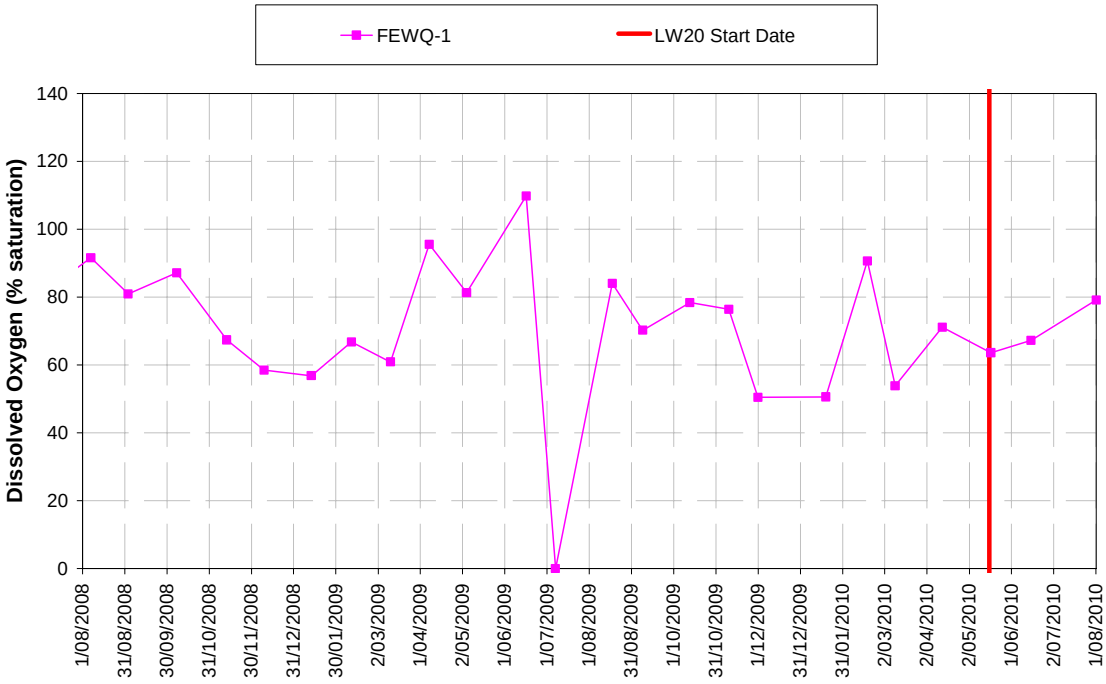

Chart A138 Dissolved Oxygen (% Saturation) Far Eastern Tributary

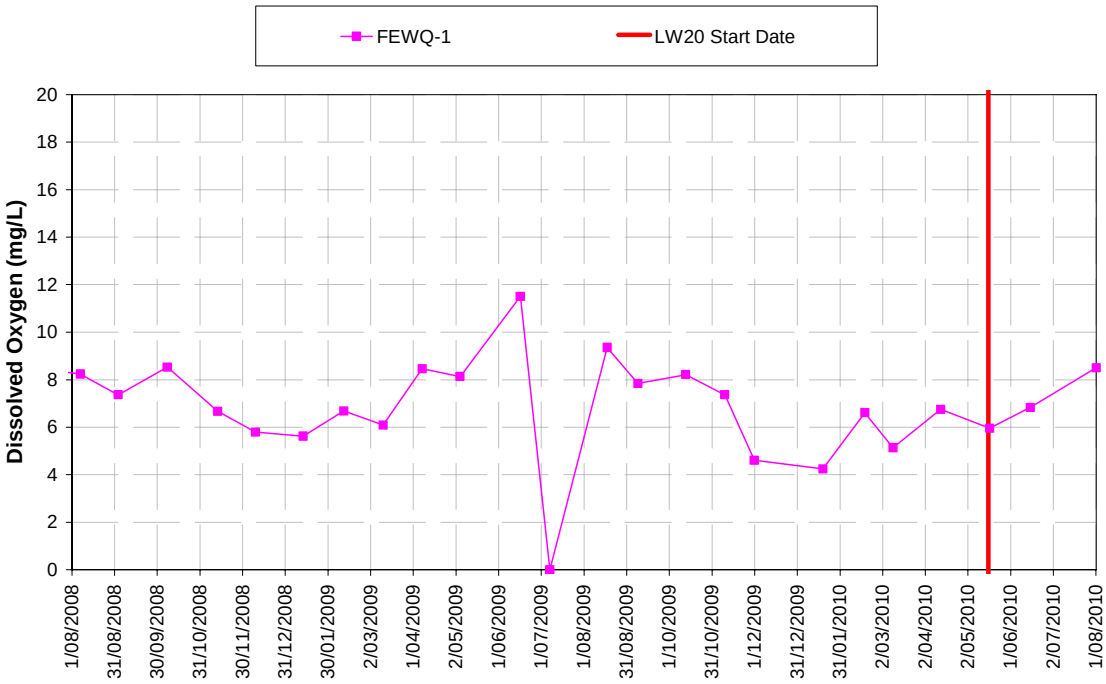

Chart A139 Dissolved Oxygen (mg/L) Far Eastern Tributary

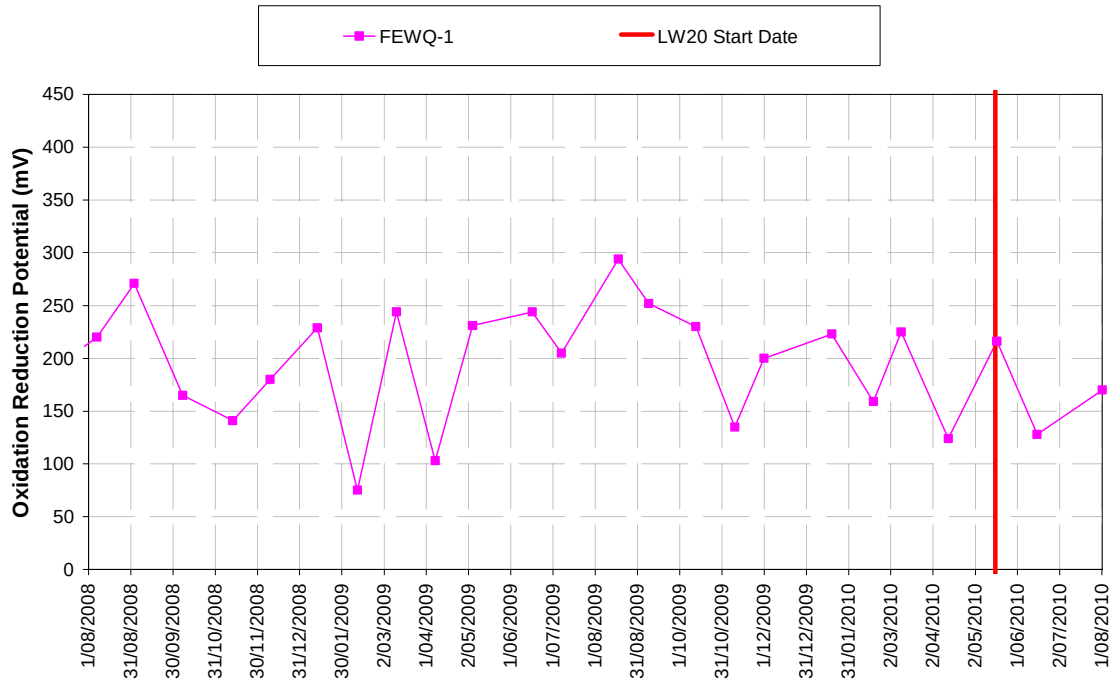

Chart A140 Oxidation Reduction Potential (mv) Far Eastern Tributary

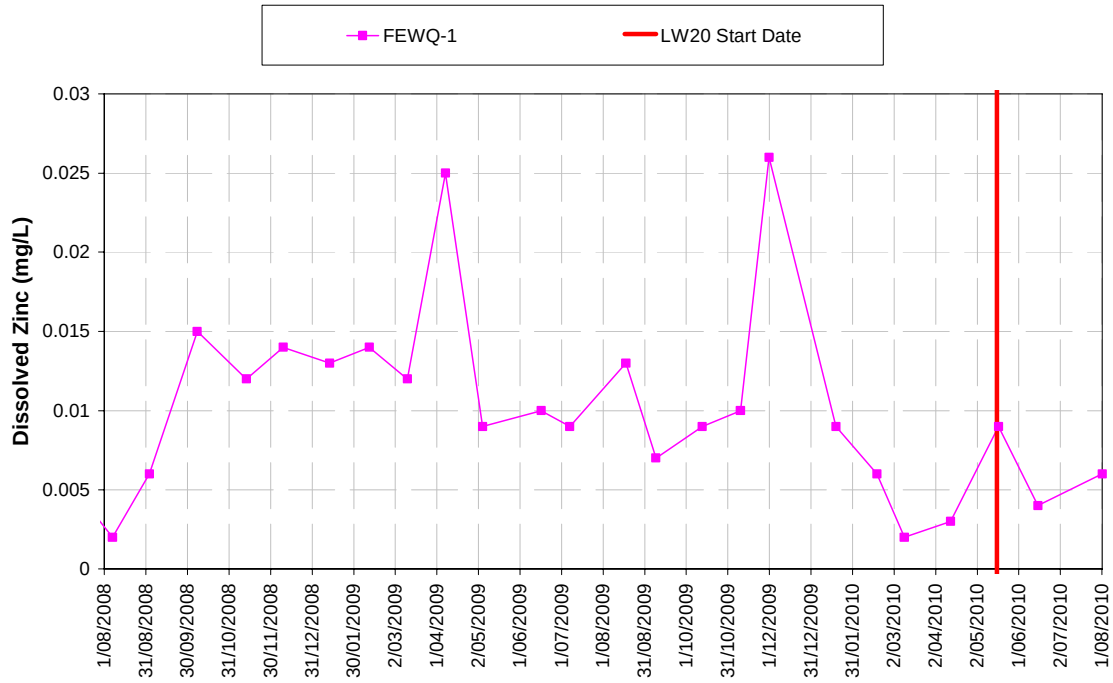

Chart A141 Dissolved Zinc (mg/L) Far Eastern Tributary

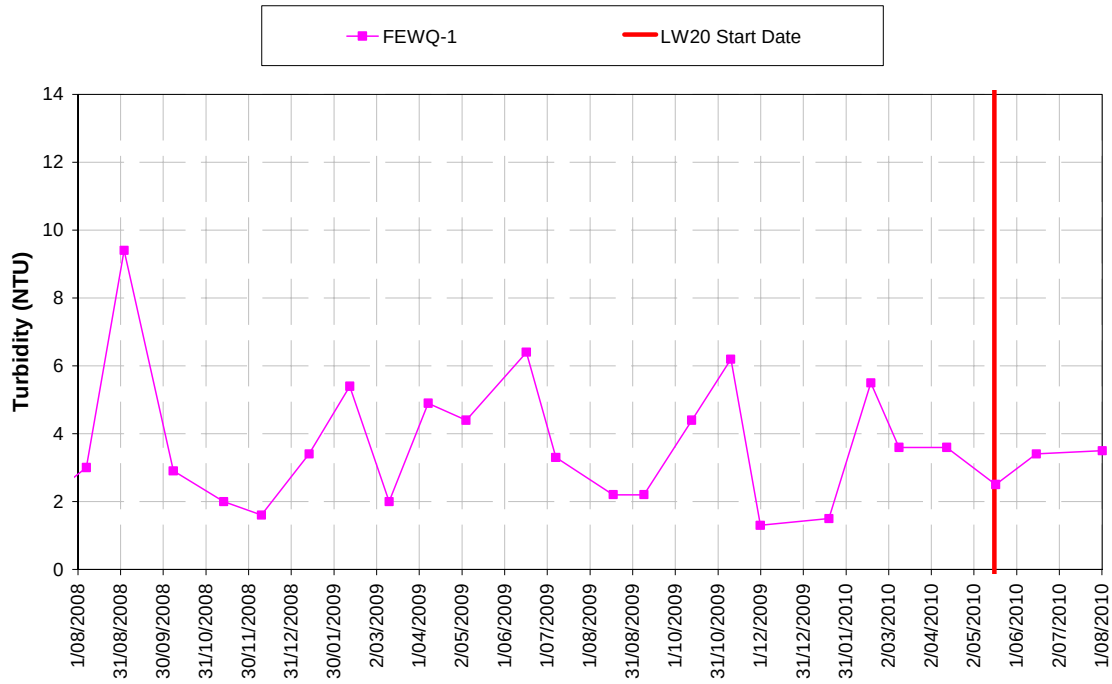

Chart A142 Turbidity (NTU) Far Eastern Tributary

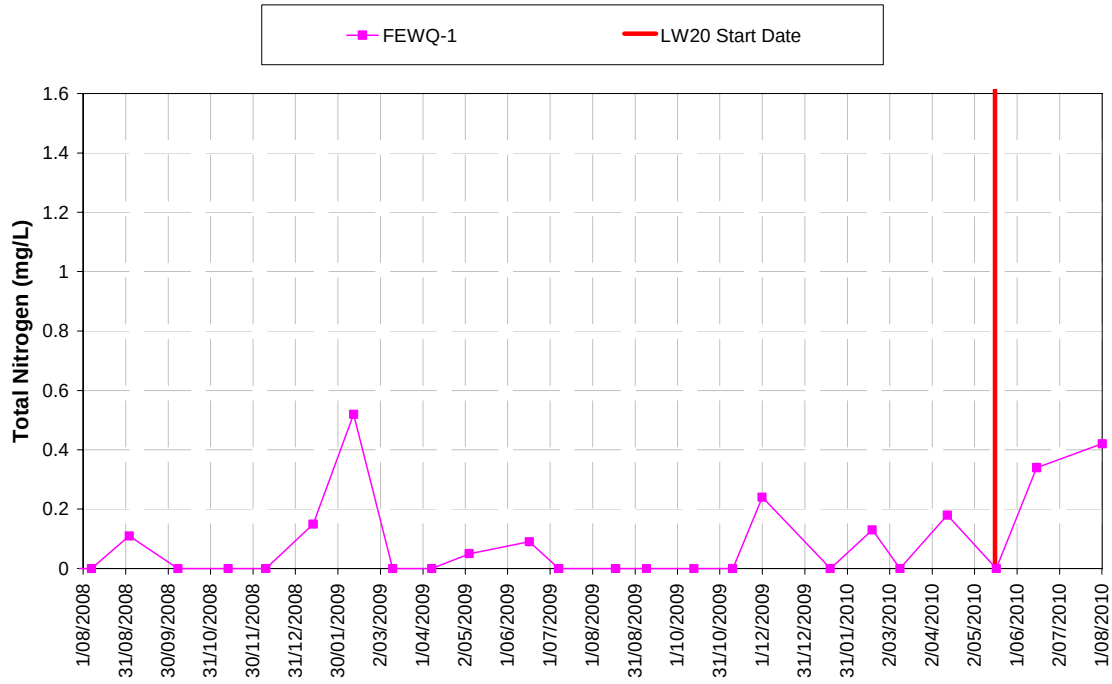

Chart A143 Total Nitrogen (mg/L) Far Eastern Tributary

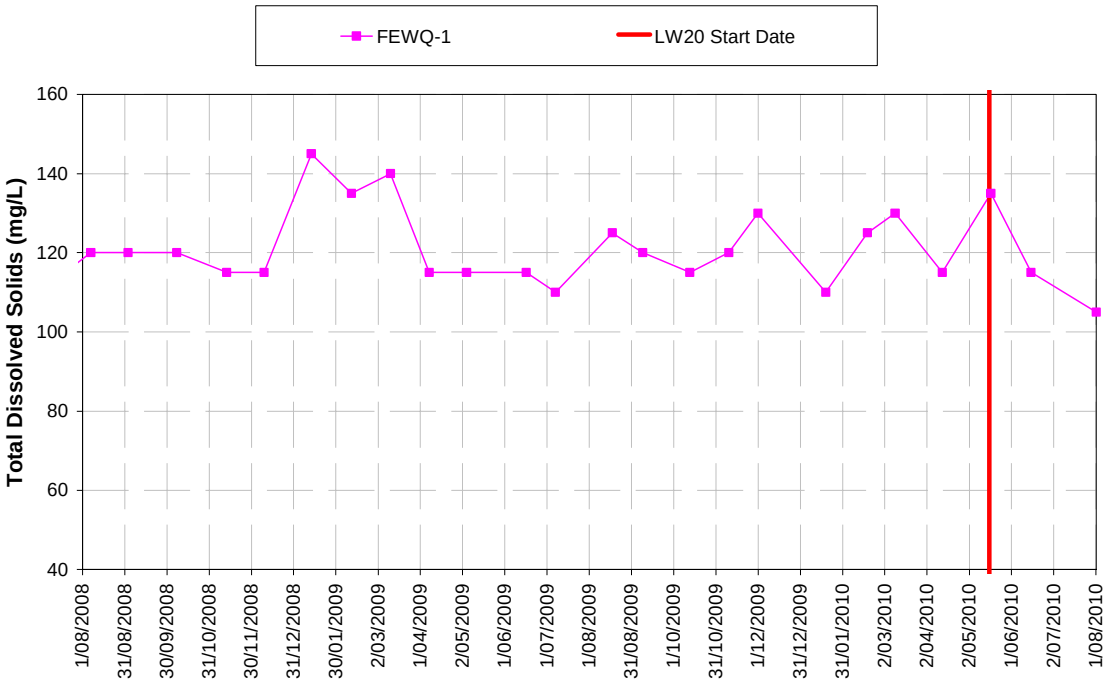

Chart A144 Total Dissolved Solids (mg/L) Far Eastern Tributary

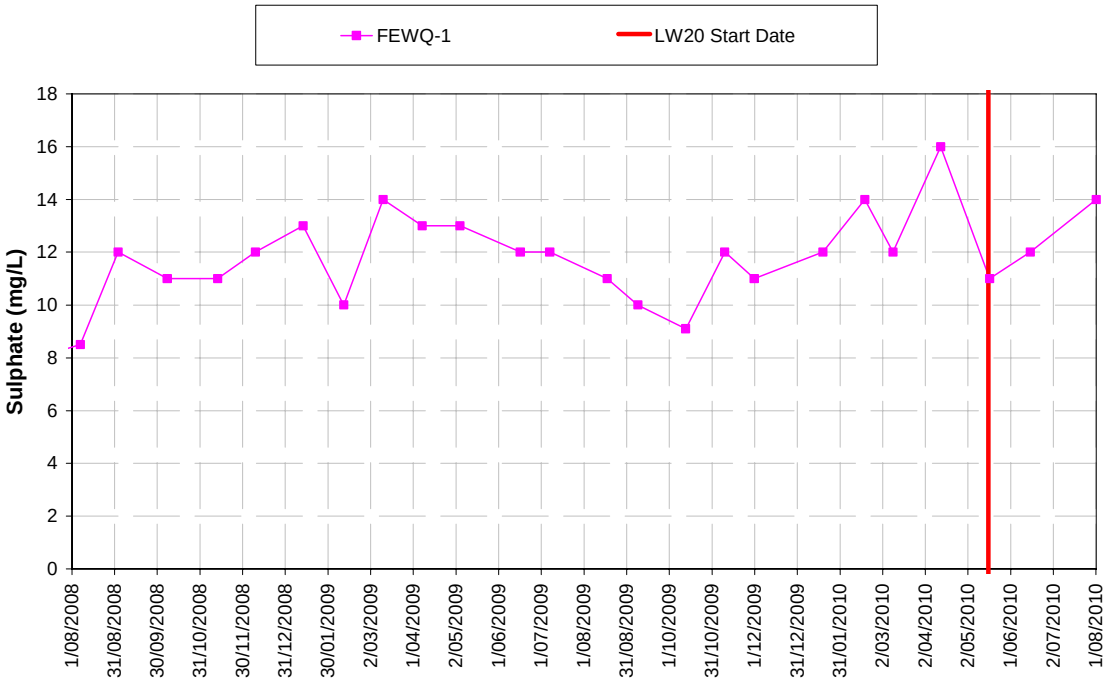

Chart A145 Sulphate (mg/L) Far Eastern Tributary

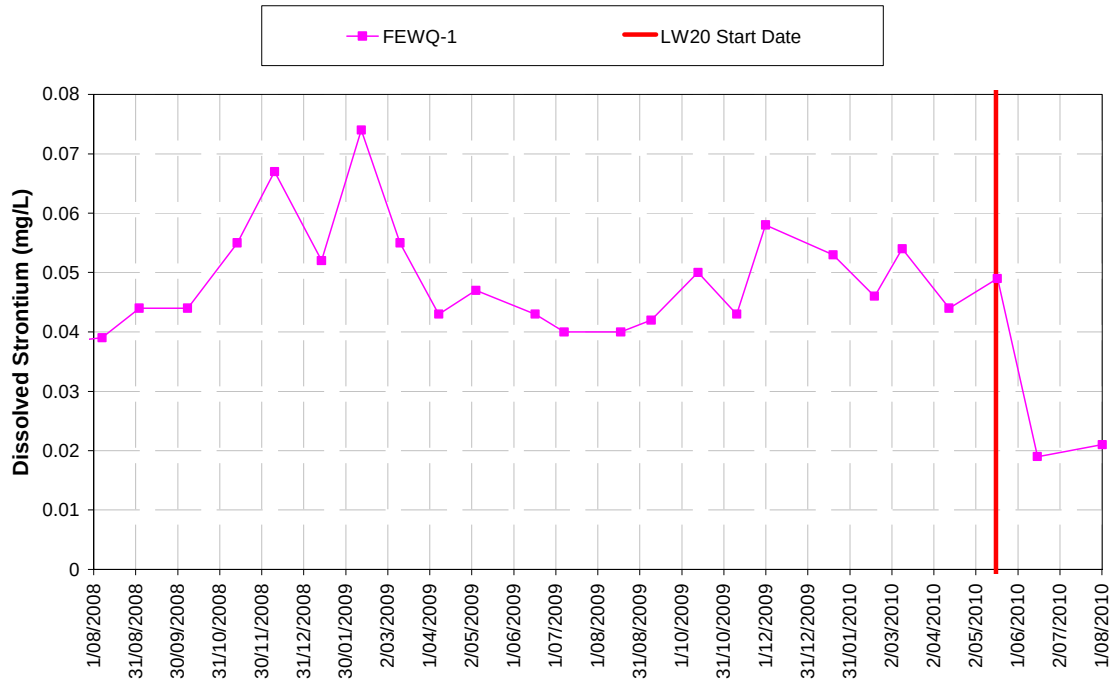

Chart A146 Dissolved Strontium (mg/L) Far Eastern Tributary

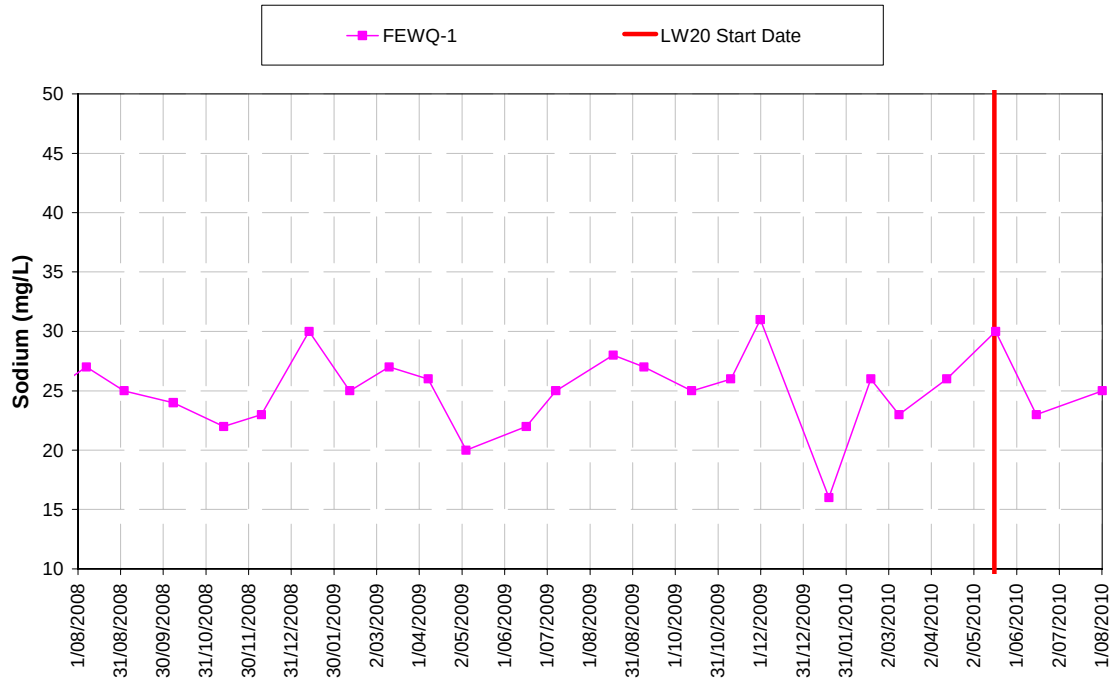

Chart A147 Sodium (mg/L) Far Eastern Tributary

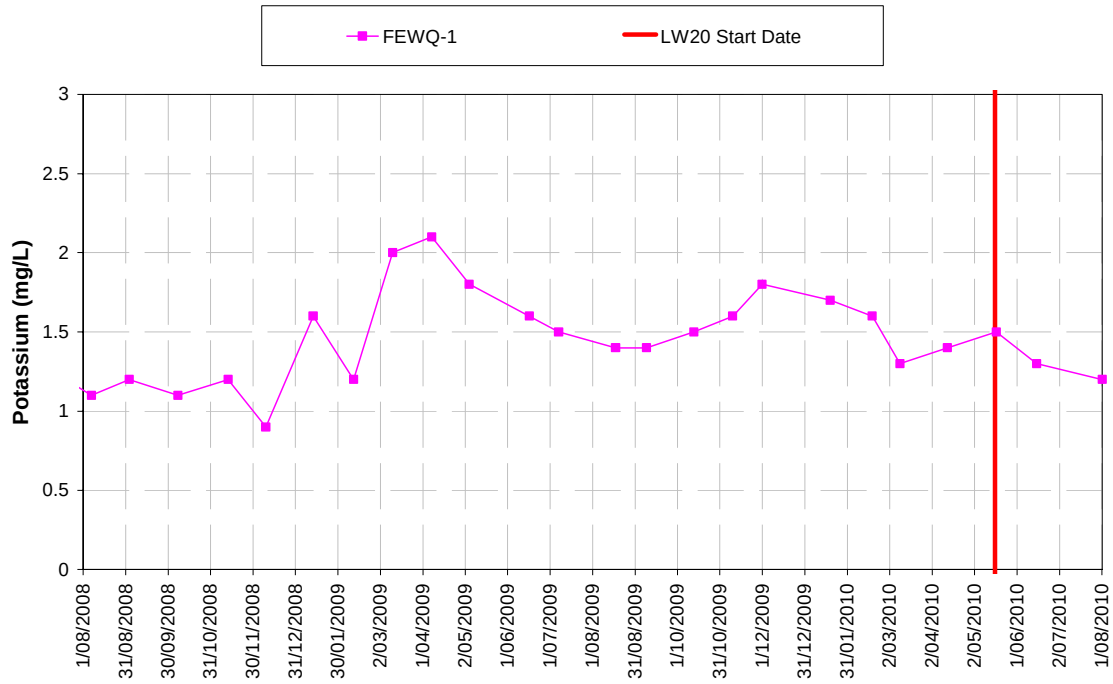

Chart A148 Potassium (mg/L) Far Eastern Tributary

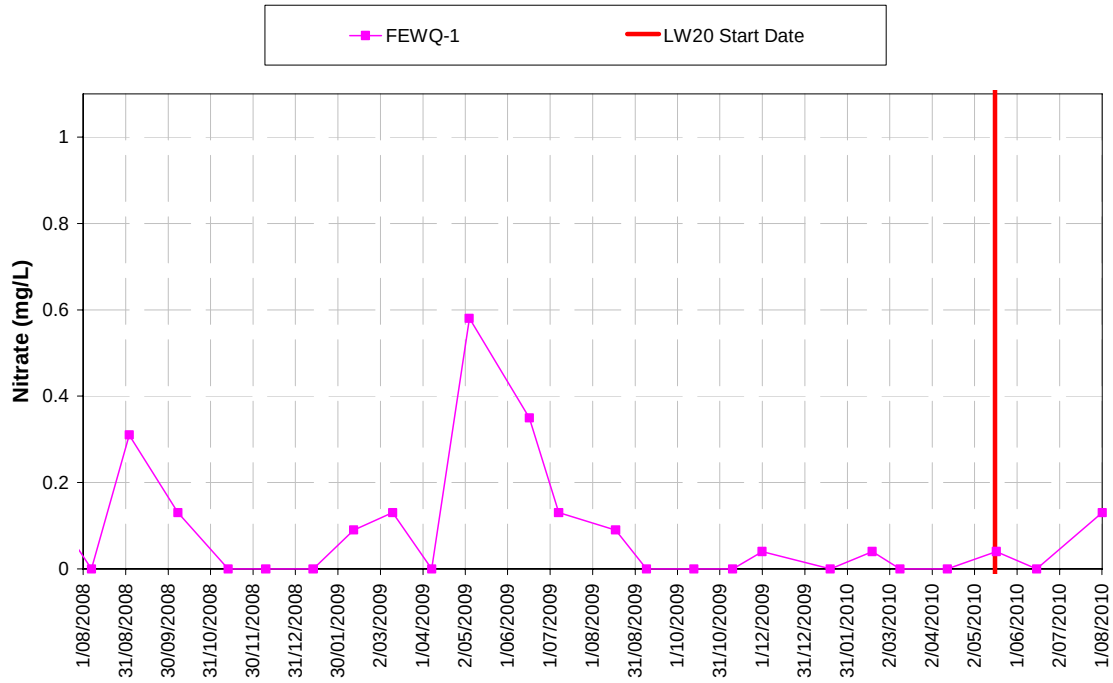

Chart A149 Nitrate (mg/L) Far Eastern Tributary

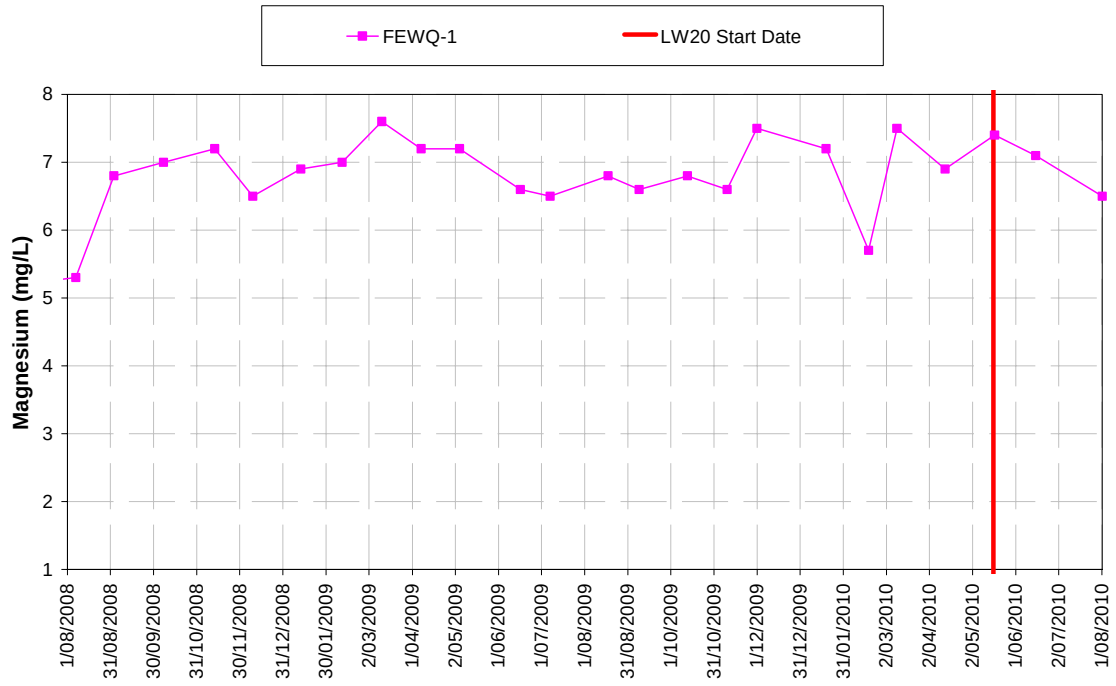

Chart A150 Magnesium (mg/L) Far Eastern Tributary

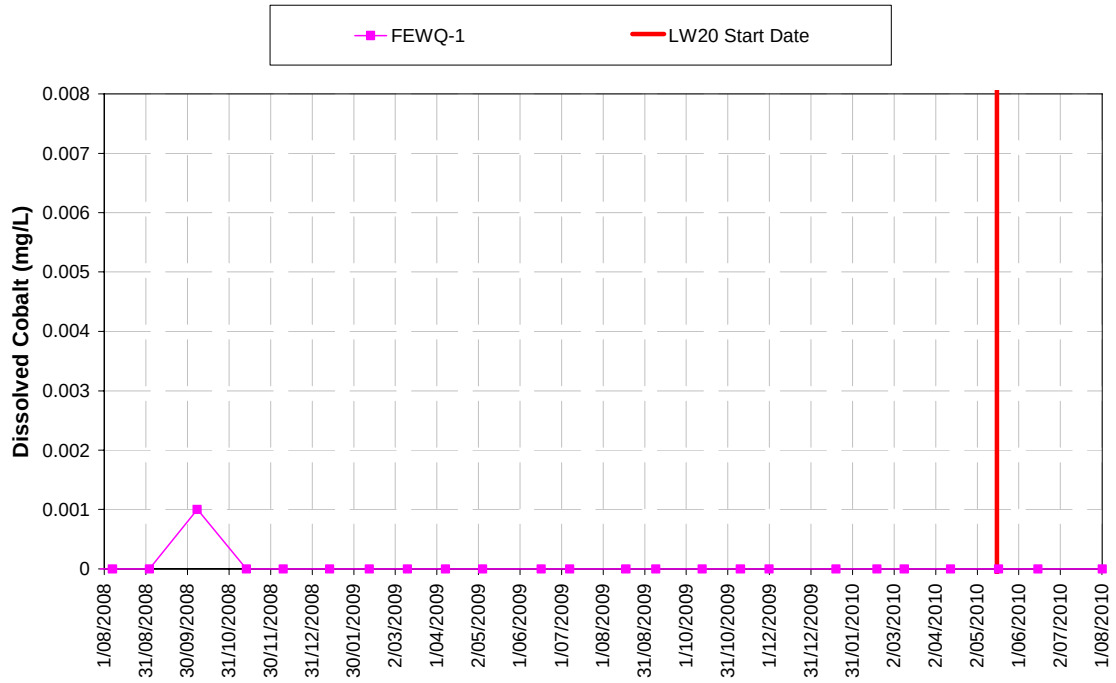

Chart A151 Dissolved Cobalt (mg/L) Far Eastern Tributary

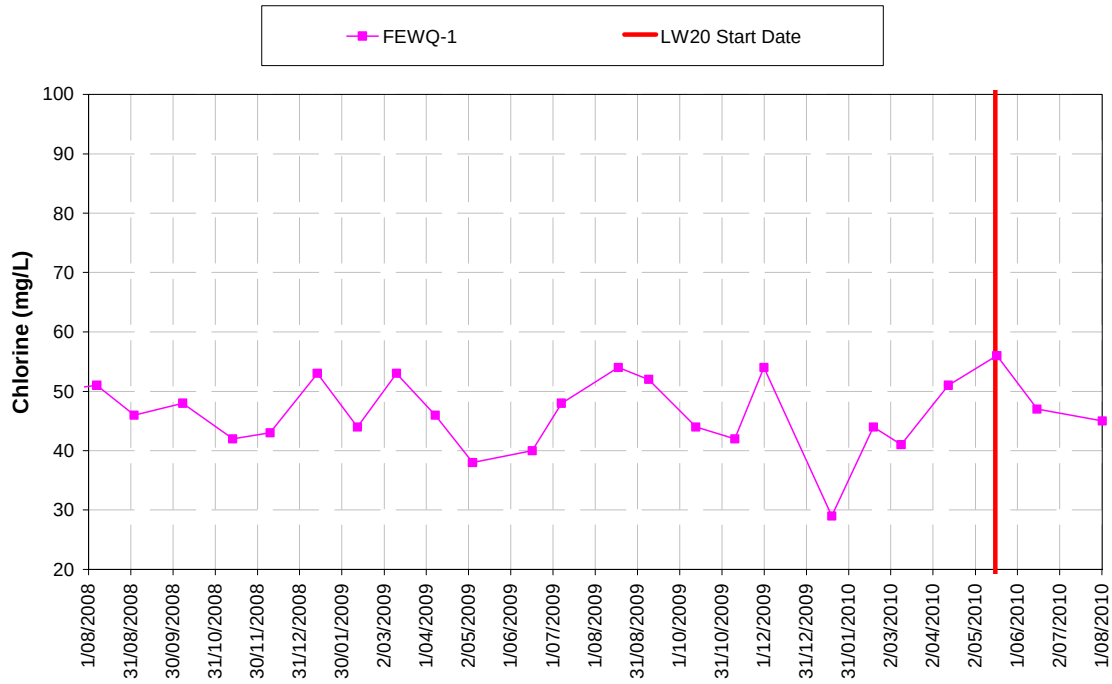

Chart A152 Chlorine (mg/L) Far Eastern Tributary

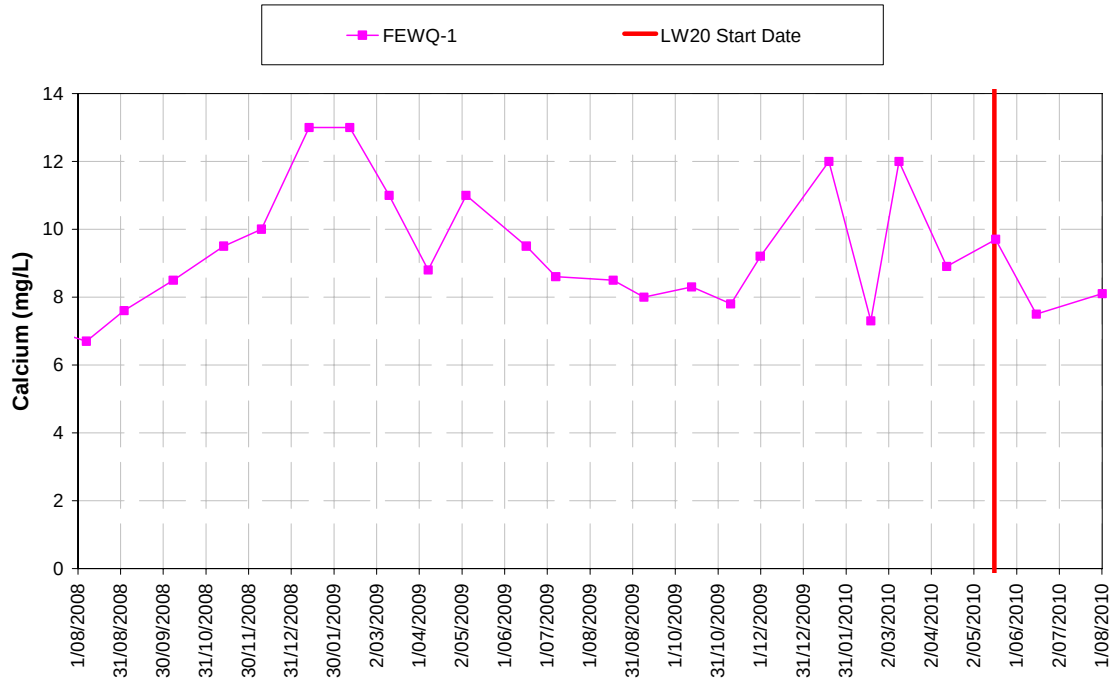

Chart A153 Calcium (mg/L) Far Eastern Tributary

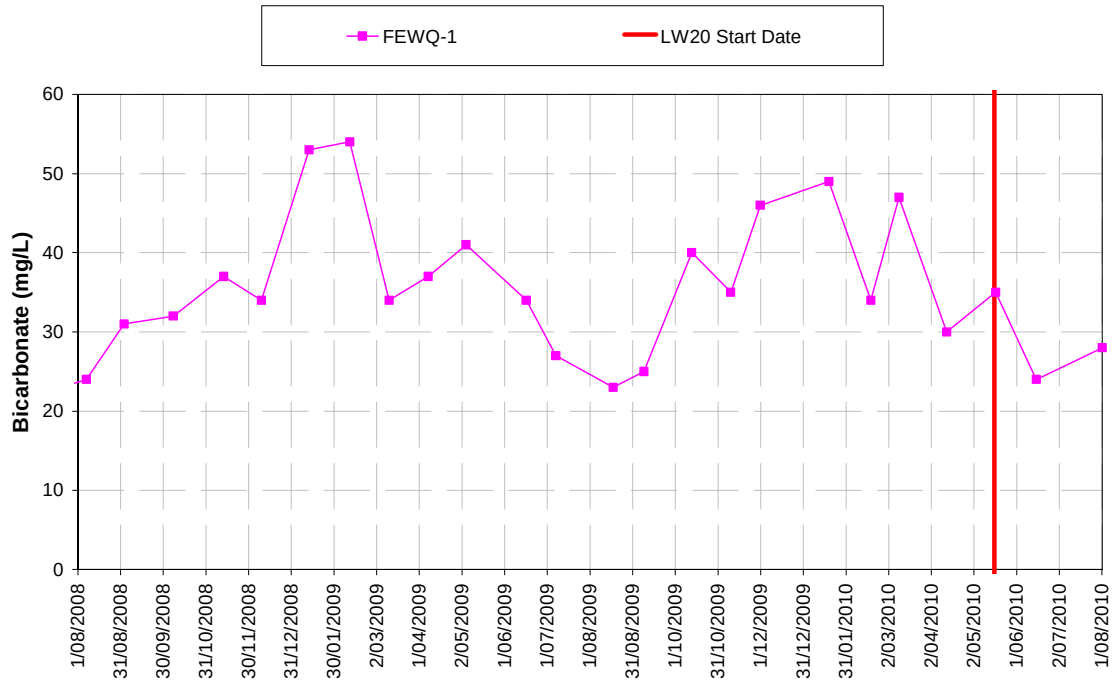

Chart A154 Bicarbonate (mg/L) Far Eastern Tributary

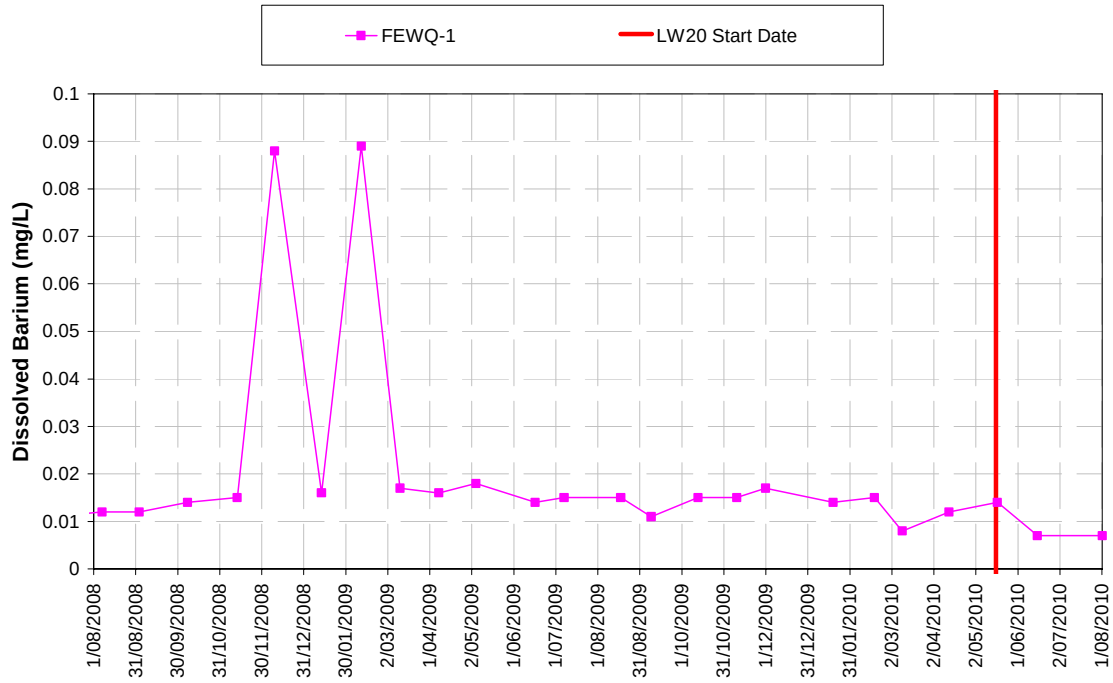

Chart A155 Dissolved Barium (mg/L) Far Eastern Tributary

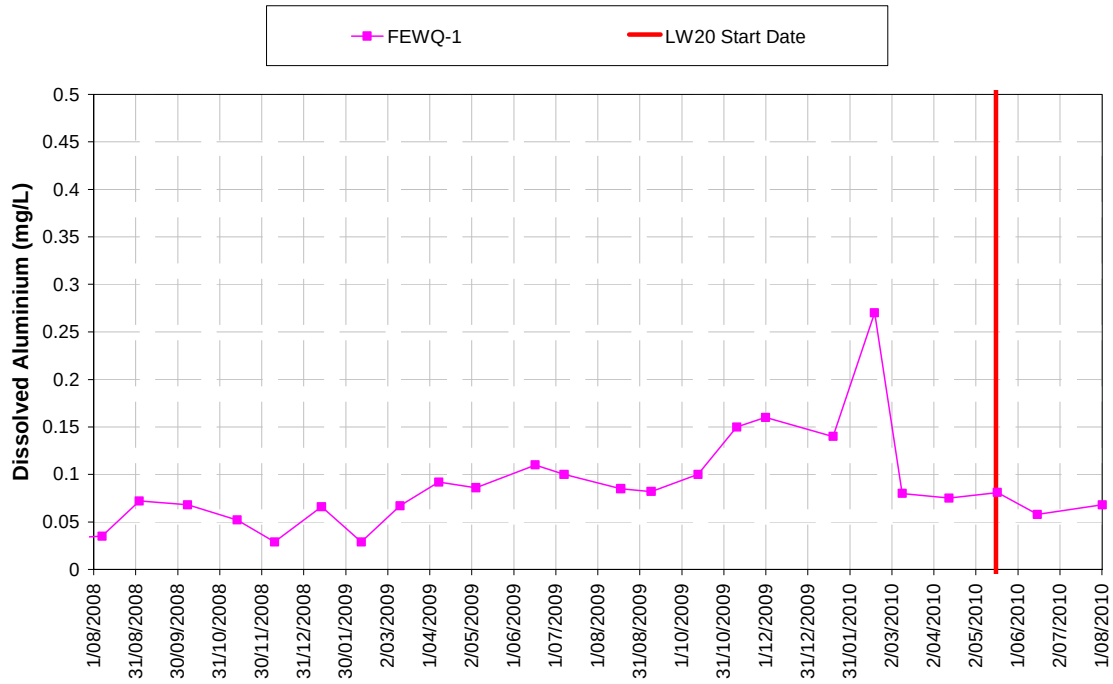

Chart A156 Dissolved Aluminium (mg/L) Far Eastern Tributary

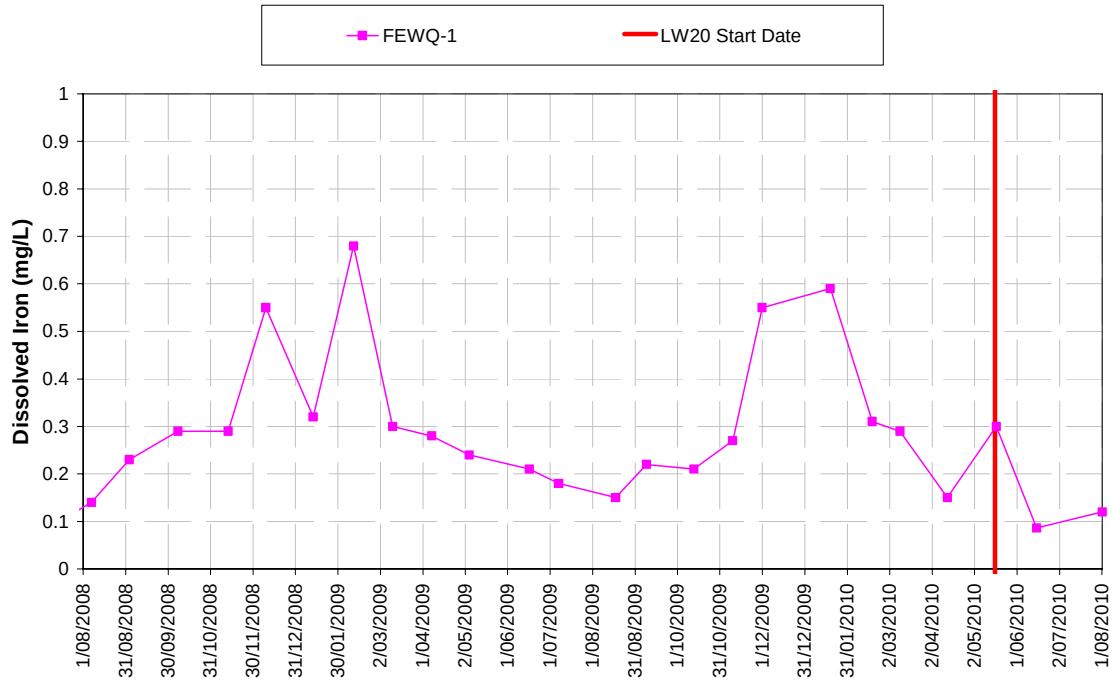

Chart A157 Dissolved Iron (mg/L) Far Eastern Tributary

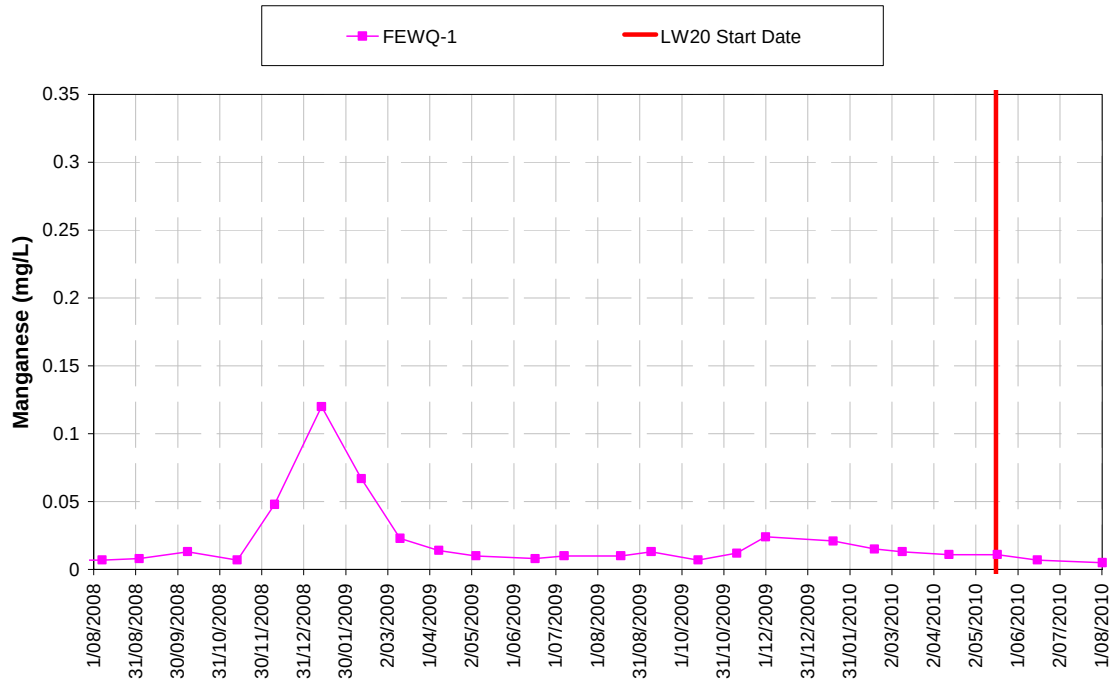

Chart A158 Manganese (mg/L) Far Eastern Tributary

