TOMINGLEY
GOLD OPERATIONS PTY LTD
(A wholly owned subsidiary of Alkane Resources Ltd)
ABN 53 149 040 371

Annual Environmental Review 2013

Contents

1 Introduction

1.1 Tomingley Gold Mine

Tomingley Gold Operations Pty Ltd (TGO) is a wholly owned subsidiary of Alkane Resources Ltd. The Tomingley Gold Operation is a medium-sized gold project with approximately 921,000 ounces of gold in the current defined resource space. TGO aims to produce 50,000-60,000 ounces of gold per year, over the next 10-12 years, based on an annual ore throughput of around one million tonnes.

The Tomingley area has a long history of mining and exploration for gold. It was first discovered and mined from the Tomingley Goldfield in the 1880s. A number of underground mining operations were operated here and in the McPhail area, immediately south of the Mine Site, through the 19th and 20th centuries. The last economic 'mining' activities were completed in the late 1990s and involved the re-treatment of tailings from the McPhail Mine.

The current mining operations are focused on the area immediately north of the historic Myalls United Mine. Mining commenced in three open cut mines (Wyoming One, Wyoming Three and Caloma) on the site in November 2013. The process plant, with associated residue facilities, was commissioned between December 2013 and February 2014.

1.2 Consents, Leases and Licenses

TGO operates under the environmental consents, leases and licenses specified in Table 1. Additional consents and approvals are specified in the Mining Operations Plan (MOP).

Table 1 Consents, leases and licenses

Title	Legislation	Regulatory Authority
Environment Protection License (EPL) 20169	Protection of the Environment Operations (POEO) Act 1997	NSW Environment Protection Authority (EPA)
Project approval 09_0155	Environmental Planning & Assessment (EP&A) Act 1979	NSW Department of Planning and Infrastructure (DoP&I)
Mining license 1684	Mining Act 1992	NSW Department of Trade and Investment, Regional Infrastructure and Services
Groundwater licences WAL20270, WAL28643 and WAL29266	Water Management Act 2000	NSW Office of Water (NOW)
Groundwater licences (extraction from open cut areas) 80WA715323, 80WA715324 and 80WA715325	Water Management Act 2000	NOW
Notification of Dangerous Goods NDG200150	Work Health & Safety Act (WHS) 2011	WorkCover NSW

This Annual Review has been prepared to address Schedule 5, Condition 4 of TGO's Project Approval 09_0155 which requires the completion of an annual review by the end of March each year once construction commences. Construction of the project commenced in 2013 and this report constitutes the first Annual Review as required by this condition. Table 2 identifies the sections of this report that address the specific requirements of Schedule 5 Condition 4.

Table 2 Annual Review compliance matrix

Condition	Requirement	Reference
4(a)	describe the development (including any rehabilitation) that was carried out in the past calendar year, and the development that is proposed to be carried out over the current calendar year	Section 3 Section 6
4(b)	include a comprehensive review of the monitoring results and complaints records of the project over the past calendar year, which includes a comparison of these results against the: (i) the relevant statutory requirements, limits or performance measures/criteria; (ii) requirements of any plan or program required under this approval; (iii) the monitoring results of previous years; and (iv) the relevant predictions in the EA	Section 4 Section 5.1
4(c)	identify any non-compliance over the past year, and describe what actions were (or are being) taken to ensure compliance	Section 4.12
4(d)	identify any trends in the monitoring data over the life of the project	Section 4
4(e)	identify any discrepancies between the predicted and actual impacts of the project, and analyse the potential cause of any significant discrepancies	Section 4
4(f)	describe what measures will be implemented over the next year to improve the environmental performance of the project	Section 4 Section 6

1.3 Mine Contacts

The primary contacts for the Tomingley Gold Mine during the review period are detailed in Table 3.

Table 3 Tomingley Gold Operations Key Contacts

Key Contact	Position	Contact Details
Sean Buxton	Operations Manager	PO Box 59 Peak Hill, NSW, 2869 Phone: (02) 6867 9780
Mark Williams	Environment and Community Manager	PO Box 59 Peak Hill, NSW, 2869 Phone: (02) 6867 9780
Community Information Line		(02) 6865 6116

2 Definitions

Term	Definition
$CaCO_3$	Calcium carbonate
Council	Narromine Shire Council
CCC	Community Consultative Committee
EEC	Endangered ecological community
EC	Electrical Conductivity
EPA	Environment Protection Authority
EP&A	Environment Planning and Assessment Act
EPL	Environment Protection Licence
DoP&I	Department of Planning & Infrastructure
ha	Hectares
HVAS	High volume air sampler
LDP	Licensed discharge point
LFA	Landscape function analysis
MOP	Mining operations plan
ML/yr	Megalitres per year
NGERS	National Greenhouse and Energy Reporting Scheme
NMP	Noise Management Plan
NOW	NSW Office of Water
NSS	Noise and Sound Services
OEH	Office of Environment and Heritage
PM10	Particulate matter
RMS	Roads and Maritime Services
SEEC	Strategic Environmental and Engineering Consulting
TARP	Trigger action response plan
TEOM	Tapered Element Oscillating Microbalance
TGO	Tomingley Gold Operations
TGP	Tomingley Gold Project
TSP	Total suspended particulates
WAD	Weak acid dissociable cyanide
WAL	Water access licence
WHS	Workplace Health & Safety
WRE	Waste rock emplacement

3 Operations during the Reporting Period

3.1 2013 Report mining activities

The Tomingley Gold Mine was under construction for most of the reporting period. The surface levels across sites varies between 268mRL and 278mRL. During 2013 the following activities were conducted across the site.