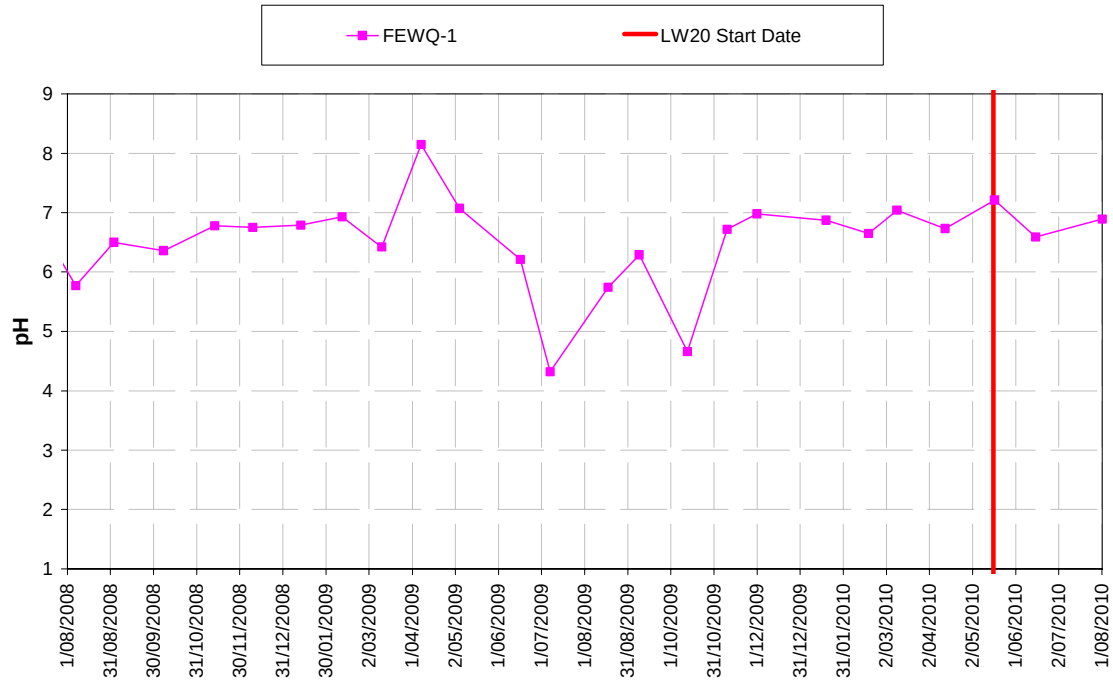

Chart A159 pH (Field) Far Eastern Tributary

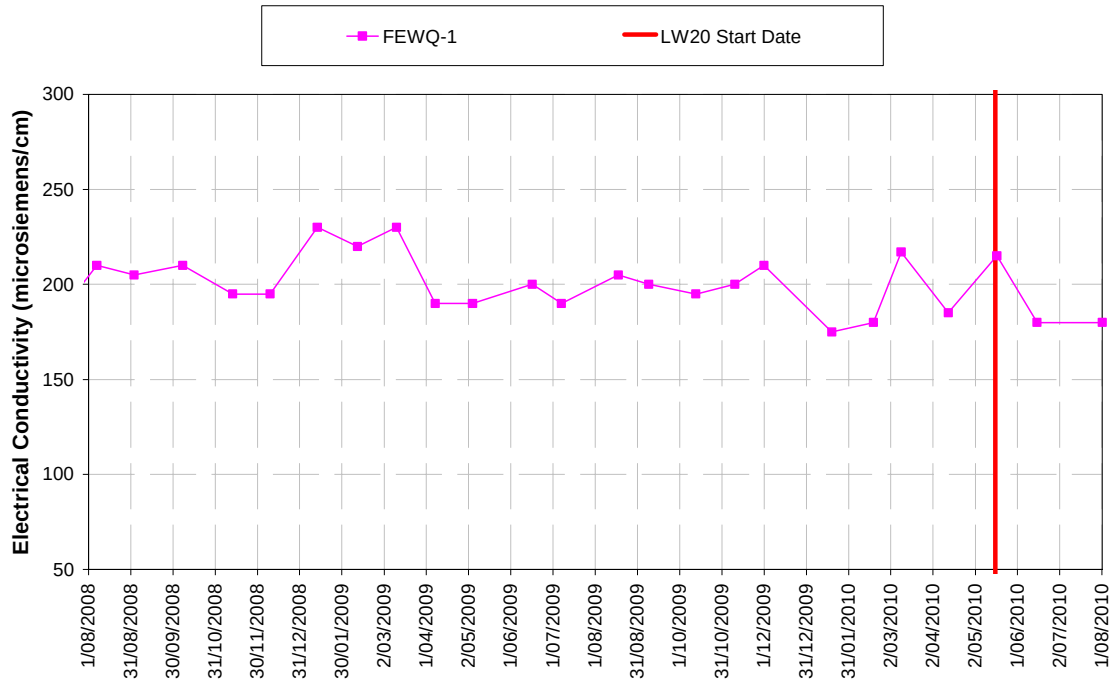

Chart A160 Electrical Conductivity (micro-Siemens/cm) Far Eastern Tributary

Graphical Plots of Water Quality Monitoring Results for Honeysuckle Creek

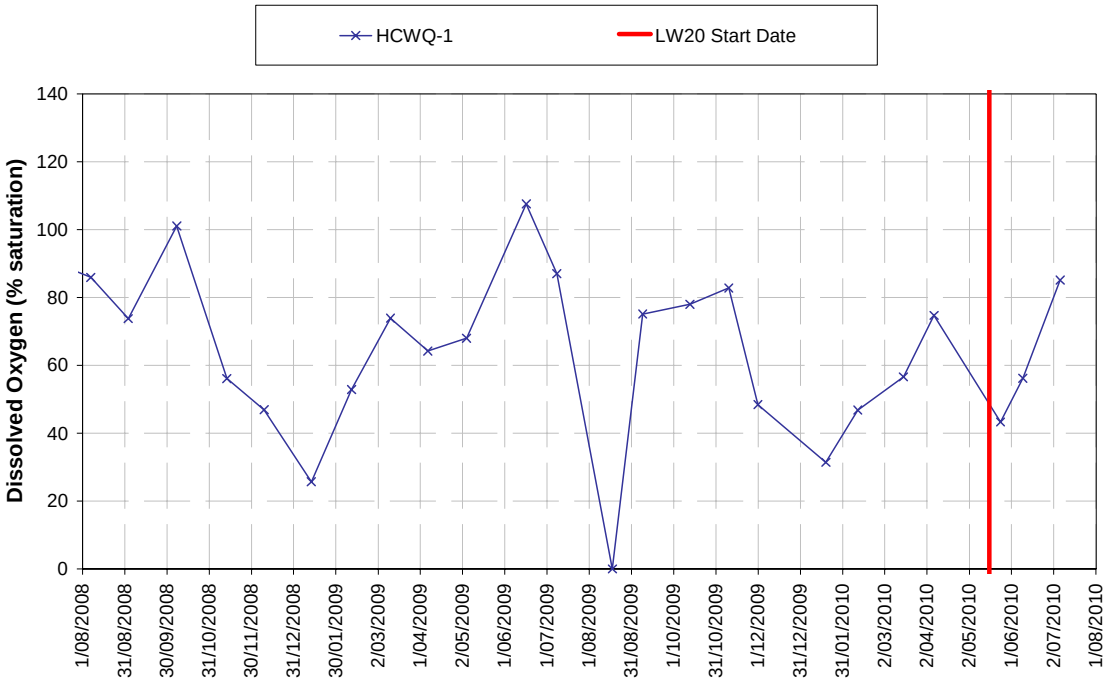

Chart A161 **Dissolved Oxygen (% Saturation) Honeysuckle Creek**

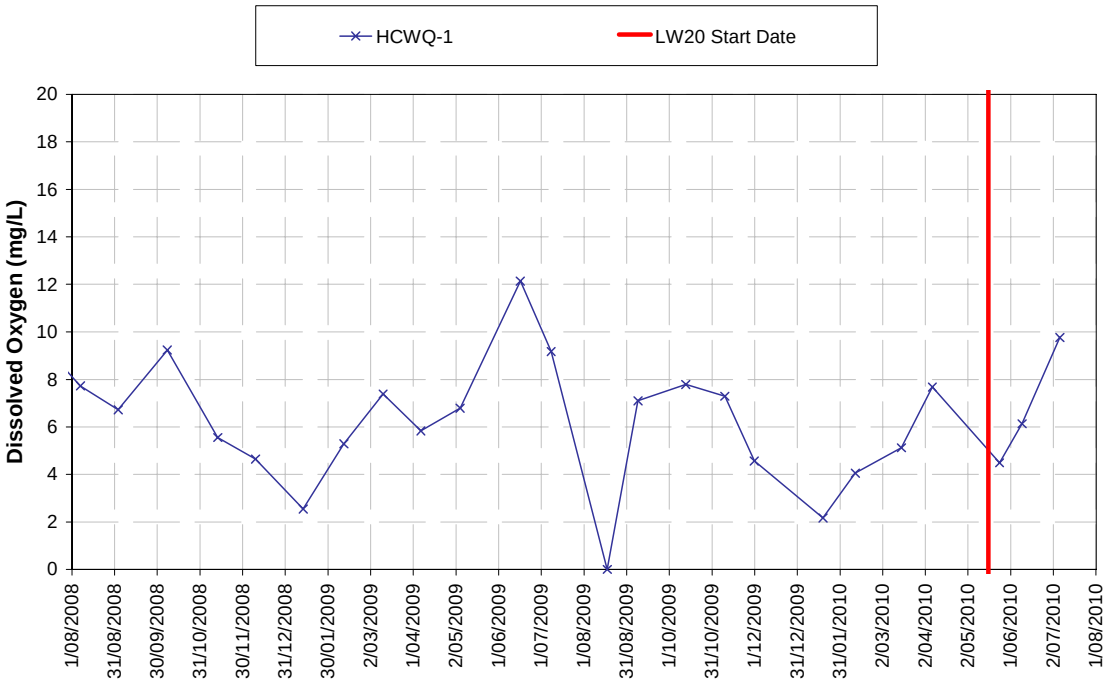

Chart A162 **Dissolved Oxygen (mg/L) Honeysuckle Creek**

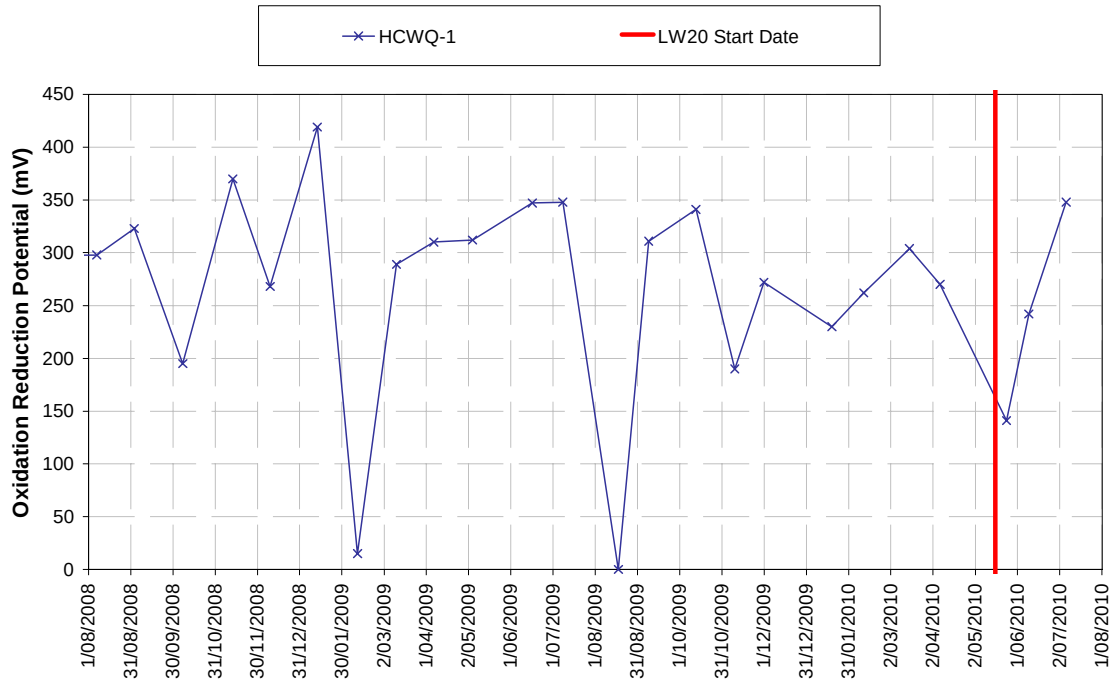

Chart A163 Oxidation Reduction Potential (mV) Honeysuckle Creek

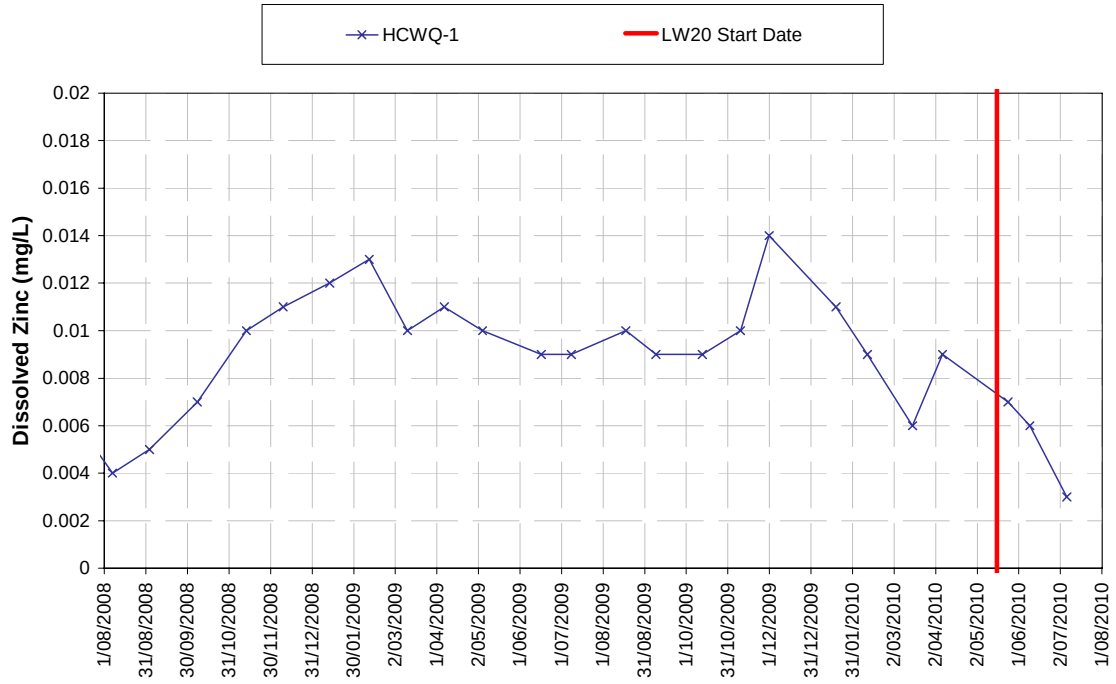

Chart A164 Dissolved Zinc (mg/L) Honeysuckle Creek

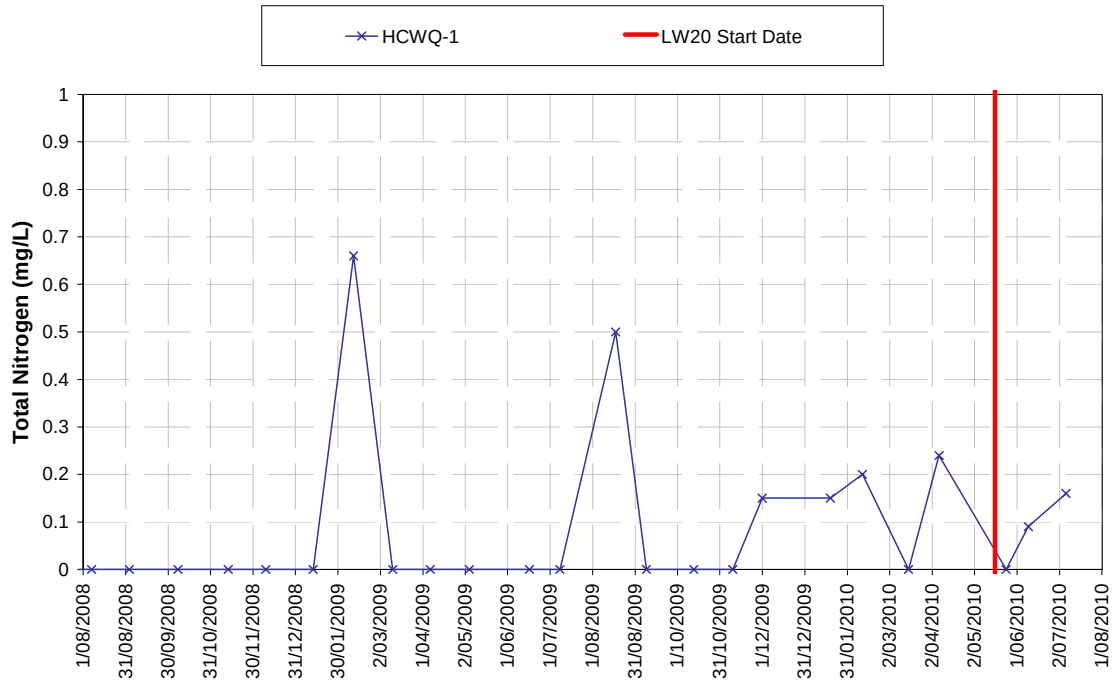

Chart A165 Total Nitrogen (mg/L) Honeysuckle Creek

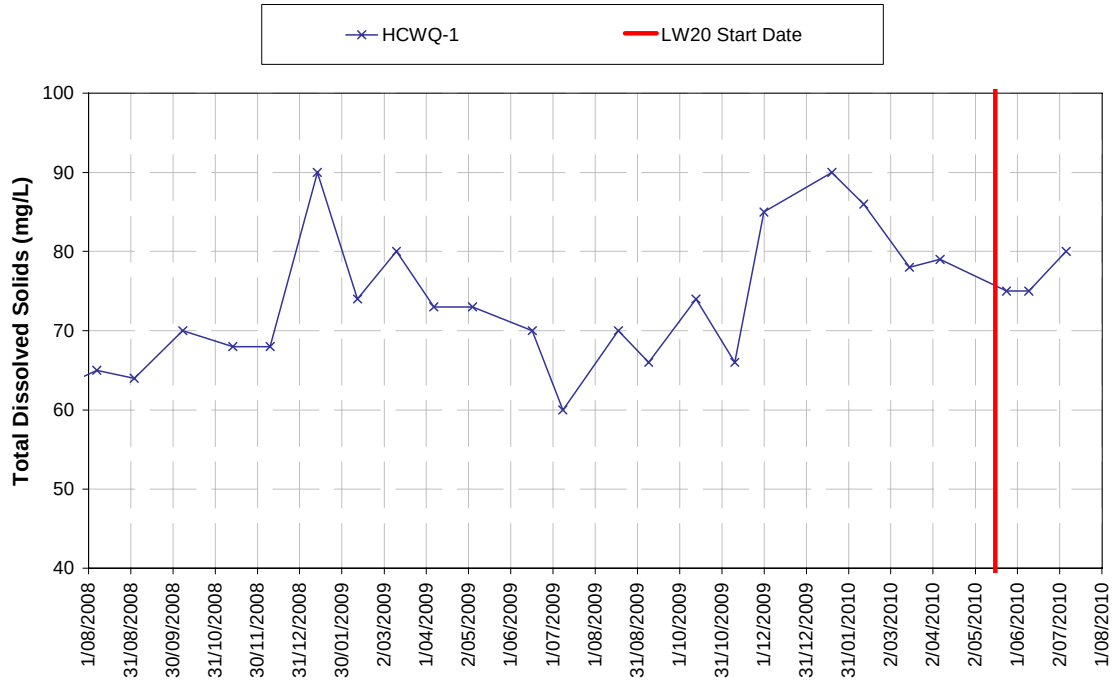

Chart A166 Total Dissolved Solids (mg/L) Honeysuckle Creek

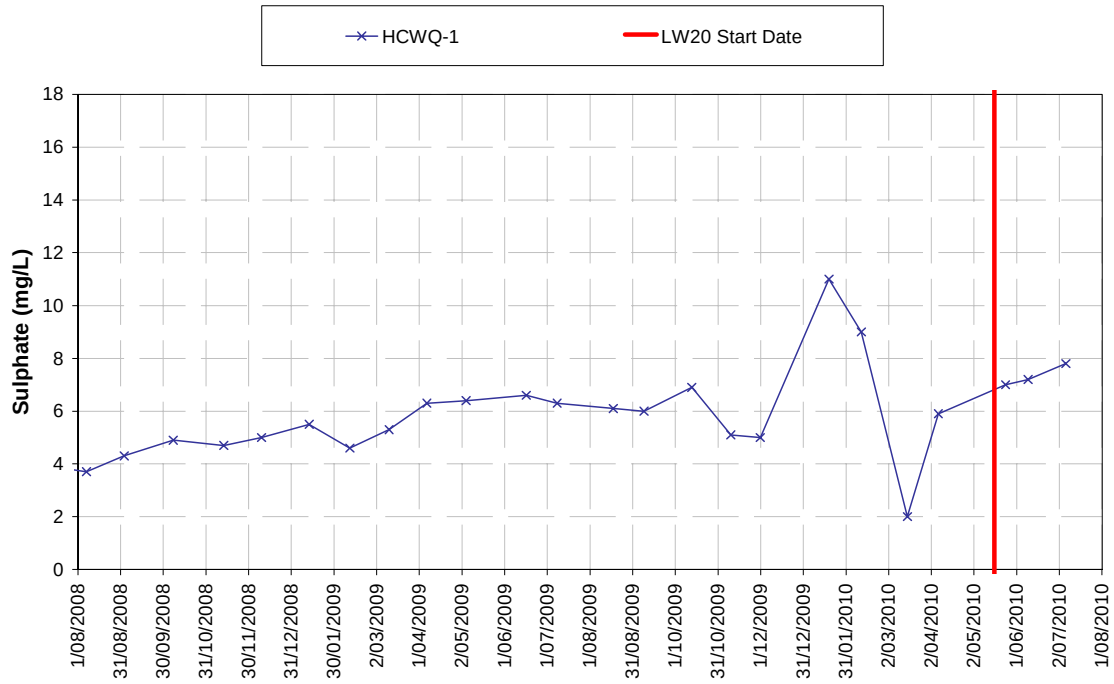

Chart A167 Sulphate (mg/L) Honeysuckle Creek

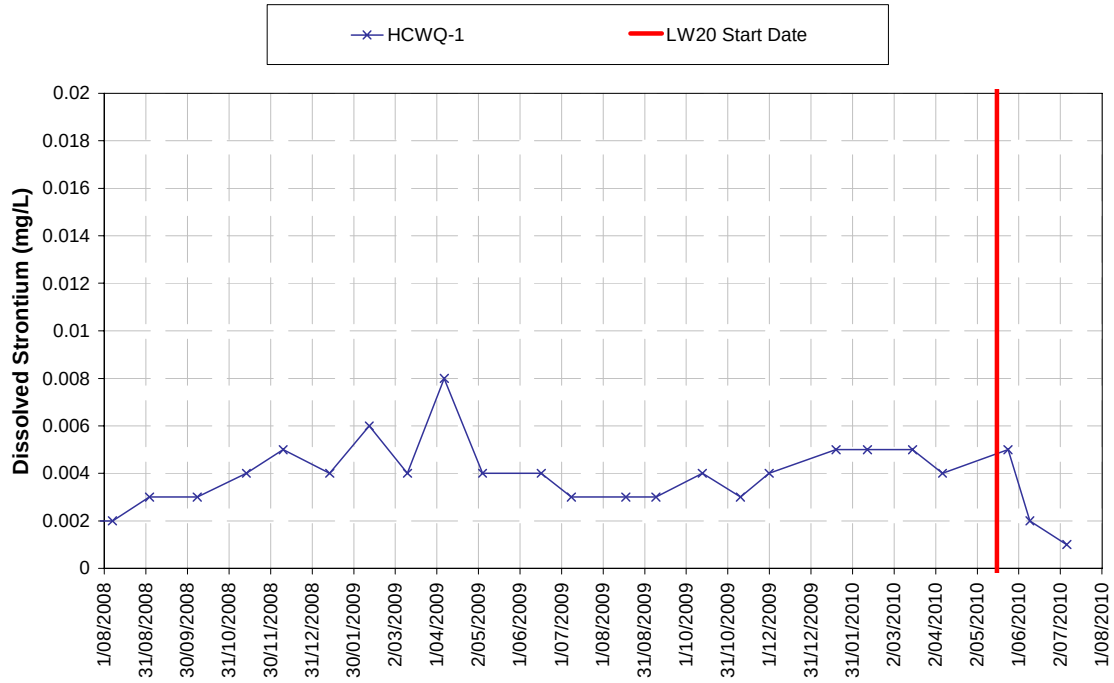

Chart A168 Dissolved Strontium (mg/L) Honeysuckle Creek

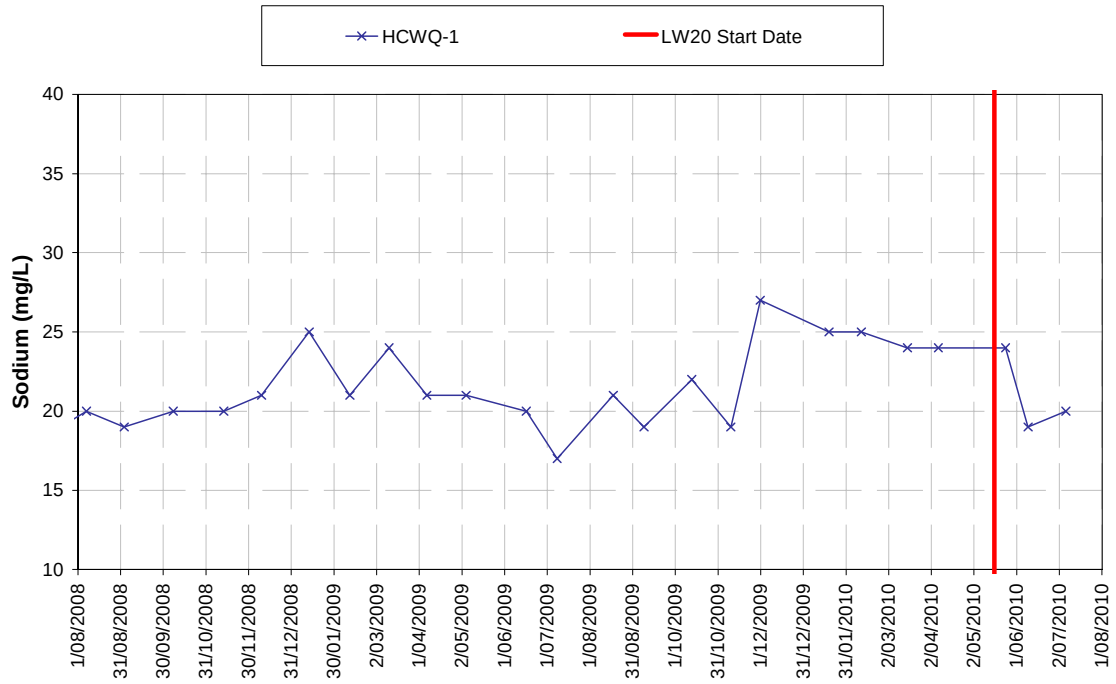

Chart A169 Sodium (mg/L) Honeysuckle Creek

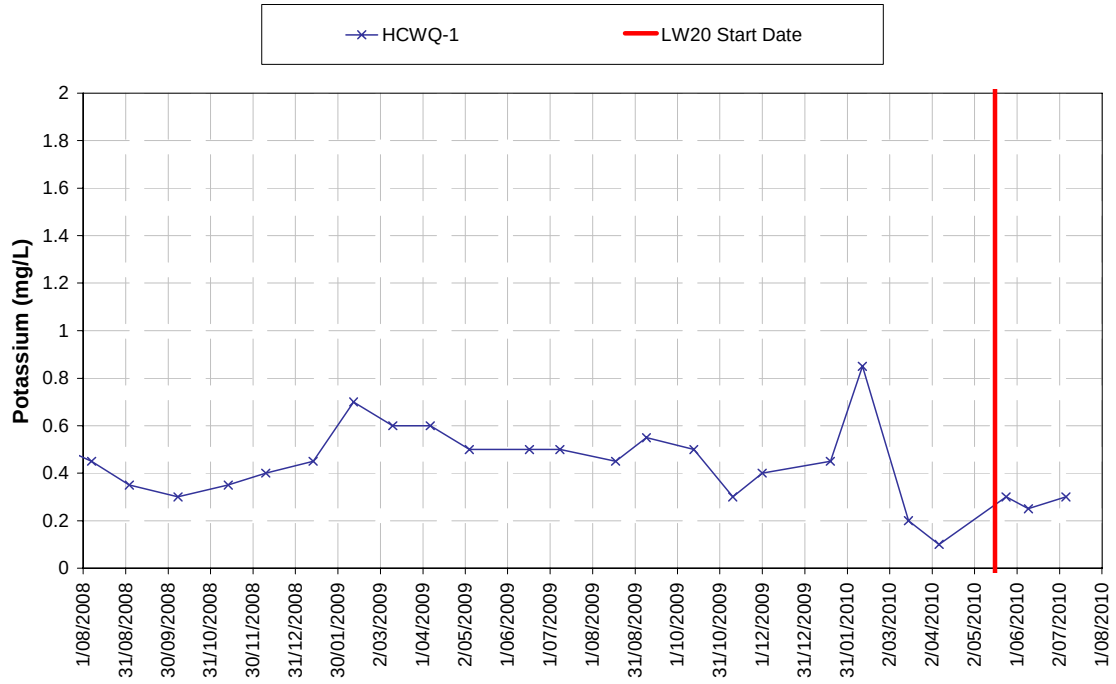

Chart A170 Potassium (mg/L) Honeysuckle Creek

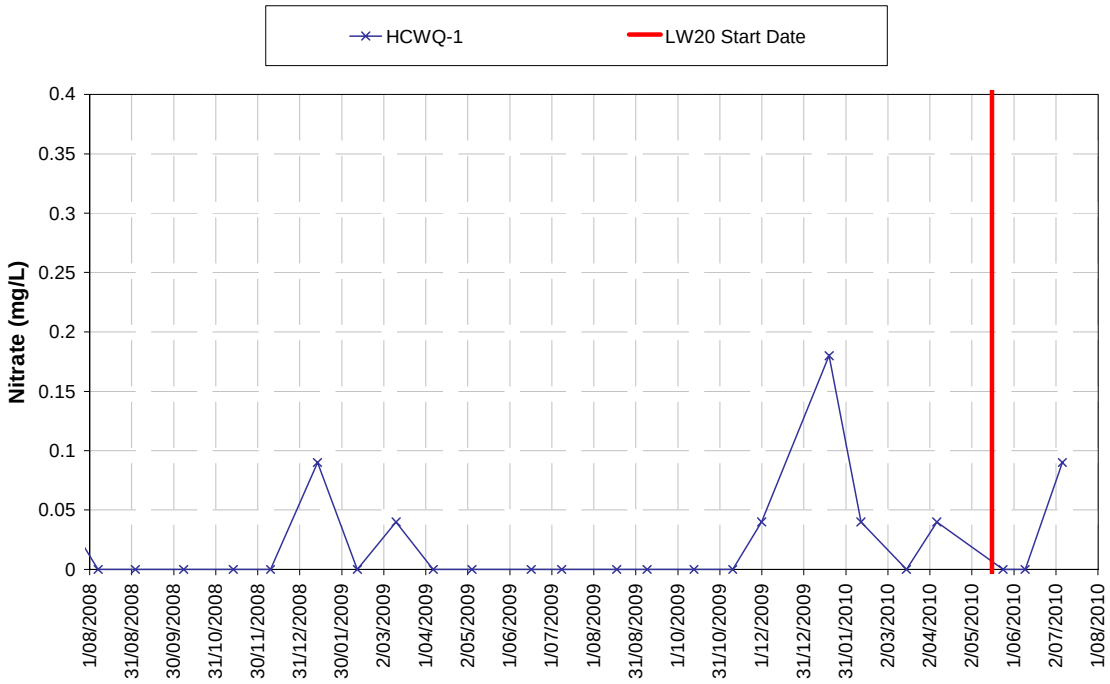

Chart A171 Nitrate (mg/L) Honeysuckle Creek

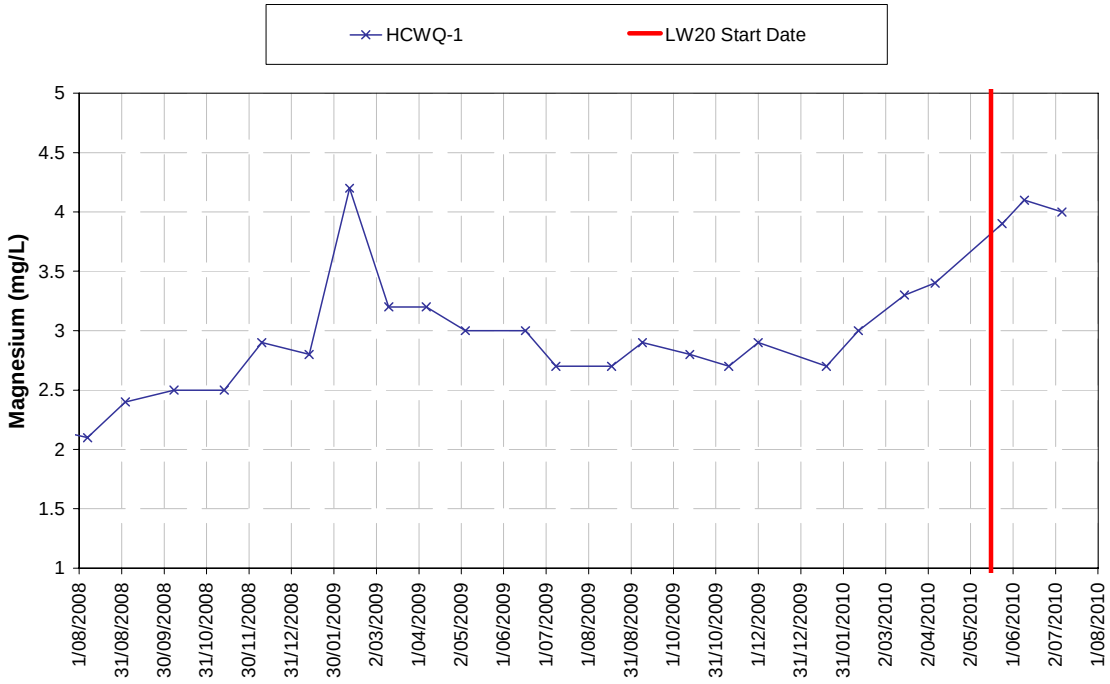

Chart A172 Magnesium (mg/L) Honeysuckle Creek

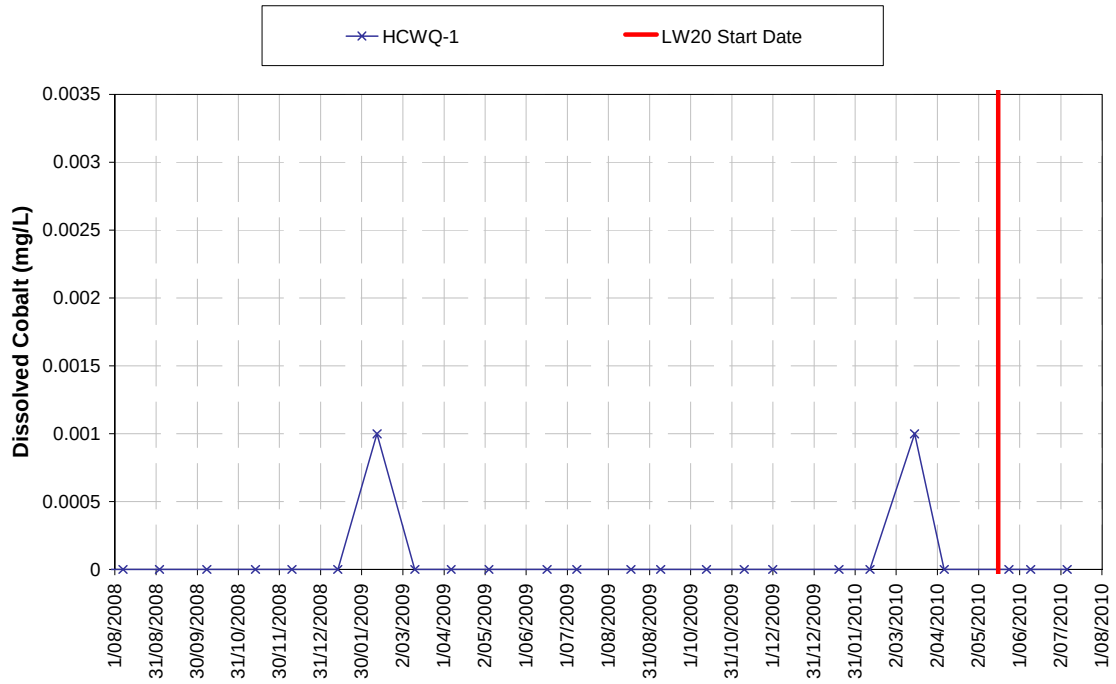

Chart A173 Dissolved Cobalt (mg/L) Honeysuckle Creek

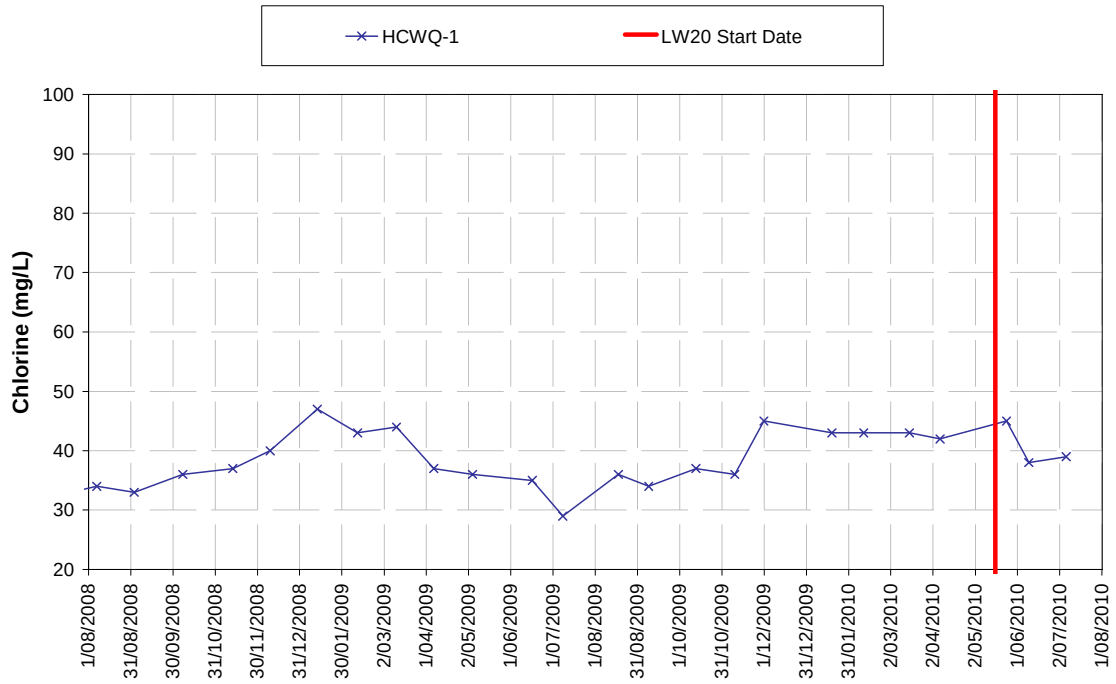

Chart A174 Chlorine (mg/L) Honeysuckle Creek

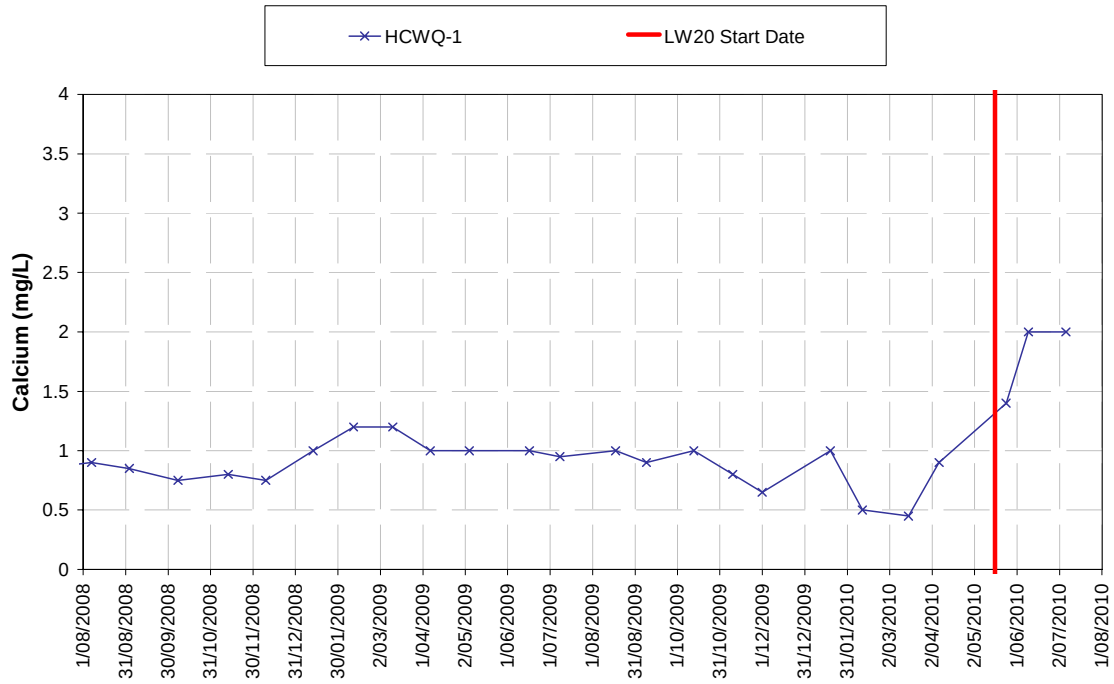

Chart A175 Calcium (mg/L) Honeysuckle Creek

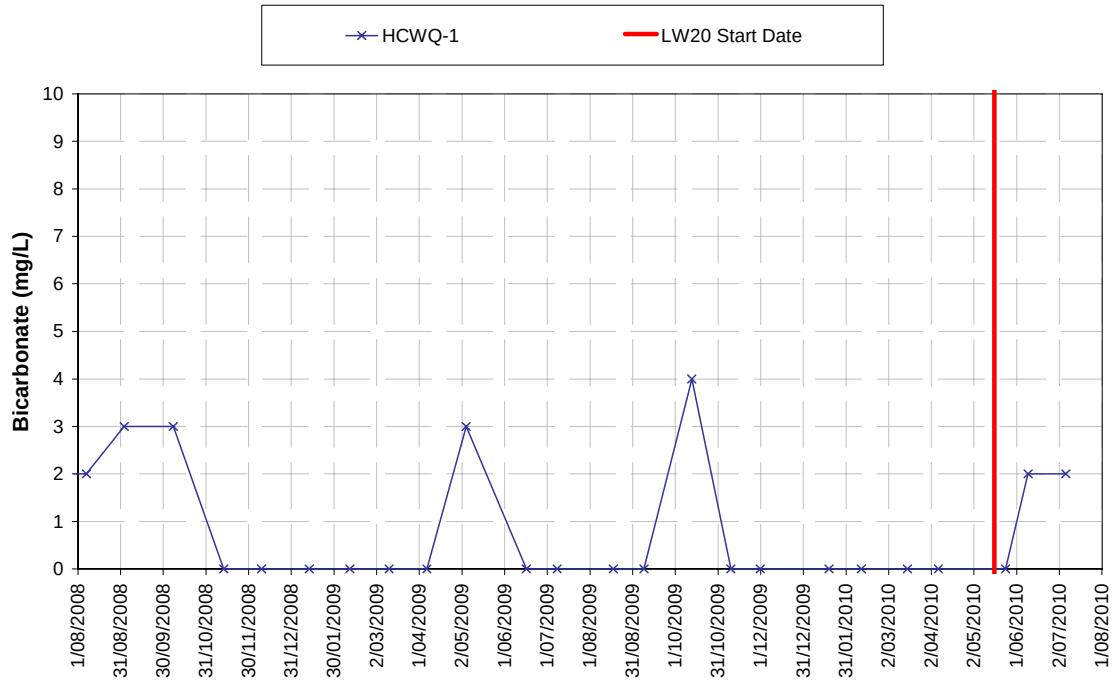

Chart A176 Bicarbonate (mg/L) Honeysuckle Creek

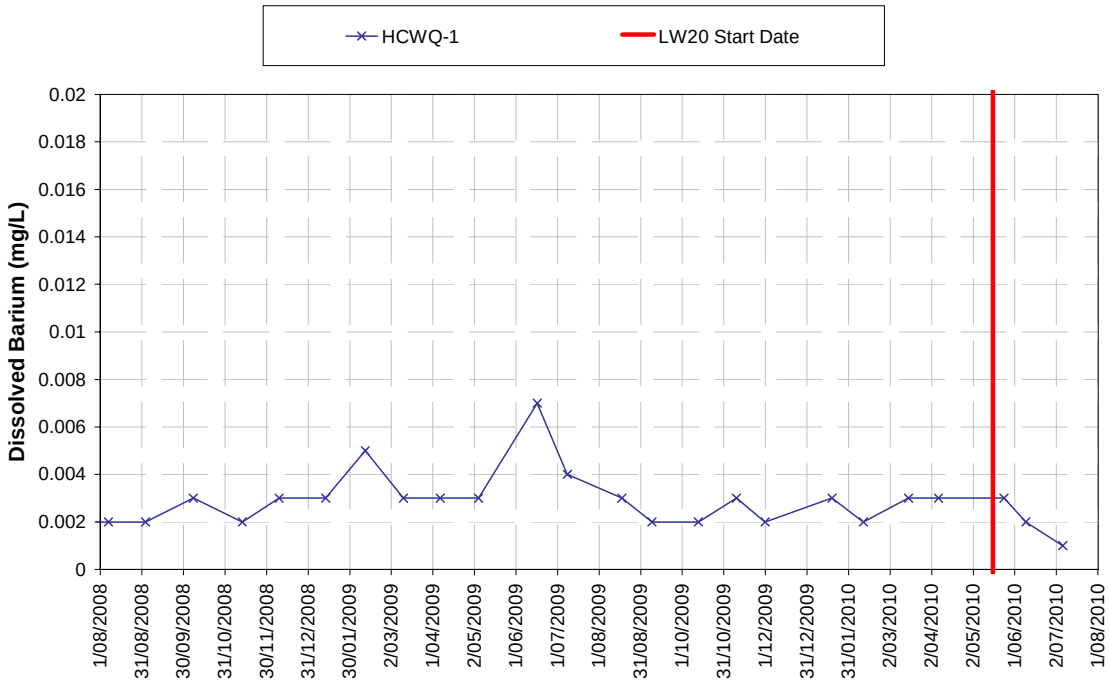

Chart A177 Dissolved Barium (mg/L) Honeysuckle Creek

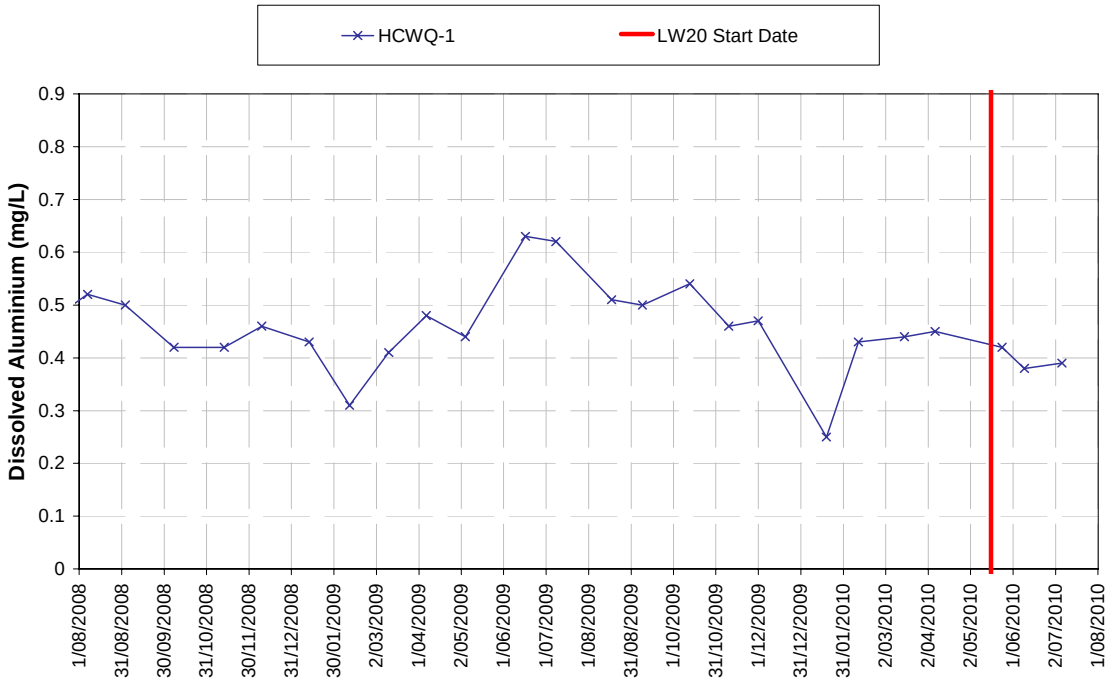

Chart A178 Dissolved Aluminium (mg/L) Honeysuckle Creek

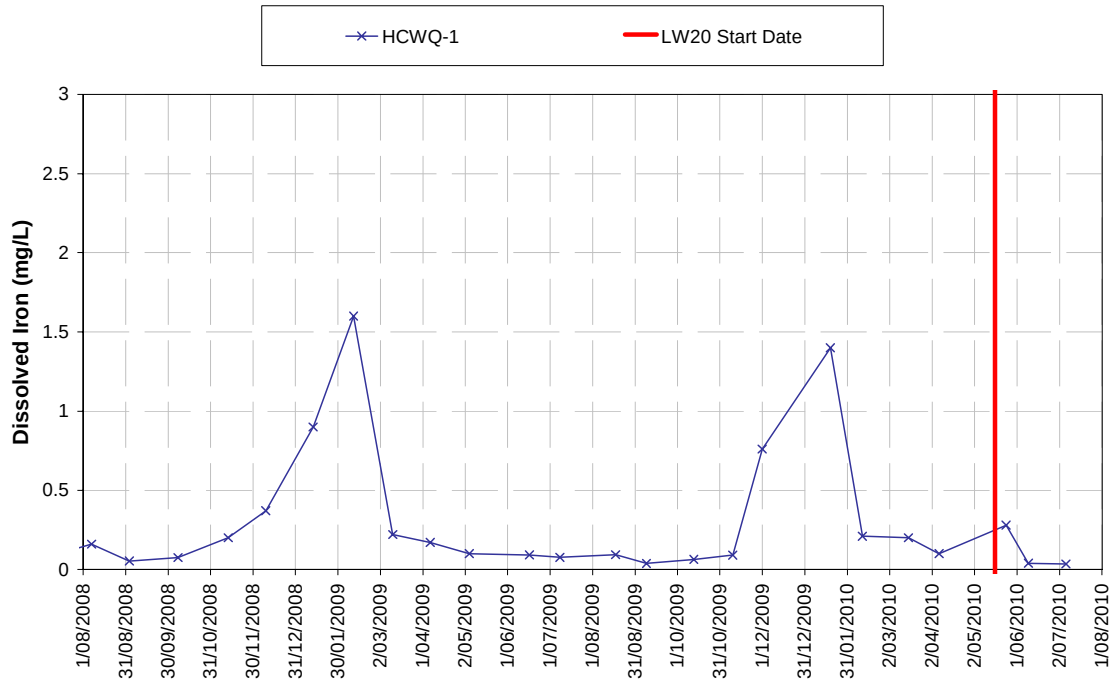

Chart A179 Dissolved Iron (mg/L) Honeysuckle Creek

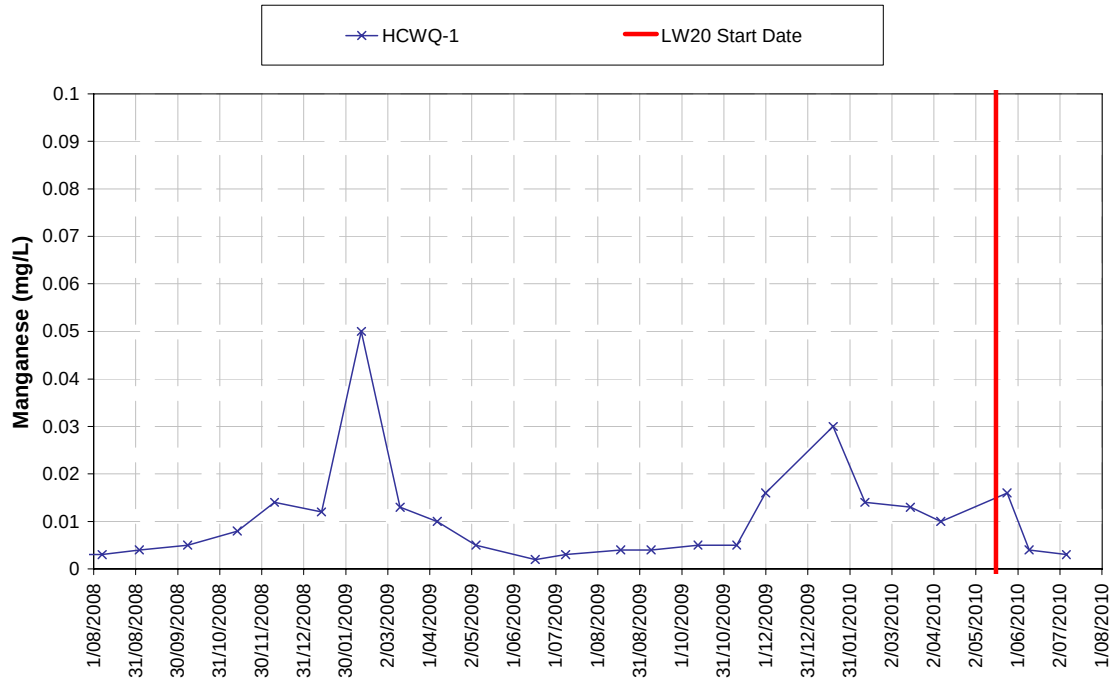

Chart A180 Manganese (mg/L) Honeysuckle Creek

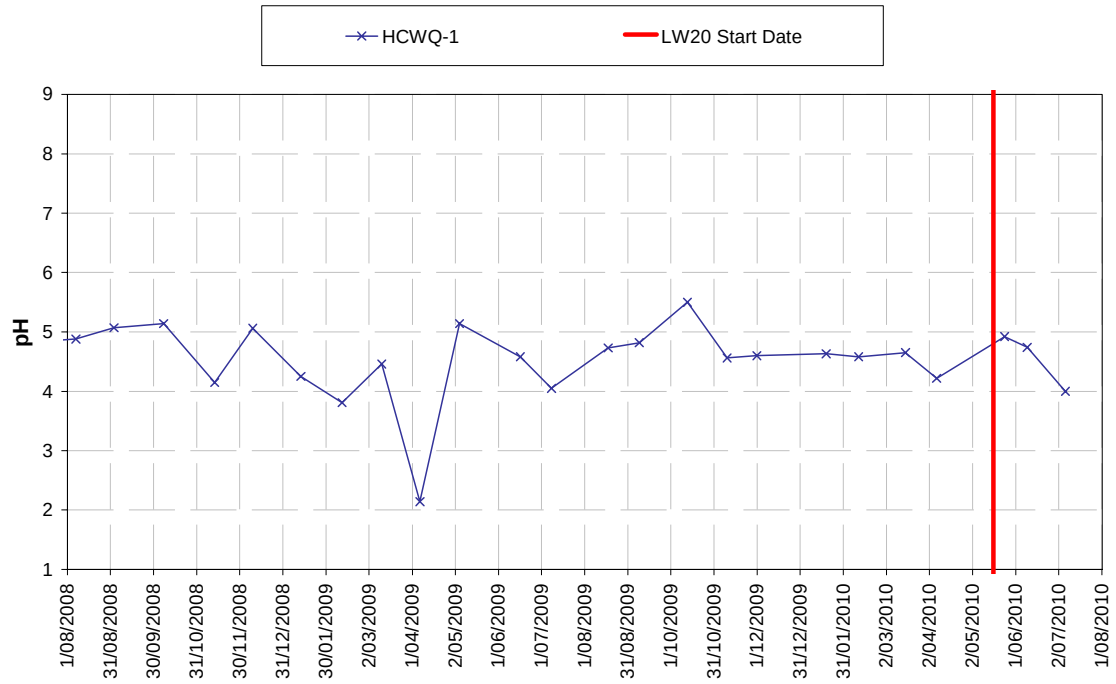

Chart A181 pH (Field) Honeysuckle Creek

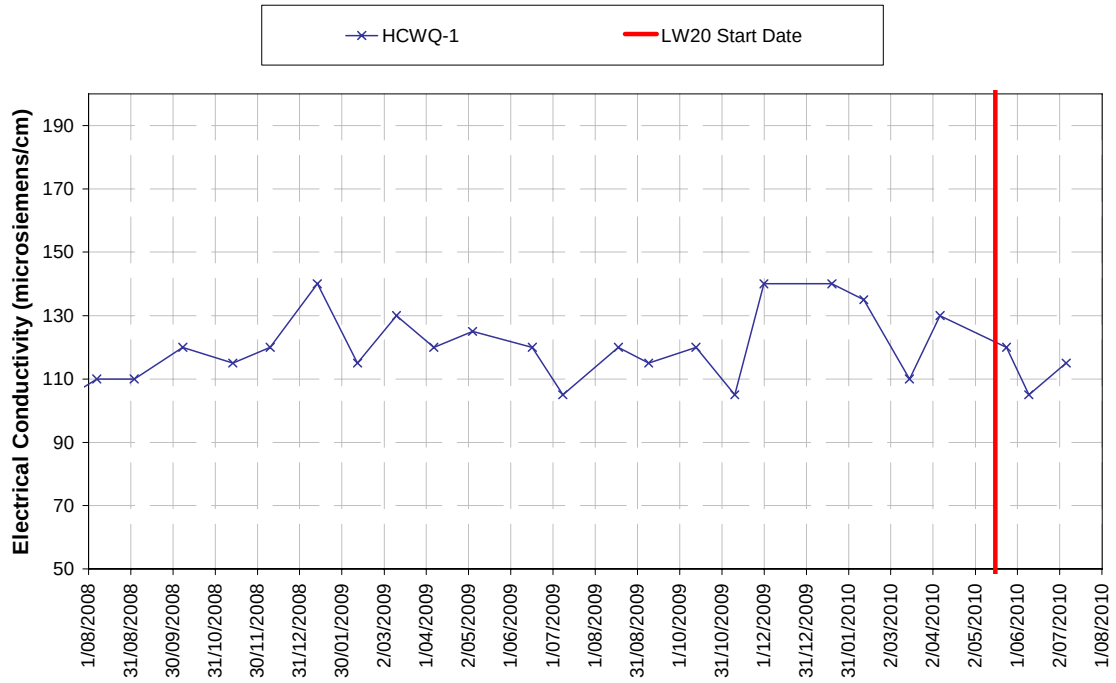

Chart A182 Electrical Conductivity (micro-Siemens/cm) Honeysuckle Creek

Graphical Plots of Water Quality Monitoring Results for Bee Creek

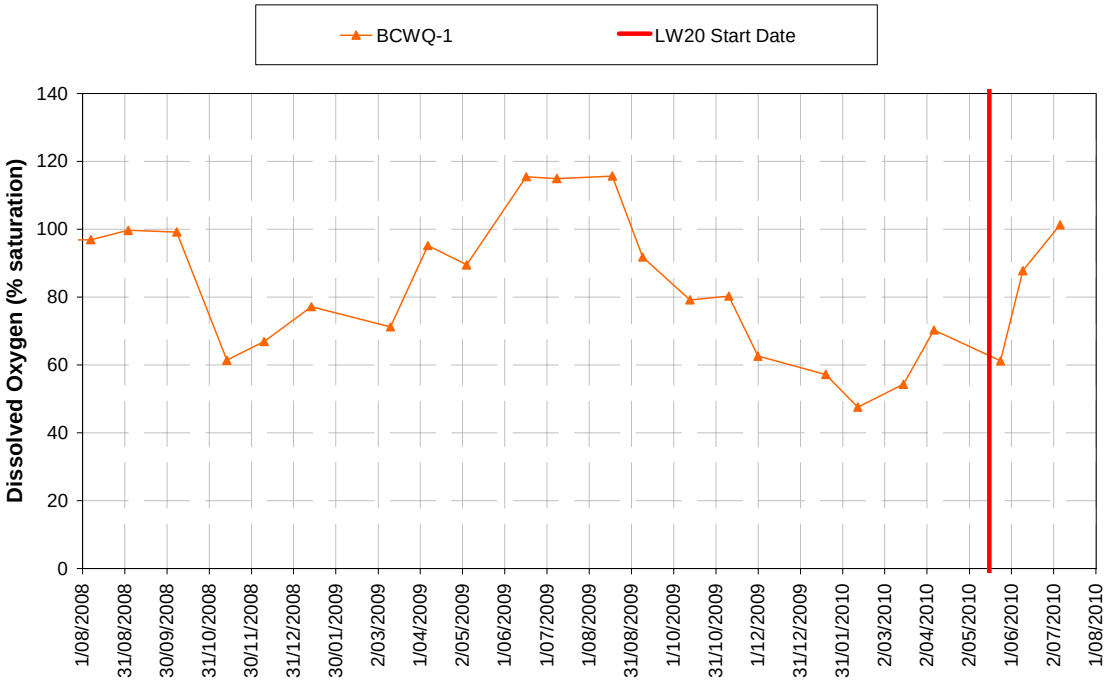

Chart A183 **Dissolved Oxygen (% Saturation) Bee Creek**

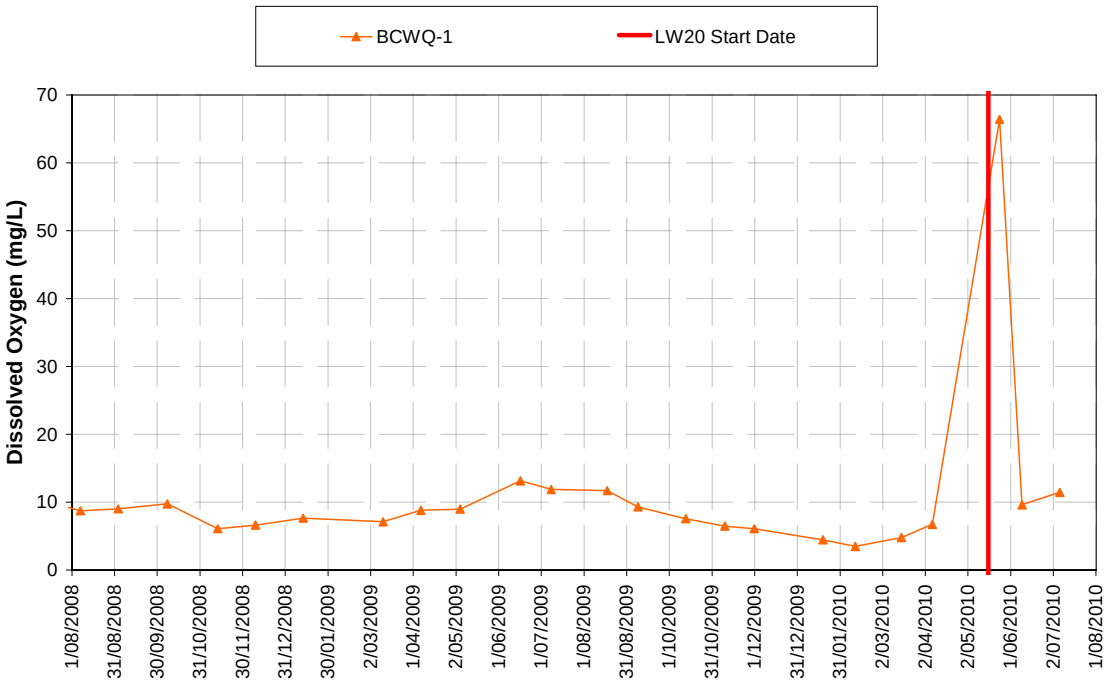

Chart A184 **Dissolved Oxygen (mg/L) Bee Creek**

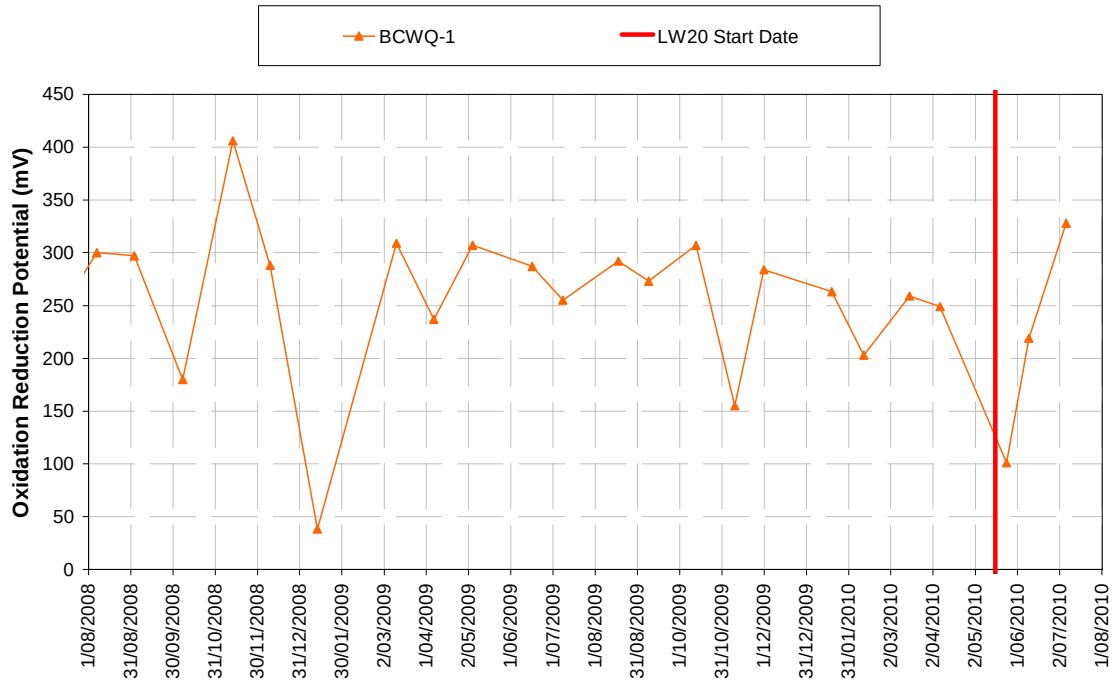

Chart A185 Oxidation Reduction Potential (mV) Bee Creek

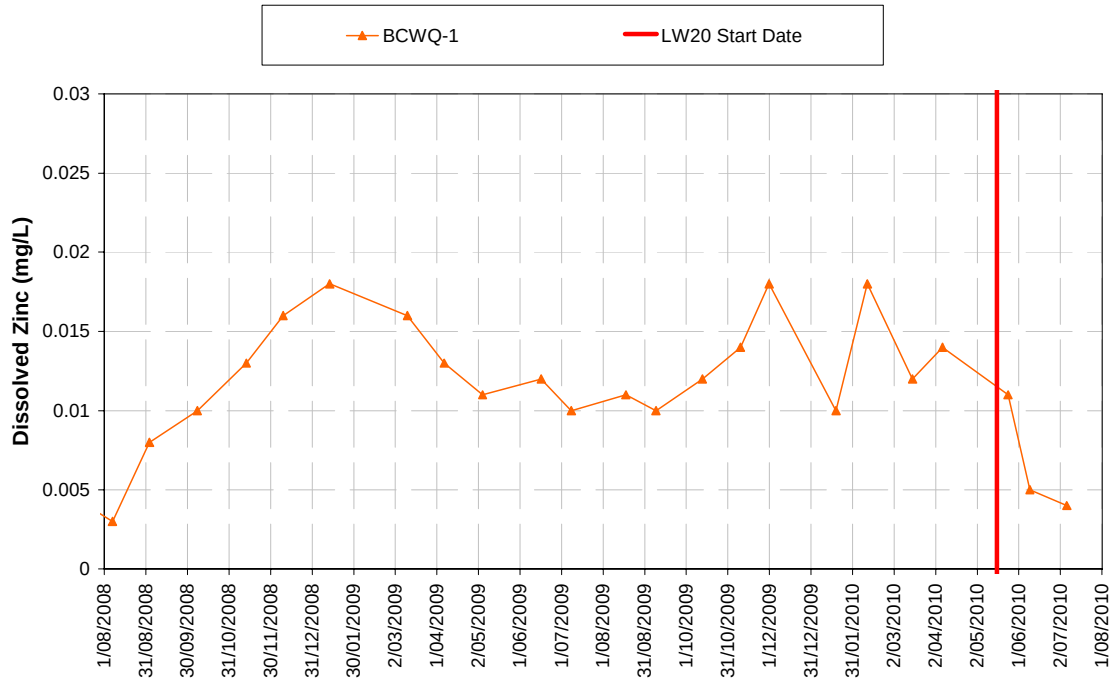

Chart A186 Dissolved Zinc (mg/L) Bee Creek

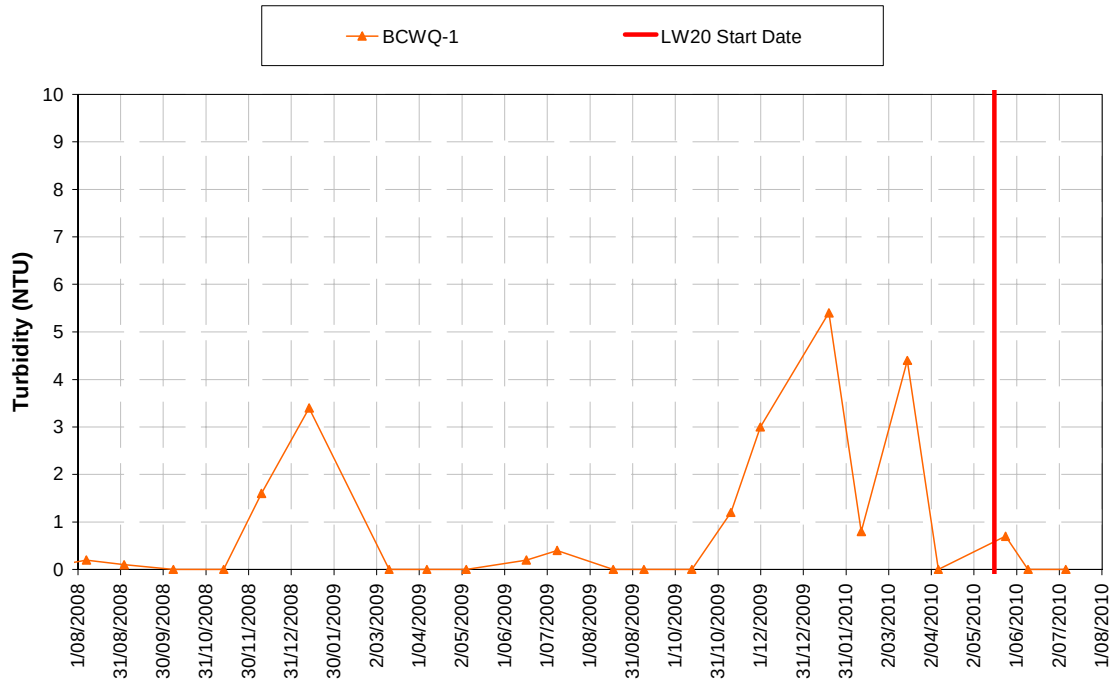

Chart A187 Turbidity (NTU) Bee Creek

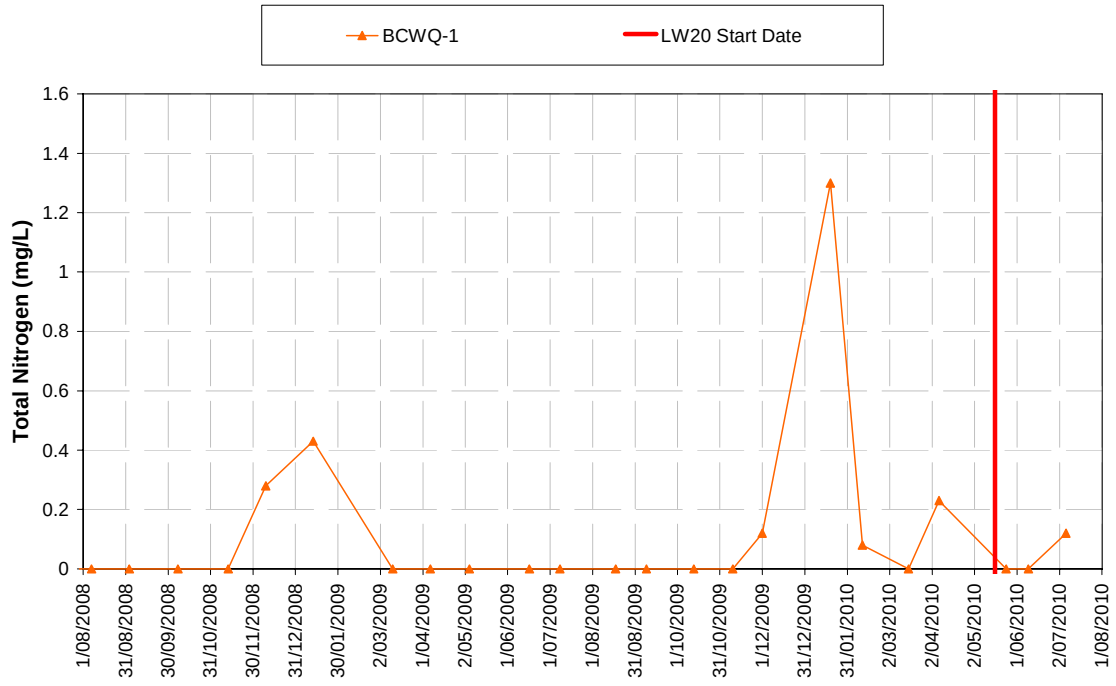

Chart A188 Total Nitrogen (mg/L) Bee Creek

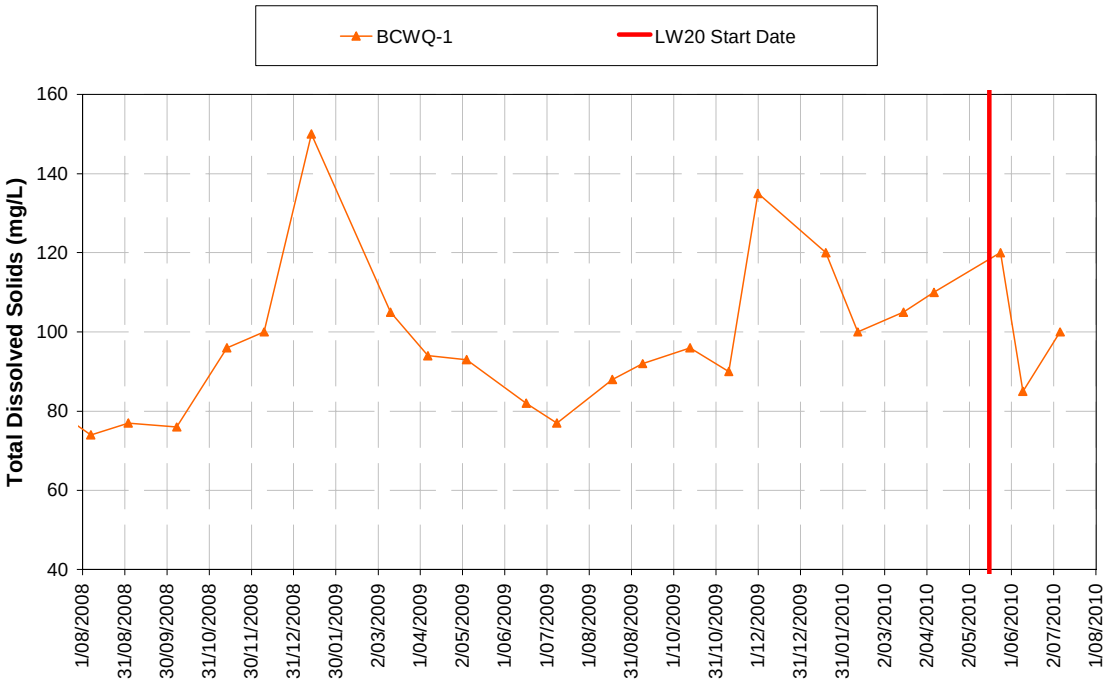

Chart A189 Total Dissolved Solids (mg/L) Bee Creek

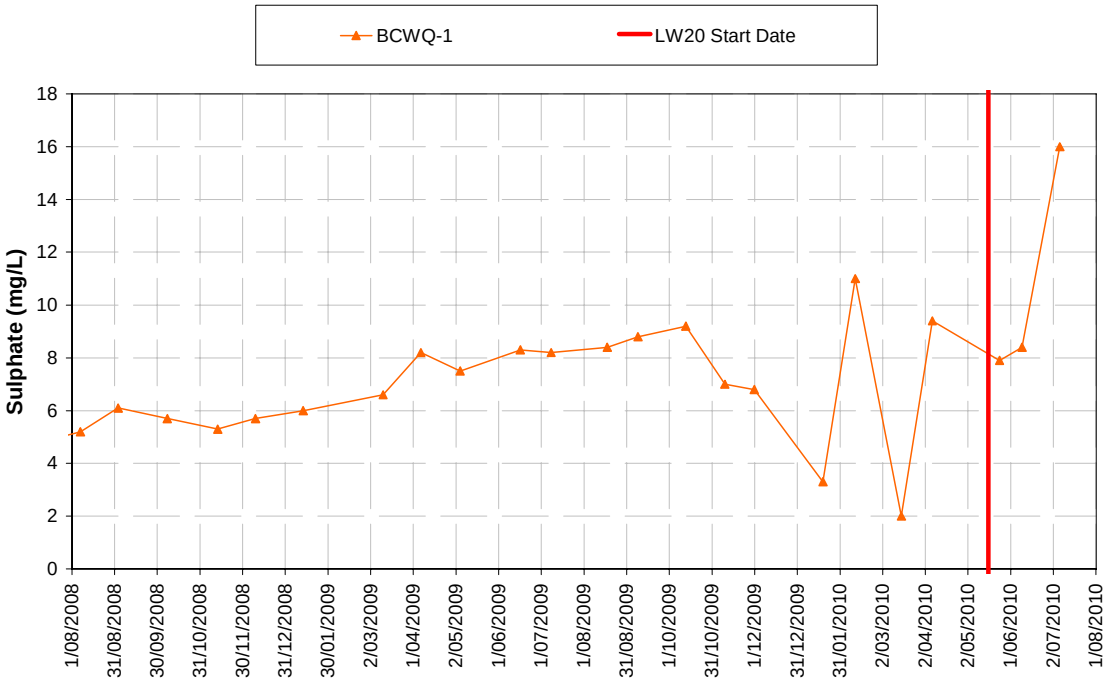

Chart A190 Sulphate (mg/L) Bee Creek

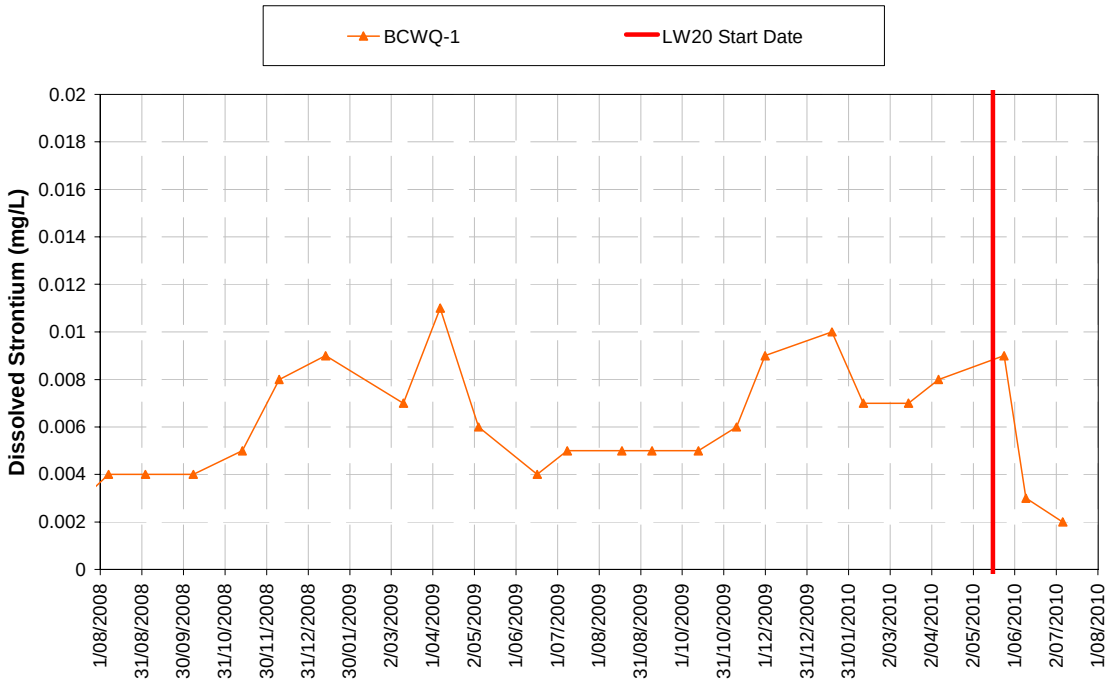

Chart A191 Dissolved Strontium (mg/L) Bee Creek

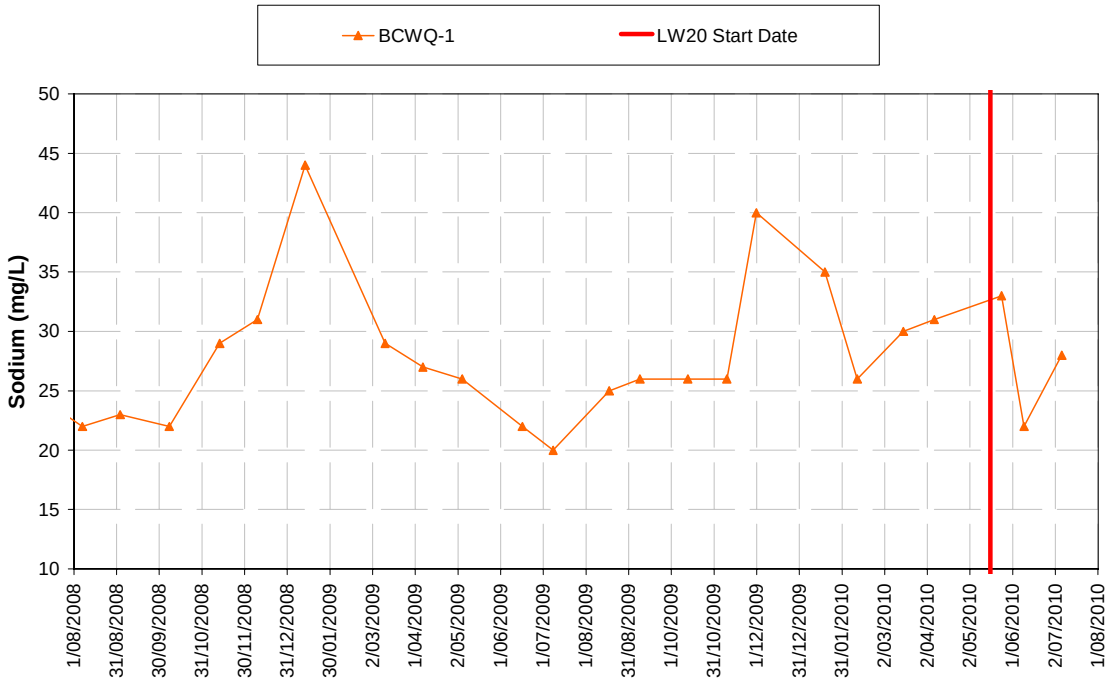

Chart A192 Sodium (mg/L) Bee Creek

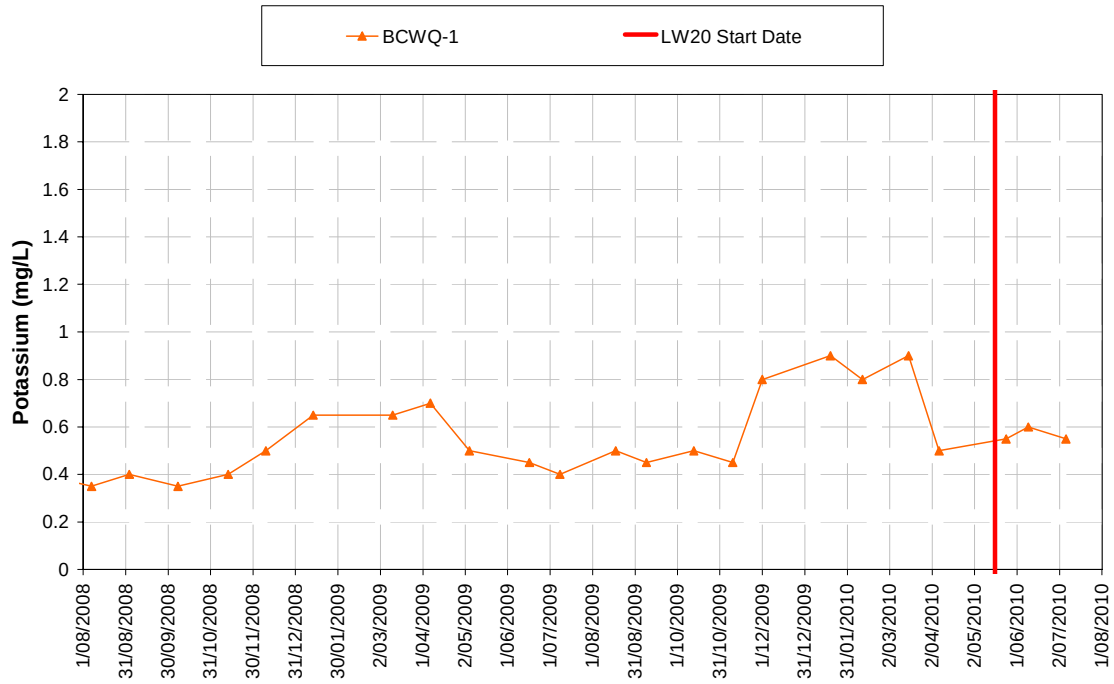

Chart A193 Potassium (mg/L) Bee Creek

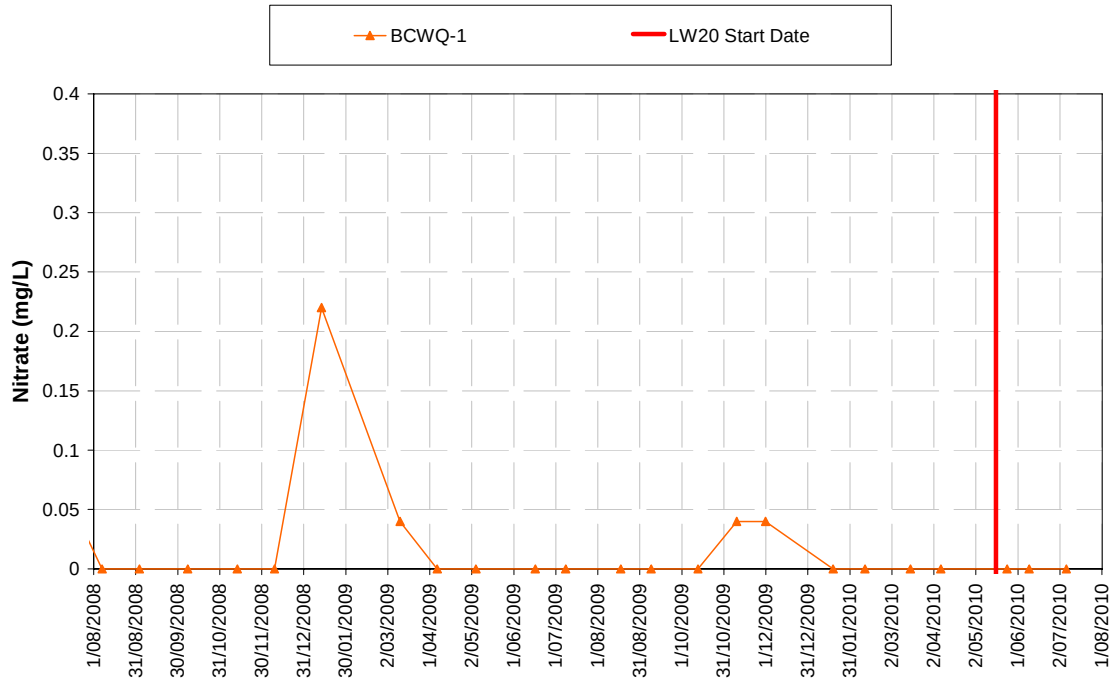

Chart A194 Nitrate (mg/L) Bee Creek

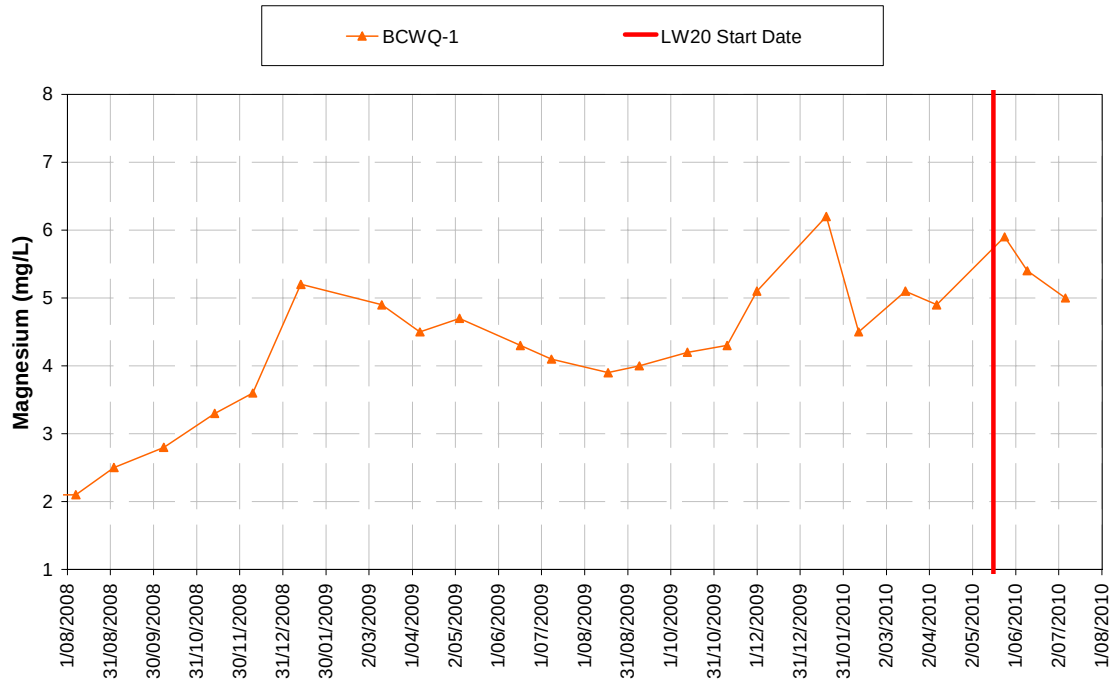

Chart A195 Magnesium (mg/L) Bee Creek

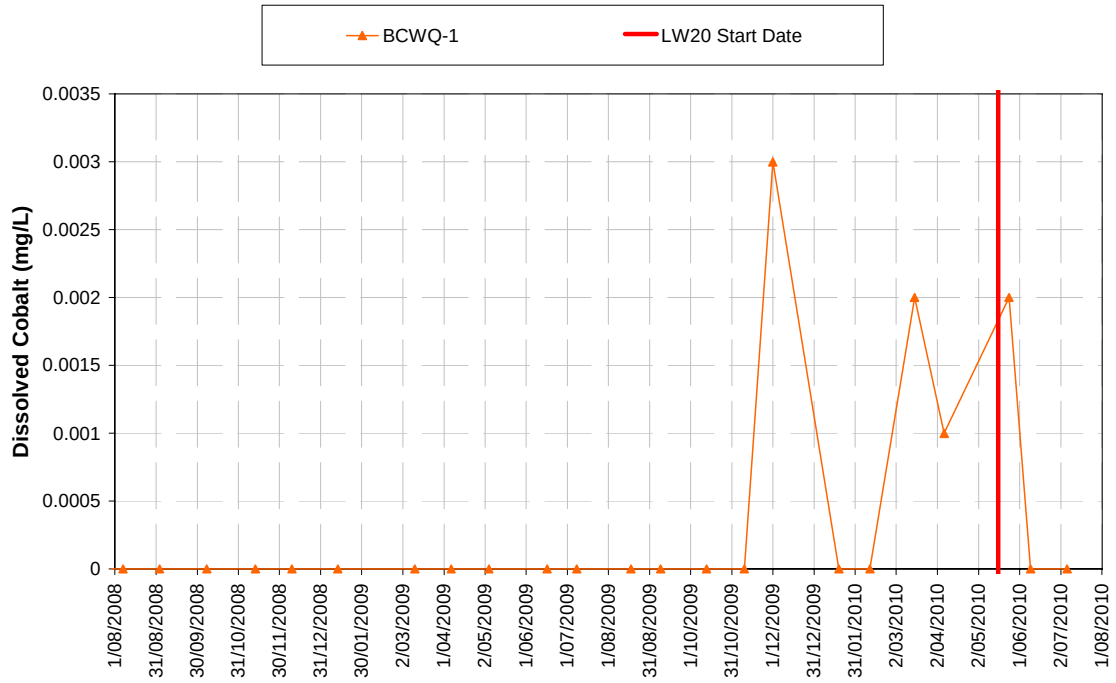

Chart A196 Dissolved Cobalt (mg/L) Bee Creek

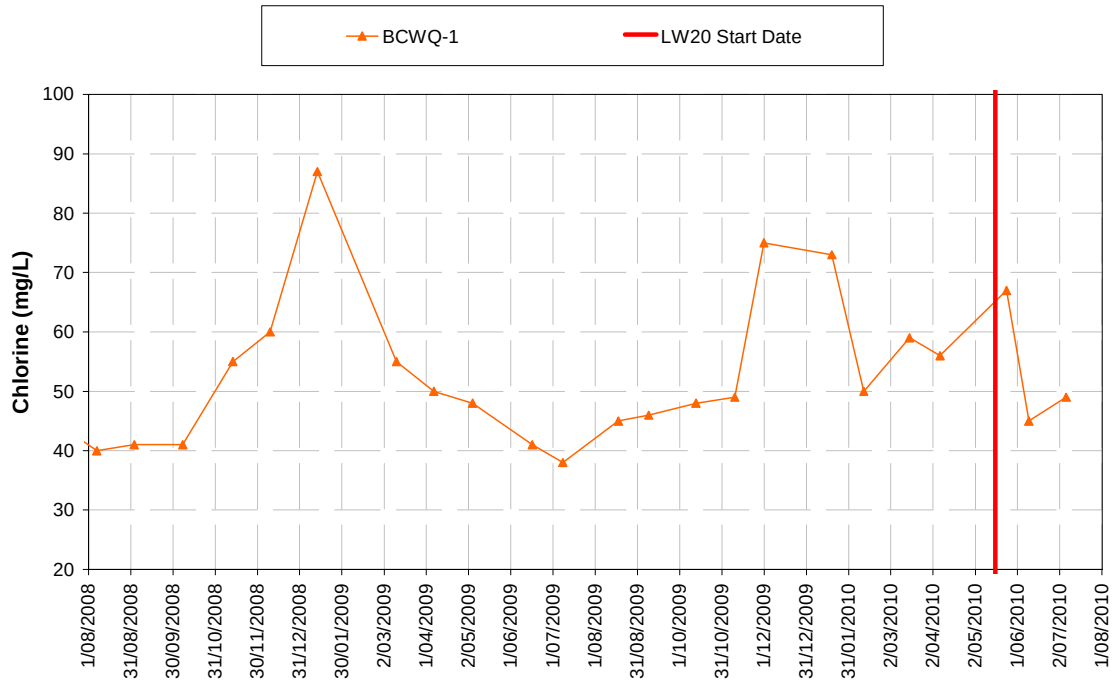

Chart A197 Chlorine (mg/L) Bee Creek

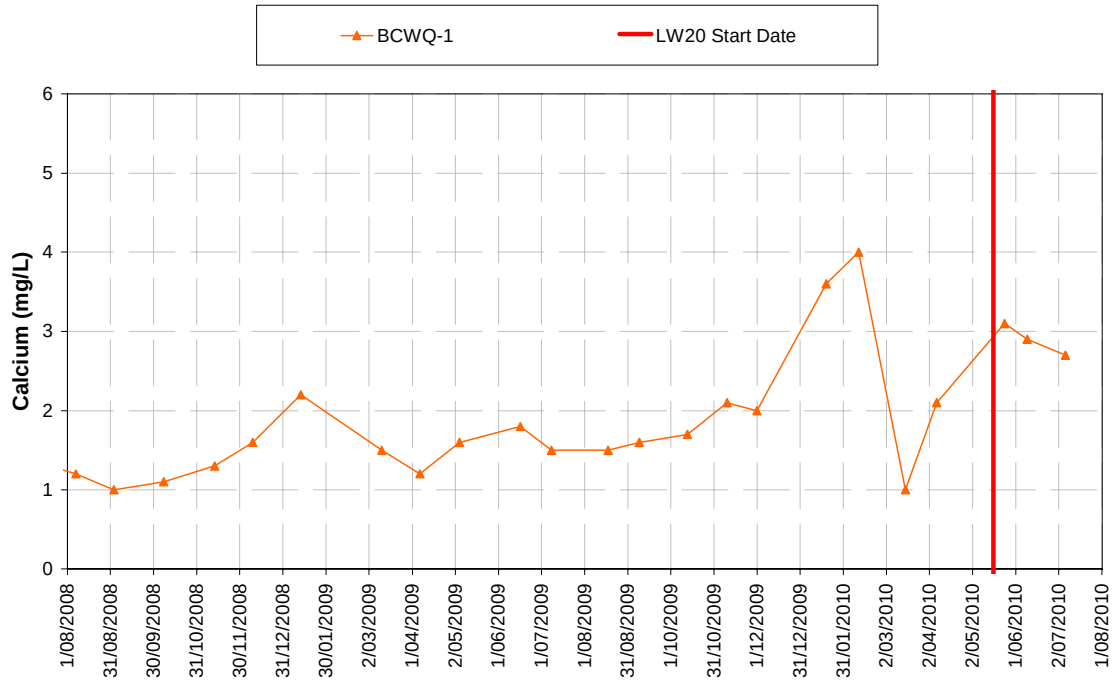

Chart A198 Calcium (mg/L) Bee Creek

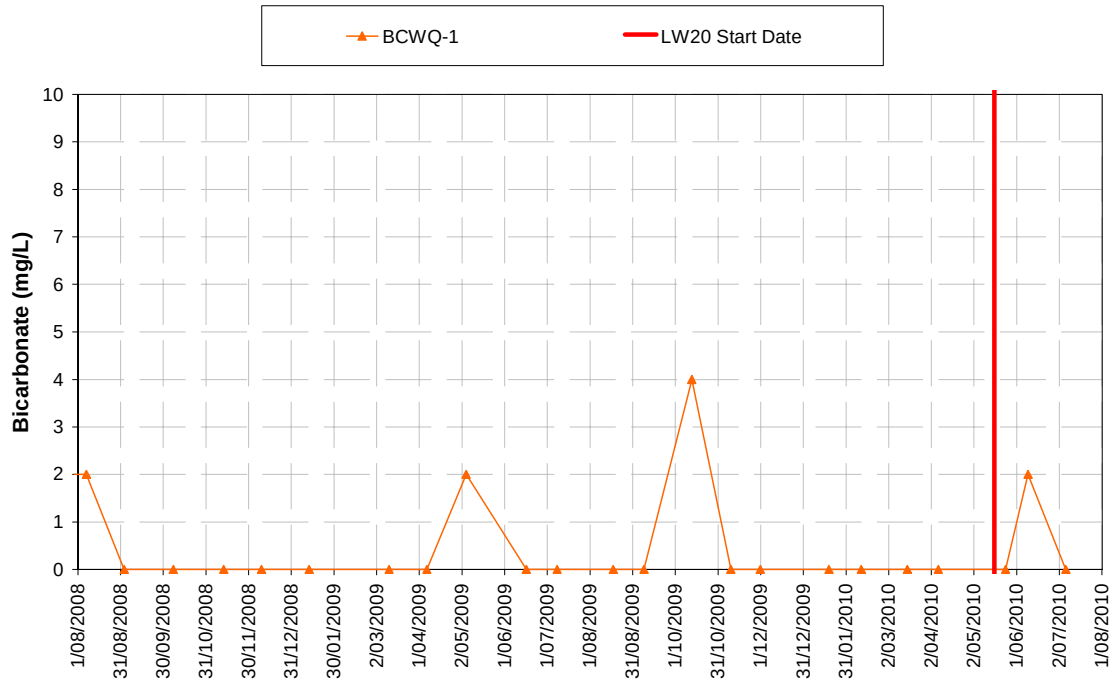

Chart A199 Bicarbonate (mg/L) Bee Creek

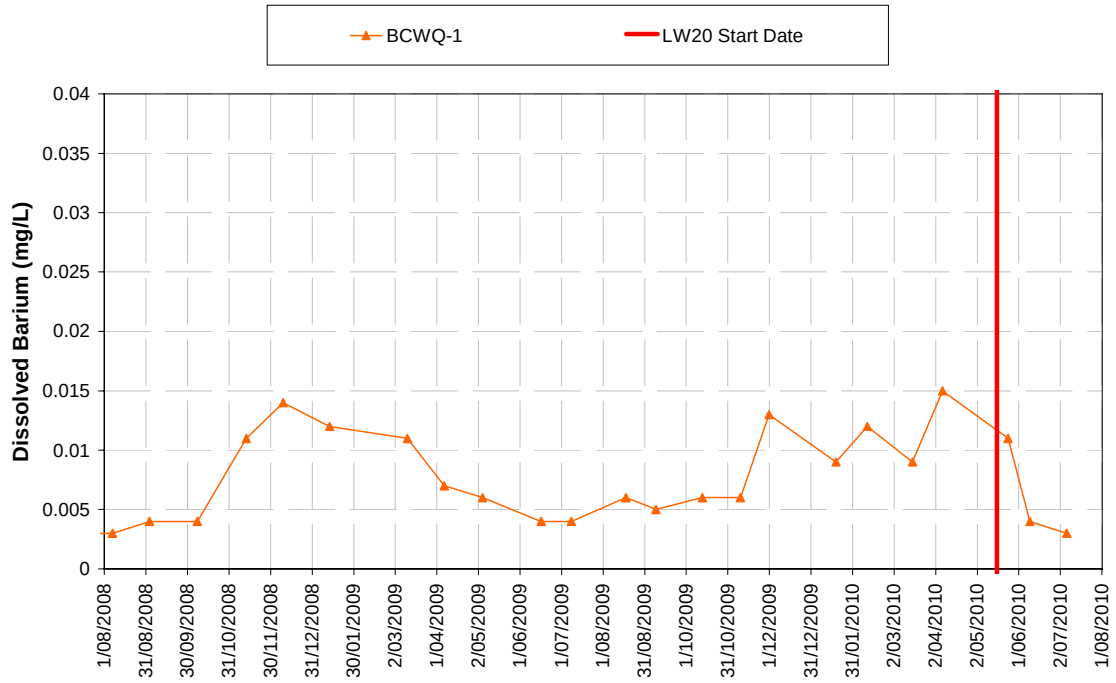

Chart A200 Dissolved Barium (mg/L) Bee Creek

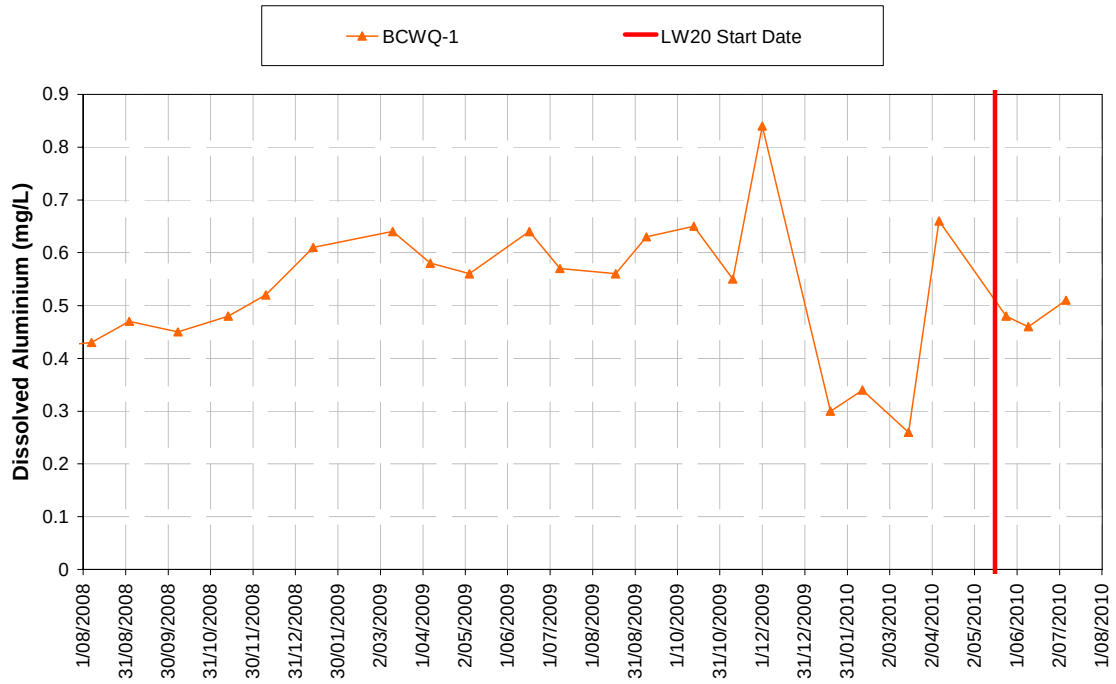

Chart A201 Dissolved Aluminium (mg/L) Bee Creek

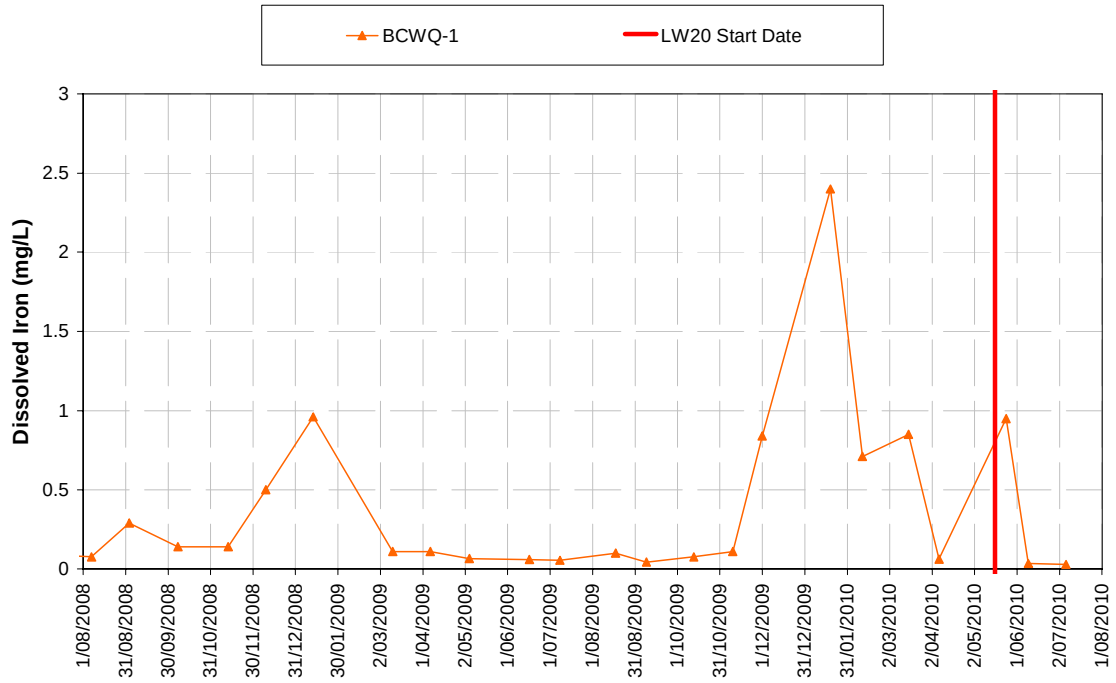