Topsoil was cleared and stockpiled at Wyoming 1 with clay material extracted for use in tailings dam construction. No mining was conducted at Wyoming 1 during 2013, the open cut area was instead used for temporary water storage whilst surface water infrastructure is being finalised.

Pit construction was staged at Wyoming 3 due to delays in construction of the Newell Highway underpass. Referenced ground level varies across site Ore and waste was mined to 250 mRL with ore used for commissioning of the mill.

Delays in construction of the Newell Highway underpass hampered TGO's ability to mine ore from the Caloma open cut. Ore was however mined to 265 mRL.

Three waste rock emplacements (WRE) were prepared. WRE1 was cleared and stockpiling commenced of a small amount of selected mined waste materials. WRE2 was partially cleared, with topsoil stockpiling to occur during 2014. A noise bund was constructed to approximately 280 mRL to protect the Tomingley Township. Clearing also occurred on the northern half of WRE3 with topsoil stockpiled to the north to form a second noise bund. The remainder of the topsoil on WRE3 is sodic and is therefore not valuable for rehabilitation so has been left insitu.

3.2 Report on construction activities

Construction of all necessary infrastructure was commenced and predominantly completed during the reporting period. This included:

- Access roads and hardstand areas.
- Processing plant including crusher, conveyers, leach circuit, cyanide detox circuit, residue thickener, laboratory, reagent storage and process/raw water storage.
- Residue Storage facility including embankments, decant structures, discharge spigots and fauna fencing.
- Sediment ponds, drains and flood levies.
- Administration, training, first aid, store and staff amenity buildings.
- Potable water and effluent treatment plants.
- Explosives magazine.

4 Environmental Management and Performance

4.1 Environmental management strategy

TGO operate under an Integrated Management System that incorporates their Environmental Management Strategy (EMS), WHS Strategy and Quality Strategy. The EMS is consistent with the requirements of ISO14001:2004 and provides the strategic framework for TGO's environmental management including risk management, legal and other compliance, roles and responsibilities, training, monitoring, incident management, non-compliance corrective and preventive action, auditing, and review. The management plans discussed throughout Section 4 form a component of the EMS.

4.2 Meteorological monitoring

Meteorological monitoring was undertaken as per the TGO project approval. Data was collected during the reporting period on wind speed and direction, rainfall and temperature as shown in Figure 4-1 to Figure 4-3 and Table 4.

4.2.1 Wind

Prevailing winds were consistently from the east-north-east with winds travelling over the township of Tomingley prior to reaching the mine site as shown in the annual wind rose for Tomingley (Figure 4-1). There was a slight increase in south-easterly wind velocity during late spring and early summer. Wind conditions were very calm during winter. Wind speeds were between 10 and 30 km/hr, rarely exceeding 40 km/hr. Monthly wind roses are provided in Appendix A.

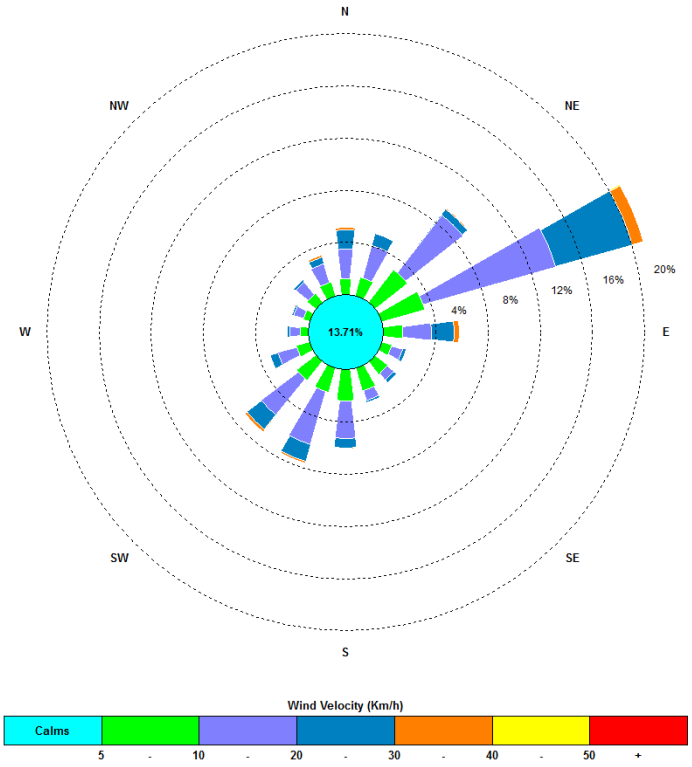


Figure 4-1 Tomingley Gold annual wind rose

4.2.2 Rainfall

During the reporting period, rainfall was highly variable (as presented in Table 4 and Figure 4-2) with a maximum monthly total of 108.6 mm in June and minimum of 4.8 mm experienced in both August and October. Total annual rainfall was 512.6 mm, this is below average compared with an average of 584.3 mm from the nearby Bureau of Meteorology Tomingley (Gundongs) weather station number 50139.