Chart A202 Dissolved Iron (mg/L) Bee Creek

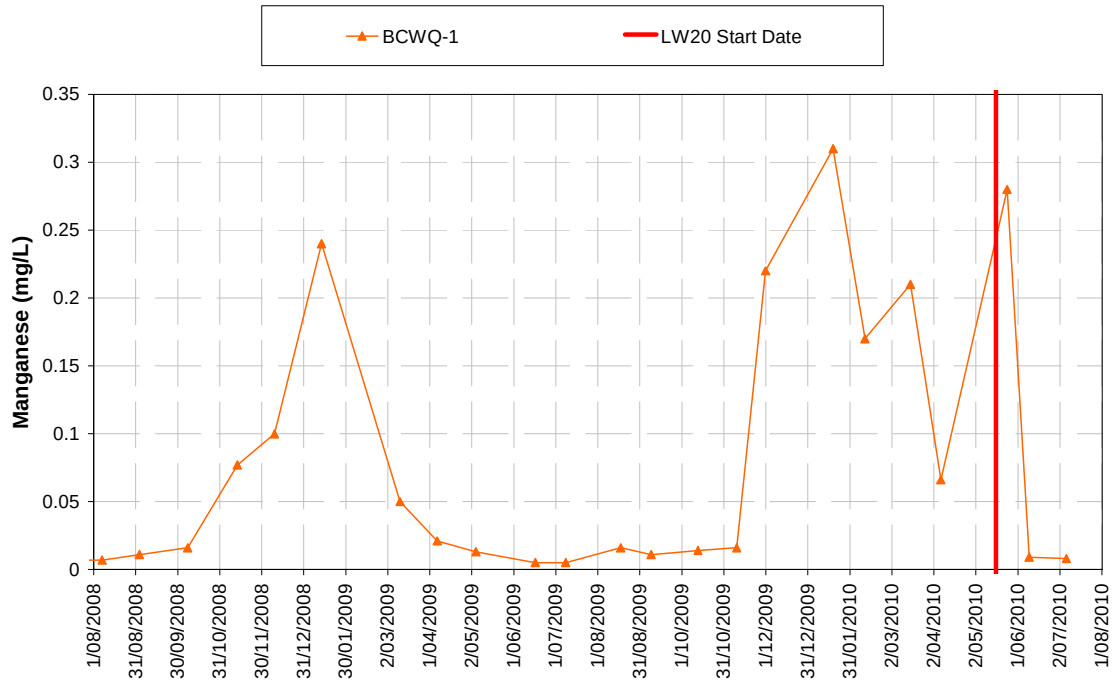

Chart A203 Manganese (mg/L) Bee Creek

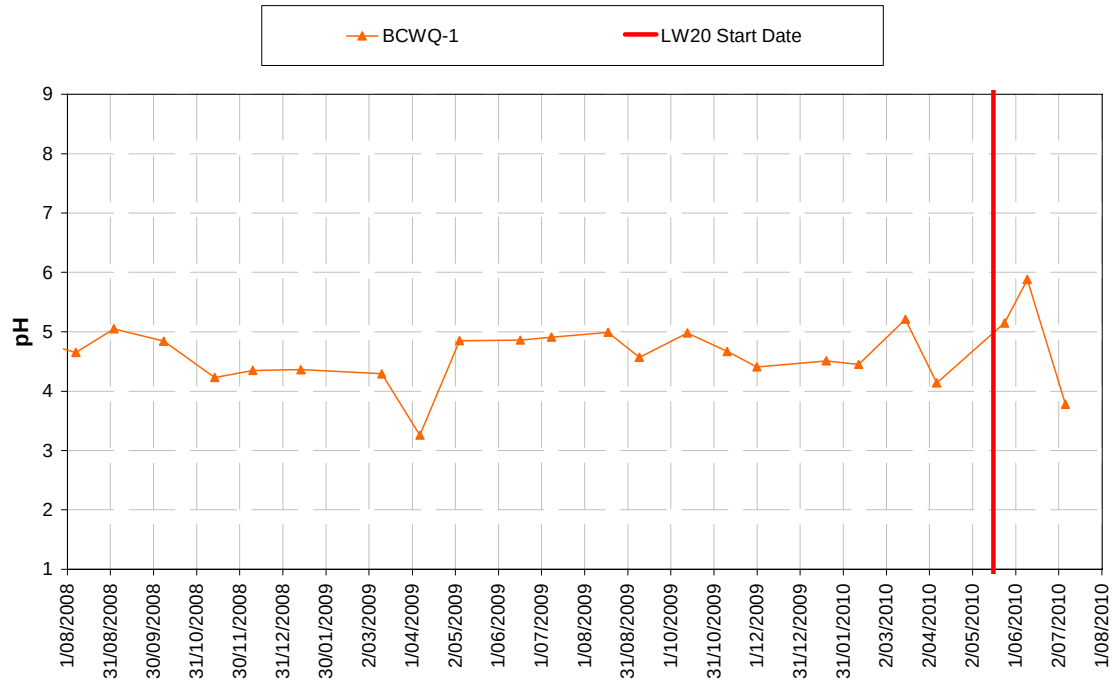

Chart A204 pH (Field) Bee Creek

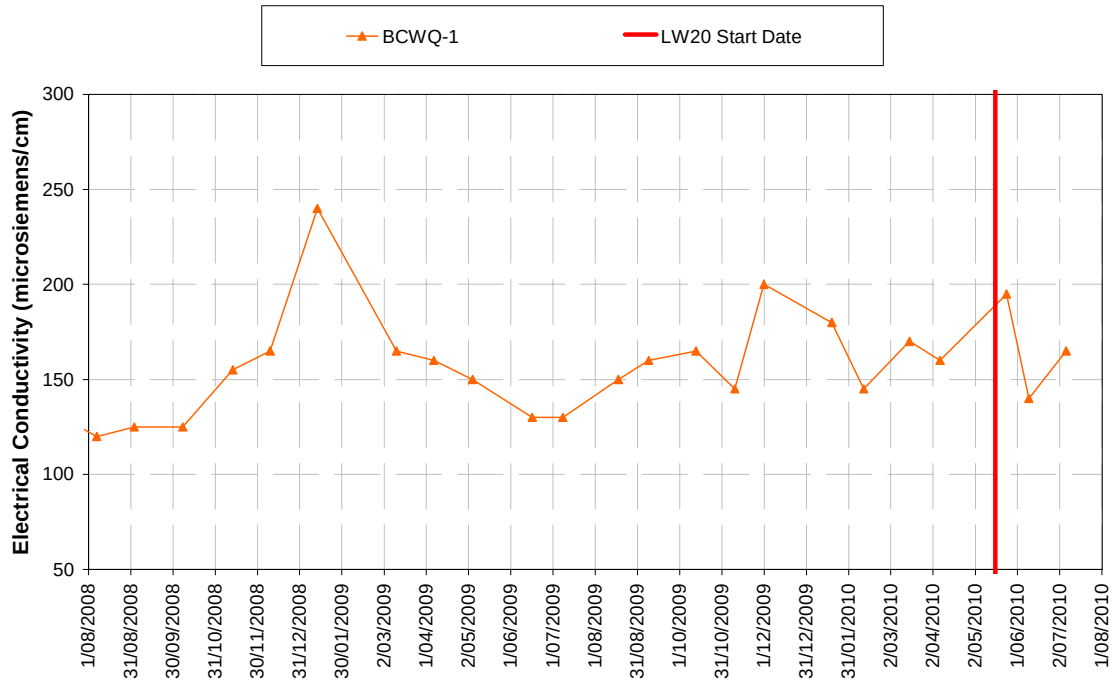

Chart A205 Electrical Conductivity (micro-Siemens/cm) Bee Creek

APPENDIX 2

METROPOLITAN COAL COMPLAINTS RECORD

Metropolitan Coal Complaints Register
August to December 2009

Complaint Number	Person Receiving Complaint	Quarter	Date Received	Time Received	Method of Contact	Nature of Complaint	Action Taken by Licensee	Follow Up Contact
2009_10	Adam Hatfield	4	25/11/2009	2.30 pm	Telephone Terry (4294 2342) – Helensburgh Resident	Trucks (TRN 705) using air brakes when entering town.	A directive was issued to remind all drivers to limit noise when passing through the township. Air brakes should only be used if absolutely essential.	Terry was called and a message was left letting him know that the trucking company had been contacted and a reminder issued about the use of air brakes through town.
2009_11	Adam Hatfield	4	15/11/2009	10.00 am	Telephone Tracey Barrell – Helensburgh Resident (Parkes Street)	Contractor mowing behind her yard showed disregard for her concerns of her plants.	Peter Baker (GM) and site environmental officer met with Tracey, she also discussed her angst at the fencing and inability to access land behind her yard. Tracey was given a key to the gate and issue was resolved.	Delivered key to Tracey.
2009_12	Adam Hatfield	4	18/12/2009	10.45 am	Telephone Katherine Hunter – Helensburgh Resident (1 Lawrence Hargrave Drive)	Complained about a flash of light entering her house around midnight earlier in the week.	Katherine is an elderly lady (90 years) and expressed the trouble she had earlier in the week when a large flash was seen in her house when she was doing the dishes at approximately midnight, said she was extremely frightened. Her doctor had informed her that it could have been the mine.	Explained to Katherine that it was unlikely to be the mine as trucking movements cease at 5.00 pm each afternoon. She appreciated the time to listen to her.

Metropolitan Coal Complaints Register
January to July 2010

Complaint Number	Person Receiving Complaint	Quarter	Date Received	Time Received	Method of Contact	Nature of Complaint	Action Taken by Licensee	Follow Up Contact
2010_1	Ryan Pascoe	1	2/02/2010	12.15 pm	Telephone	Noise - truck using compression braking through town.	The relevant area manager was contacted. He made contact with the trucking company and the need to minimise noise when passing through residential areas was reinforced.	NA - No details were provided, even when prompted.
2010_2	Ryan Pascoe	1	4/02/2010	1.00 pm	Telephone	Noise - truck noise excessive.	Provided feedback to the complainant that trucks are required to transport coal to local coal works and export reject. A paste plant will be trialled and if successful, trucking of reject will not be required. A noise management plan is currently being developed and this will include provision for real-time noise monitoring.	Provided feedback to the complainant that trucks are required to transport coal to local coal works and export reject. A paste plant will be trialled and if successful, trucking of reject will not be required. A noise management plan is currently being developed and this will include provision for real-time noise monitoring.
2010_3	Ryan Pascoe	1	26/02/2010	12.30 pm	Telephone	Other - complainant considered that herbicide was inappropriately applied by a Metropolitan Coal contractor who was carrying out weed control works on mine owned land. The complainant, who owns the property adjacent to the works, thought that spray drift could impact upon their plants. In addition, the complainant stated that a tractor was used to slash an area of vegetation and it damaged a pipe and erroneously entered the property owned by the complainant.	