Table 4 Tomingley Gold rainfall and temperature summary

Month	Monthly Rain Total (mm)	Min 2m Temp (°C)	Average 2m Temp (°C)	Max 2m Temp (°C)
Feb-13	55.4	13.6	25.8	34.9
Mar-13	50.4	9.9	22.2	31.6
Apr-13	19.6	5.6	18.4	29.2
May-13	18.6	2.8	14.2	26.4
Jun-13	108.6	1.1	11.2	18.7
Jul-13	47.2	1.2	11.1	19.6
Aug-13	4.8	0.7	11.4	25.4
Sep-13	54.8	4.6	16.4	29
Oct-13	4.8	-1.2	17.6	35
Nov-13	45.8	6.8	20.9	37.8
Dec-13	41.4	5.1	24.8	40.9
Jan-14	61.2	11.2	26.7	42.1

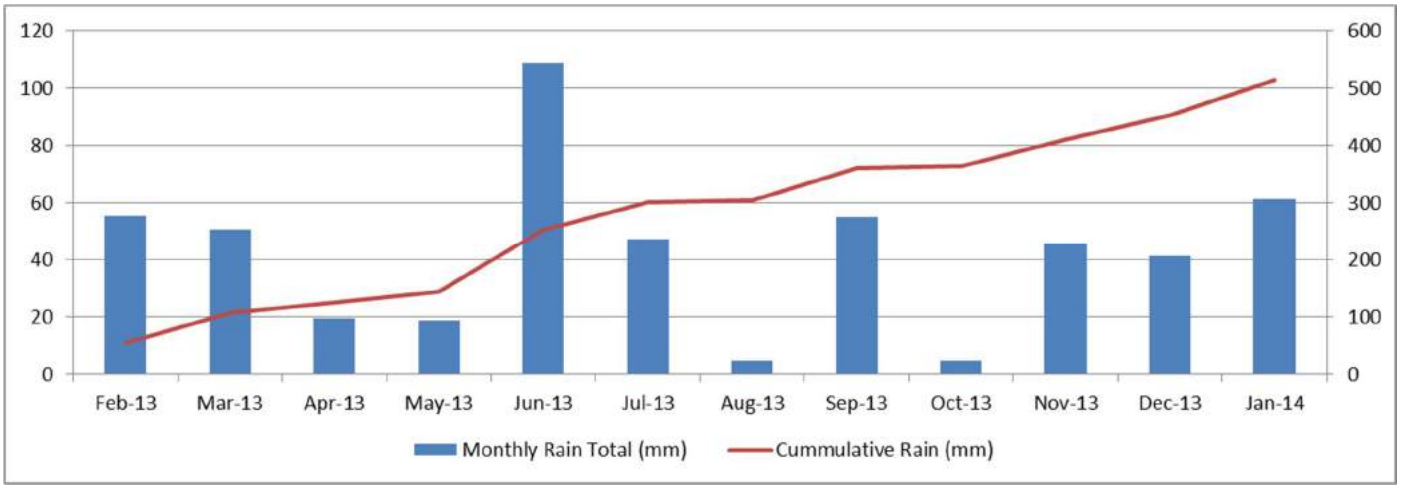


Figure 4-2 Tomingley Monthly and Cumulative Rainfall

4.2.3 Temperature

Temperature, as recorded at the TGO weather station, is presented in Table 4 and Figure 4-3. Minimum daily temperatures ranged from -1.2 °C in October to 13.6 °C in February. Maximum daily temperatures ranged from 18.7 °C in June to 42.1 °C in January.

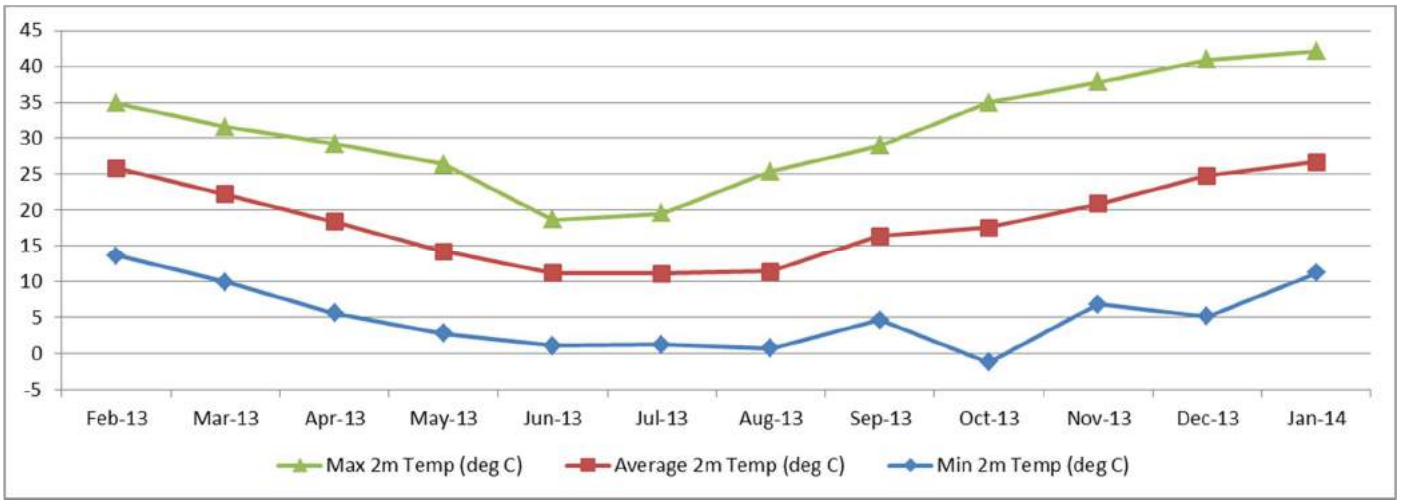


Figure 4-3 Tomingley Monthly Temperature 2013-14

4.3 Noise management

A Noise Management Plan (NMP) was completed in May 2013 as a requirement of the planning approval following consultation with the EPA and Narromine Shire Council. As mentioned above, the NMP is a component of the mine's EMS and aims to be a practical guide for the management of noise issues on site. TGO have developed a number of mitigation measures to prevent adverse noise impacts on neighbouring properties including land acquisition, property modification, hours of operation, engineering noise controls, procedural noise controls, noise monitoring, staff induction and a complaints handling procedure.