The contractor was informed that he is not to spray weeds adjacent to neighbouring properties and that a brush cutter will be used in the future. Also, the use of a tractor is not warranted on a residential sized block and this practice is to be discontinued. This was communicated to the complainant.	The Manager - Environment and Community called the complainant and left a message at 12.42 pm on 3/03/10. The message provided details regarding instructions given to the contractor. In addition, the complainant was asked to return the call should they wish to discuss the matter further.

Metropolitan Coal Complaints Register (Continued)
January to July 2010

Complaint Number	Person Receiving Complaint	Quarter	Date Received	Time Received	Method of Contact	Nature of Complaint	Action Taken by Licensee	Follow Up Contact
2010_4	Ryan Pascoe	1	16/03/2010	3.32 pm	Email	Other - Complainant observed inappropriate driving practices carried out by a person that drove into Metropolitan Coal's entrance before shift change at around 6.30am.	The complaint was investigated but there was not enough detail provided by the complainant to allow the individual responsible to be identified. Managers at Metropolitan Coal were informed of the issue and they subsequently communicated the need to drive appropriately to the workforce. This issue will continue to be monitored.	Complainant was emailed and thanked for their message. Feedback was provided that the issue was raised at the Manager's Meeting and pre-start meetings. The Manager - Environment and Community offered to meet with the complainant to discuss the matter further.
2010_5	Ryan Pascoe	1	18/03/2010	12.08 pm	Telephone	Other - Complainant reported that a truck driver was texting on way to Metropolitan Mine. The truck was described as being dark blue. The complainant said that they had observed this previously.	An investigation was commenced and concluded with the identification of the driver in question and this driver being issued with a final warning regarding correct conduct when operating their truck.	No follow-up was possible as the complainant's details were not provided.
2010_6	Ryan Pascoe	1	17/03/2010	1.25 pm	Telephone	Noise/Light - This complaint was referred to the Metropolitan Coal via the Department of Environment, Climate Change and Water. The complaint related to noise and light nuisance around the Top Administration building and the operation of the Community Complaints Line (1800 115 003).	A full investigation was conducted and a report was provided to the Department of Environment, Climate Change and Water. The primary findings of the investigation were that the Mine was operating in accordance with its requirements however additional tree screening and the use of an alternative entrance will be considered to reduce any potential nuisance.	A comprehensive report was provided to the Department of Environment, Climate Change and Water.

Metropolitan Coal Complaints Register (Continued)
January to July 2010

Complaint Number	Person Receiving Complaint	Quarter	Date Received	Time Received	Method of Contact	Nature of Complaint	Action Taken by Licensee	Follow Up Contact
2010_7	Ryan Pascoe	1	26/03/2010	6.27 am	Telephone	Noise/Light - At 6.00 am a machine was dropped off near the Metropolitan Coal entrance from Parkes Street in Helensburgh. The noise and light was allegedly very disruptive.	An investigation revealed that Metropolitan Colliery was not aware that the machine was going to be delivered and it is not standard practice to receive machinery to site at before 7.00 am. Metropolitan Colliery expressed its disappointment to the company responsible for the delivery and reiterated that deliveries before 7.00 am are not appropriate.	The complainant was called at 9.27 am to discuss the issue. The actions taken by Metropolitan Colliery were outlined. An offer to meet with complainant was made. The complainant said they would call to confirm a time.