There were no land acquisition requests or additional noise mitigation measures carried out during the reporting period.

4.3.1 Monitoring requirements – Noise

Noise monitoring requirements for TGO are detailed in EPL20169 and project approval 09_0155 as shown in Table 5.

Table 5 Noise Monitoring Requirements

Reference	Monitoring Requirement	Frequency
EPL20169	Compliance noise assessment at neighbouring properties	Annually over three days
Project approval 09_0155	Monthly attended noise monitoring for first 12 months Hours of operation Real time monitoring at the most sensitive receiver	First three months – day / evening / night Remaining nine months – evening / night NA Continuous

An updated noise plan is required to be submitted to the DoP&I following 12 months of monitoring. It is likely that the plan will be reviewed prior to this period lapsing. This plan could include revised monitoring requirements dependent on monitoring results and the extent of complaints.

4.3.2 Monitoring results – Noise

In 2013 Noise and Sound Services (NSS) completed the *Construction Noise Compliance Report at Tomingley Gold Project* (NSS 2013) to satisfy the EPL and determine compliance with the noise limits during construction at neighbouring residential dwellings. Attended noise measurements were carried out at six locations neighbouring the construction site over a three day period. Background sound, particularly B-double trucks utilising the Newell Highway, was a major contributor to sound in the area. As a result, the measured sound pressure level for almost all of the daytime samples and all of the night time samples were elevated. The construction noise levels were within the EPA noise limits with the exception of two locations (40 Myall St and Ben Rees house). A contributing factor to these elevated levels was determined to be as a result of reversing alarms and recommendations were made for alternative safety measures to be implemented during truck reversing.

The monthly noise monitoring program, as outlined in the NMP, did not commence during the reporting period. It has subsequently started however its use as the most appropriate tool for assessing of noise impact is to be reviewed in the NMP. The results from this type of monitoring are dependent on favourable weather conditions at the time of monitoring. The use of additional continuous monitors during the year is considered to be a more reliable tool for assessing noise.

TGO installed a continuous noise meter at the most sensitive receiver prior to the start of the reporting period. Results from this continuous monitoring are presented in Figure 4-4, Table 6 and Figure 4-5. The data was reviewed to understand the cause of the exceedances. As with NSS 2013 (mentioned above), the review concluded that background sound including frogs, cicadas, bird song and road traffic on the Newell Highway was a major sound source in the area. This can be confirmed during playback of the recorded sound where exceedances were identified.

NSS has suggested that a low pass frequency filter (e.g. below 2 kHz) in the sound level meter should be used to exclude high frequency extraneous noise such as frogs and cicada. High frequency noise does not propagate from the mine over large distances due to dissipation of the sound energy from atmospheric absorption. The use of the filter would ensure noise monitoring is more representative of possible mine noise. TGO is discussing the option of filtering of the sound with the monitoring equipment supplier Brüel and Kjaer and these changes will be incorporated into the review of the NMP.

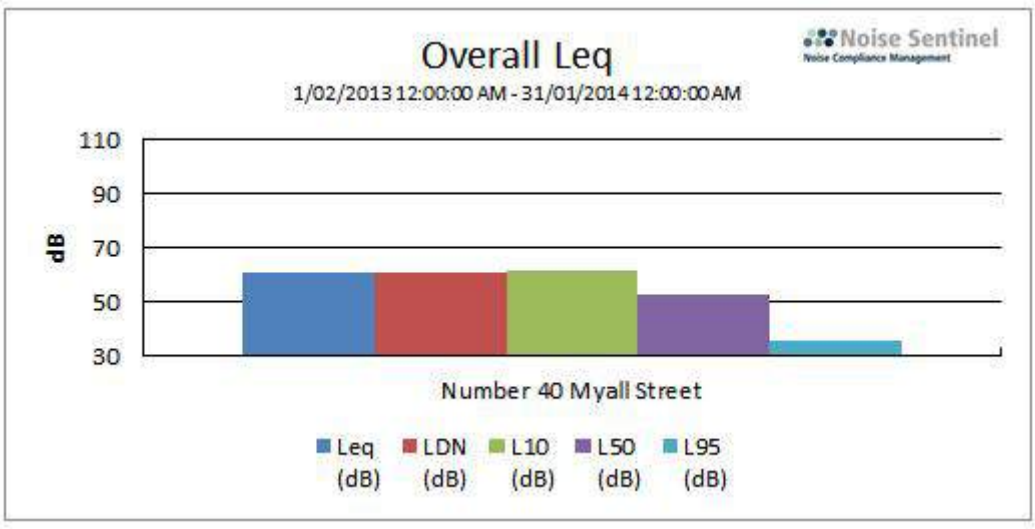


Figure 4-4 TGO Annual Equivalent Continuous Noise Level

Table 6 TGO Noise Data Summary

Location	Start Time	End Time	Activity	LDN (dB)	L_{eq} (dB)	L_{Min} (dB)	L_{10} (dB)	L_{50} (dB)	L_{95} (dB)
40 Myall St	1/02 12:00 AM	31/01 12:00 AM	98%	60.5	60.5	20.6	61.7	52.3	35.7

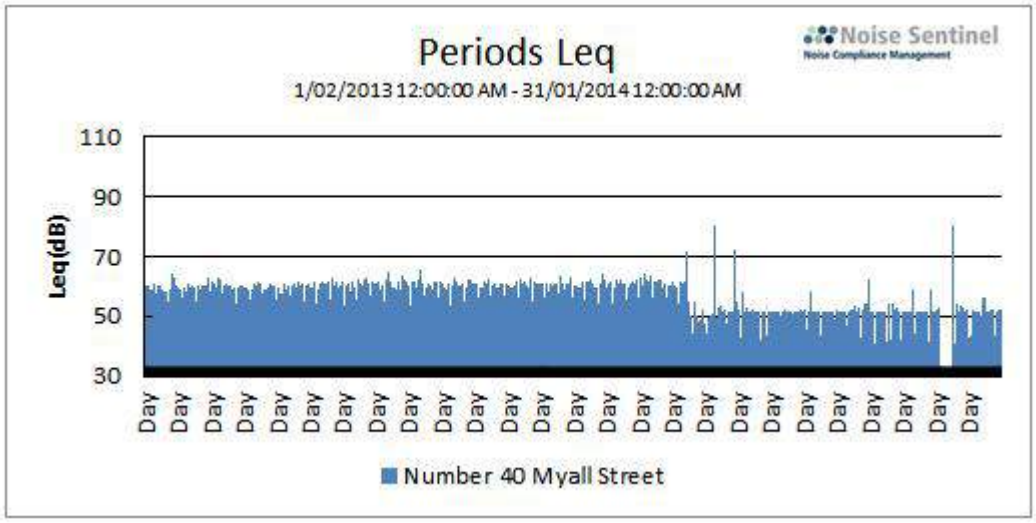
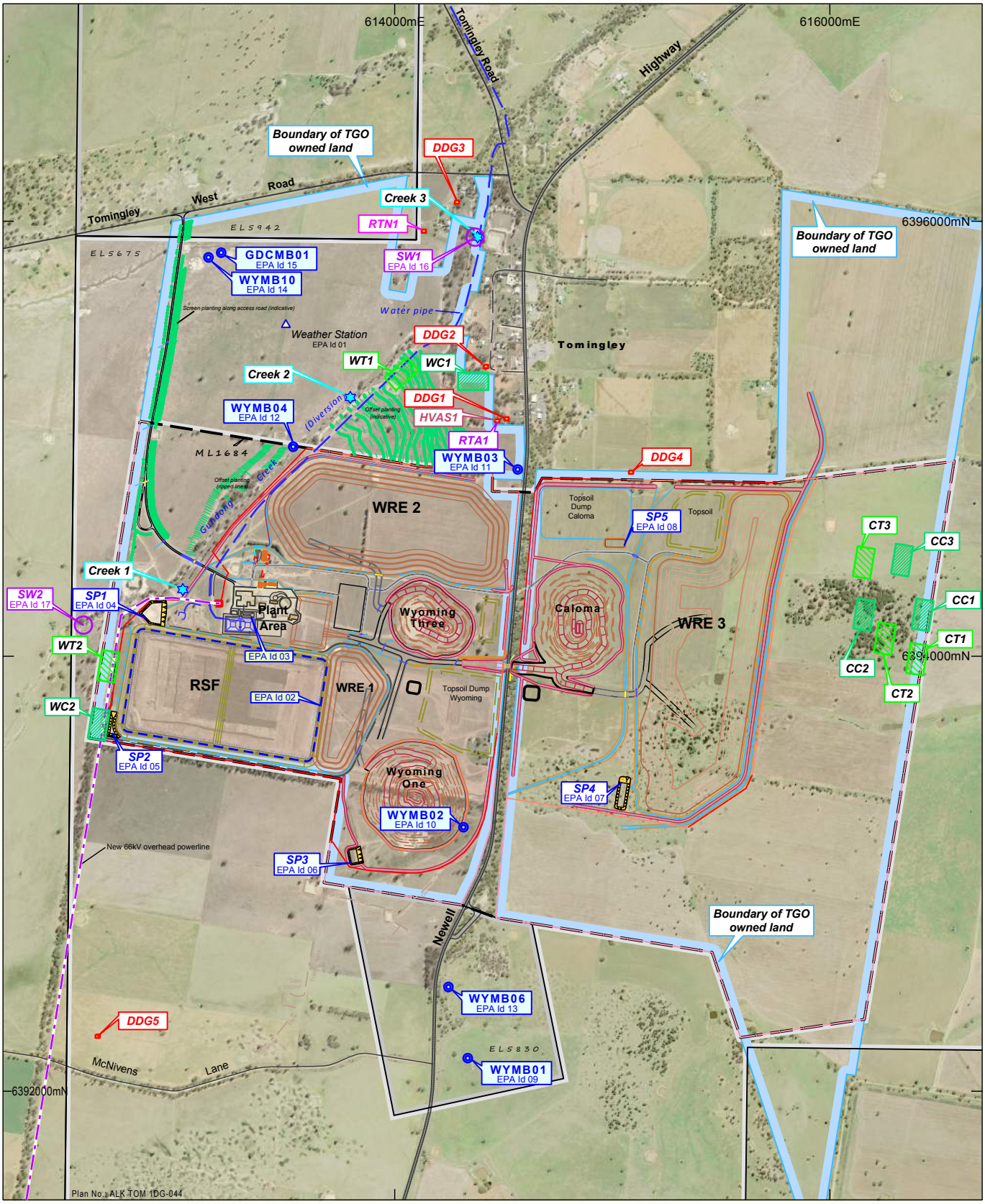