2010_08	Ryan Pascoe	2	1/06/2010	1.52 pm	Email	Dust/Noise - Complainant expressed concern regarding dust and noise impacts.	An investigation revealed that Metropolitan Colliery is compliant with depositional dust limits at the property adjacent to the complainants. The complainant was telephoned to discuss the matter in greater detail. Metropolitan Coal requested a meeting to discuss dust management at the Mine.	On Saturday 19 June, Metropolitan Coal's Manager – Environment and Community, met with the complainant and their husband to discuss noise and dust management at the Mine. The complainant was provided with information concerning how the operation manages dust and noise impacts, new management plans being developed by the Mine and the conditions of Project Approval 08_0149. Copies of the Approval and the draft management plans were provided.

Metropolitan Coal Complaints Register (Continued)
January to July 2010

Complaint Number	Person Receiving Complaint	Quarter	Date Received	Time Received	Method of Contact	Nature of Complaint	Action Taken by Licensee	Follow Up Contact
2010_09	Ryan Pascoe	2	9/06/2010	4.00 am	Telephone	Noise/Dust - Bulldozer noise impacting upon sleep and dust settling on house.	Discussed the complaint with the Coal Handling and Preparation Plant manager who outlined operations during the night in question. Operations were described as 'typical', with one train arriving at around 4.45 am. The complainant was telephoned to discuss the complaint and a meeting regarding the issues raised. Indicated that the complainant would be called back when an investigation had been conducted regarding activities being carried out during the night in question.	The complainant was contacted and provided with information concerning activities during the night to which the complaint pertained. Also, a detailed discussion was had regarding the Noise Management Plan which is being prepared, including the noise monitoring program and how this would be used to manage compliance. An offer to go through this information in further detail was made. The offer was declined as the complainant said that the actions being taken by the Mine had been outlined effectively. An offer was also made to meet with any neighbours to outline the Mine's various management plans and strategies.