Figure 4-5 TGO Daily Equivalent Continuous Noise Level



SP_ Sediment pond discharge location

DDG_ Dust deposition gauge location

HVAS_ High volume air sampler location

RTA_ Real time air quality monitoring station

RTN_ Real time noise monitoring station

SW2 Surface water

WYMB06 Groundwater bore

Creek 2 Gundong Creek Diversion monitor / photo point

WT2 Vegetation treatment site

WC2 Vegetation control site

Additional EPA ID Locations

EPA Id 02 Discharge of tailings to the RSF moves around the circumference.

EPA Id 03 Discharge between the Process Sediment Pond and the Process Water Pond

Scale 1 : 25 000

0 1000 metres

TOMINGLEY GOLD OPERATIONS PTY LTD
(A SUBSIDIARY OF ALKANE RESOURCES LTD)

TOMINGLEY GOLD OPERATION

Environmental Monitoring Sites

Projection - AMG Zone 55
Datum (horizontal) - AGD66

Compliled: Alkane (CM) Plan No.: ALK TGO 1EV-001
Drafted: DJM Date: 12 December 2013 Figure No.:

4.4 Blast management

Blasting is managed through a dedicated Blast Management Plan. The blast plan forms part of the EMS and was developed during the reporting period following a risk assessment to identify the significant risks associated with blasting at Tomingley. The plan details the management controls to mitigate blasting risks including blast notification systems, blasting times and frequency, pre-blast risk assessments, blasting criteria, property inspections and complaints handling procedures.

The plan was developed in compliance with the project approval, including consultation with OEH, RMS and Council.

4.4.1 Monitoring requirements – Blasting

Ground vibration and air blast overpressure monitoring will be undertaken at the sensitive receiver locations identified in Figure 4-6.

4.4.2 Monitoring results – Blasting

No blasting was undertaken during the reporting period. Structural inspections on buildings and other structures of neighbouring properties were undertaken to determine baseline condition, and noise and blast monitors were installed.

4.5 Air quality

Schedule 3, Condition 19 requires the preparation of an Air Quality and Greenhouse Gas Management Plan for TGO. It was developed in 2013 in consultation with Narromine Shire Council and the EPA and focusses on dust emissions from the site with the objective of:

- Minimising dust nuisance to surrounding residents
- Avoiding adverse health impacts as a result of the project.

The plan includes management strategies and measures to manage dust across the site and at neighbouring sensitive receivers.

It is not anticipated that odour will be an issue arising from the operations and as such, no odour limits have been included in the EPL.

The plan also addresses greenhouse gas emissions arising from the mining operations including sources, options to reduce emissions and reporting requirements. It has been identified through project planning that TGO will trigger the reporting requirements for a facility under the National Greenhouse and Energy Reporting Scheme (NGERS). TGO will report to NGERS during 2014 and will include information on greenhouse emissions in the 2014 Annual Review.

During the reporting period, in response to identified concerns relating to dust, a site specific plan was developed including a trigger action response plan (TARP). A training and education program was implemented for all site staff and contractors to ensure future adverse conditions were identified and mitigated. This is an additional action to the AQGGMP and will be incorporated into the AQGGMP upon review of this document.

During the reporting period, TGO received seven dust complaints. One of these incidents was investigated by the EPA and an official caution was issued. Further information on this caution is provided in section 4.12.

4.5.1 Monitoring requirements – Air quality

The project approval requires TGO to implement an air quality monitoring program. As a result, monitoring equipment has been installed surrounding the mine site as follows:

- One Tapered Element Oscillating Microbalance (TEOM) measuring PM10
- One High Volume Air Sampler (HVAS) measuring Total Suspended Particulates (TSP)
- Five depositional dust gauges measuring total insoluble matter; and
- One meteorological weather station.

4.5.2 Monitoring results – Air quality

Air quality data has been collected at the abovementioned sites since May 2013. It is not possible to compare air quality results for TGO against the long-term impact assessment criteria for particulate matter and deposited dust as the project has not yet collected 12 months of data, these results will be presented in the 2014/15 Annual Review. Monthly depositional dust results are presented in Figure 4-7. A spike in dust recorded at the monitoring sites in November coincided with several dust complaints received from the community. This could be attributed to a moderate increase in south-westerly winds (as observed in the monthly wind roses in Appendix A) as well as an increase in land disturbance and mining activity at the site.

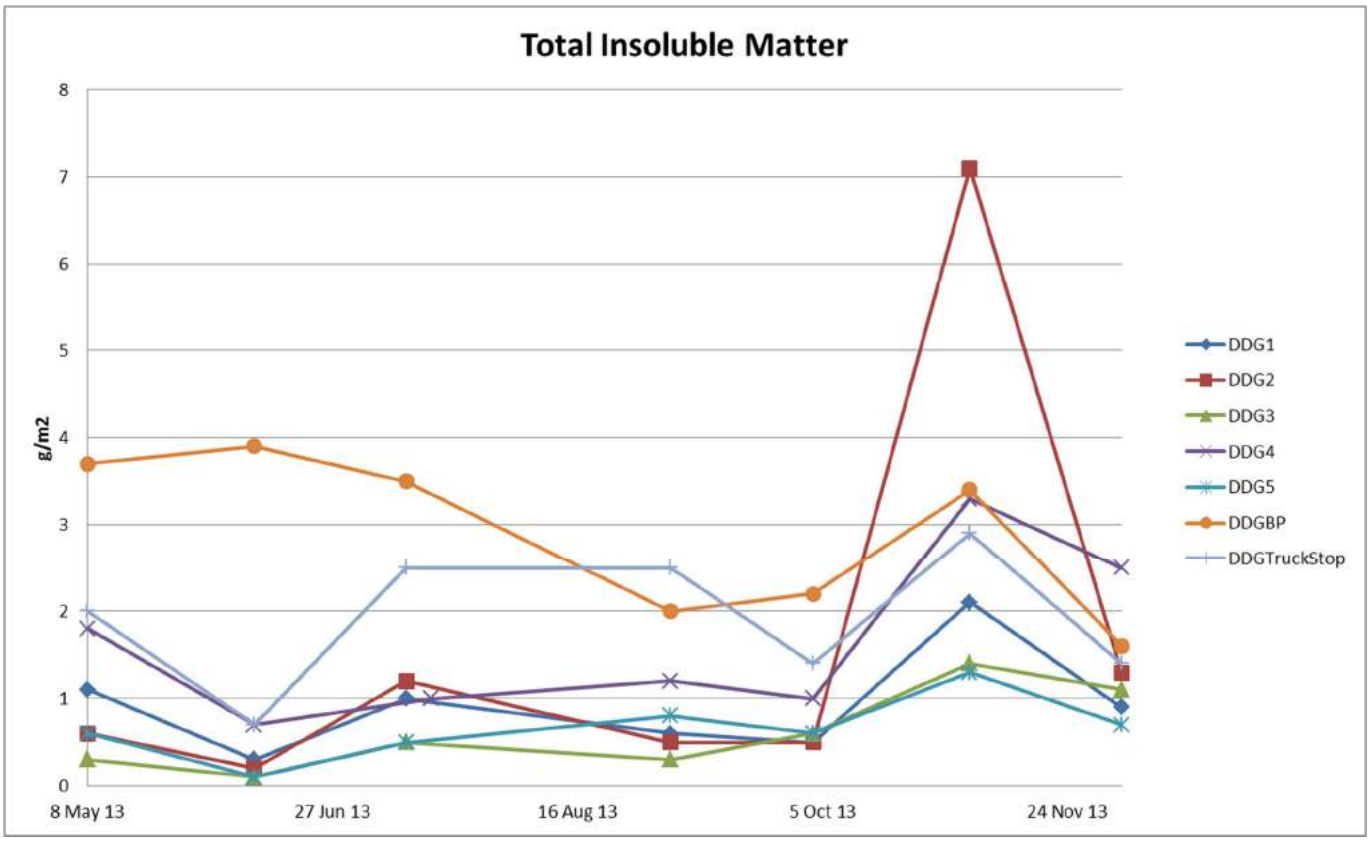


Figure 4-7 Depositional Dust

Particulate matter results can be compared with the short-term impact assessment criterion. These results indicate that there were three exceedances of the short-term impact assessment criterion during the reporting period. The data from 5 November to 26 December could not be relied upon due to technical issues associated with the TEOM including a motherboard fault and filtration issues. TGO has installed a live data link to ensure data capture is reliable and accessible from off site. An alternate supplier has been sourced for TEOM maintenance and this will allow the use of temporary unit in the event of another system failure.

Dust generation proved to be an ongoing challenge for TGO through construction and then into operating the mine. TGO was issued with an official caution from the EPA relating to a dust incident in November 2013. Original estimates for water requirements for dust mitigation of 60 ML/yr were exceeded with the total volume of water used for dust suppression in the reporting period actually totally 150.24 ML. Through the

implementation of a new Site Specific Procedure and a review of operational methods, TGO was able to reduce dust emissions despite the hot dry conditions that were experienced.

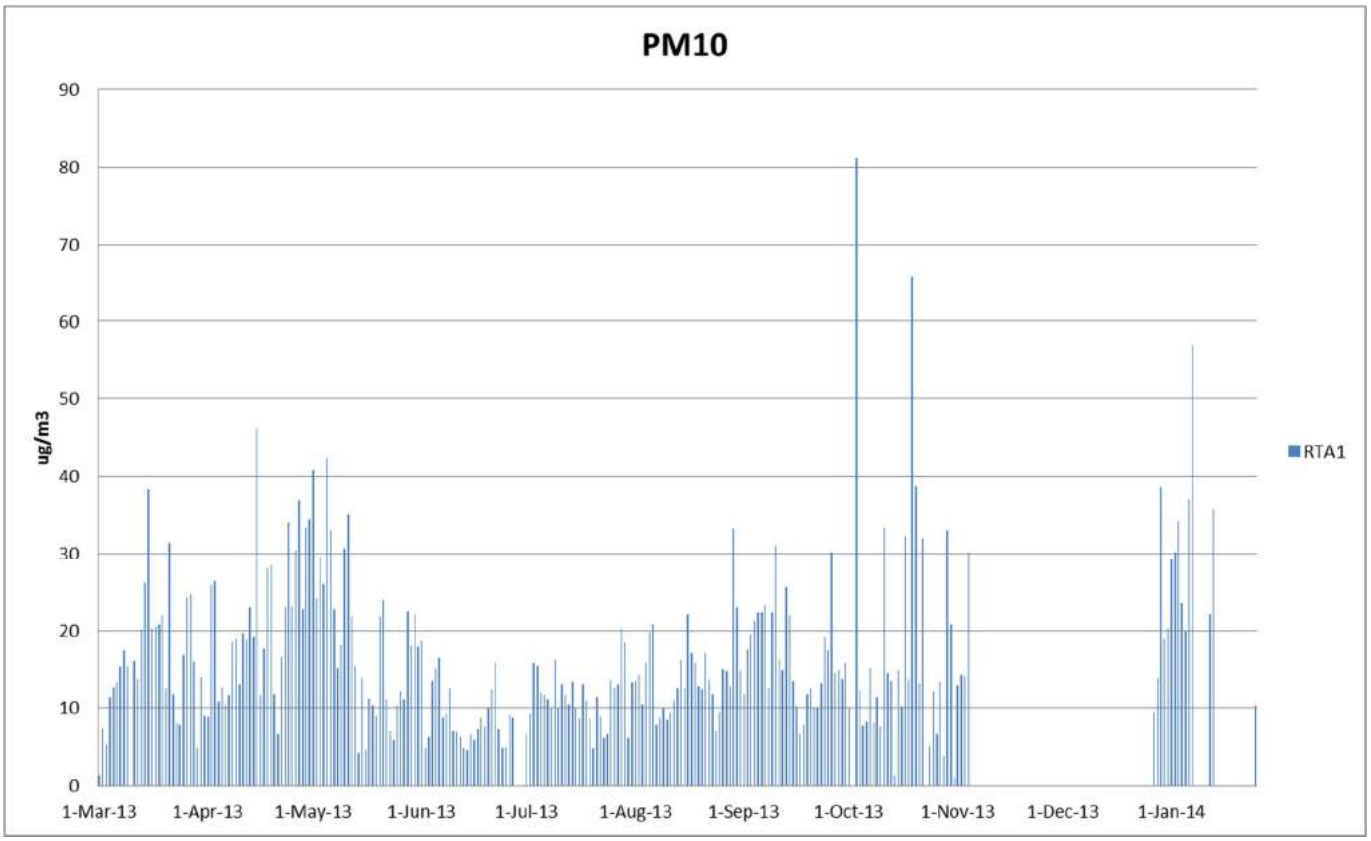


Figure 4-8 PM10 Short Term Criterion

4.6 Water management

Development of a Water Management Plan (WMP), addressing both surface and groundwater management for the mine, is ongoing. A draft was submitted to the department as per the required dates however it is yet to be finalised. Since the site has become operational it has become evident that the draft plan requires reviewing. Whilst it is considered that the constructed and proposed physical infrastructure components of the plan are satisfactory, further work needs to be carried out to ensure the procedural and administrative commitments in the plan meet operational and legislative requirements. TGO is planning to submit a revised draft plan to the regulators in August 2014. Water monitoring was carried in accordance with EPL and project approval requirements during the reporting period.

4.6.1 Monitoring requirements – Water

Water quality and flow monitoring is being undertaken in line with the requirements of EPL20169 and the project approval. Table 7 details the surface water monitoring requirements for TGO from EPL20169. Results are presented in Section 4.6.2 and Appendix B.

Table 7 EPL20169 Monitoring Requirements – Water

Monitoring Location	Parameter	Unit	Monitoring Frequency	Concentration Limit
LDP2	Cyanide	mg/L	Daily during discharge	20-30
LDP4, LDP5, LDP6, LDP7, LDP8	EC	µS/cm	During discharge	350
	Total Nitrogen	µg/L		250
	Total Phosphorus	µg/L		20
	Total Suspended Solids	mg/L		50
	pH	pH units		6.5-8.5
	Oil and Grease	mg/L		
	Aluminium	mg/L		
	Arsenic	mg/L		0.024
	Boron	mg/L		
	Cadmium	mg/L		0.0002
	Chromium	mg/L		
	Copper	mg/L		0.0014
	Total Cyanide	mg/L		
	Cyanide (WAD)	mg/L		
	Lead	mg/L		0.0034
	Mercury	mg/L		
	Molybdenum	mg/L		
	Nickel	mg/L		0.011
	Selenium	mg/L		
	Zinc	mg/L		0.008
LDP9, LDP10, LDP11, LDP12, LDP13, LDP14, LDP15	Alkalinity (as calcium carbonate)	mg/L	Quarterly	
	Ammonia	mg/L		
	Arsenic	mg/L		
	Bicarbonate	mg/L		
	Cadmium	mg/L		
	Calcium (dissolved)	mg/L		
	Carbonate	mg/L		
	Chloride	mg/L		
	Copper	mg/L		
	Free Cyanide	mg/L		
	Total Cyanide	mg/L		
	Cyanide (WAD)	mg/L		
	EC	µS/cm		
	Hardness (as calcium carbonate)	mg/L		
	Lead	mg/L		
	Magnesium (dissolved)	mg/L		
	Mercury	mg/L		
	Nickel	mg/L		
	Nitrate	mg/L		
	pH	pH units		
	Phosphate	mg/L		
	Potassium (dissolved)	mg/L		
	Sodium (dissolved)	mg/L		
	Standing water level	m		
	Sulphate	mg/L		

The project approval sought TGO to obtain baseline data for surface water bodies that could be affected by the project and groundwater underlying the mine site. The surface water component has proved

challenging due to the ephemeral nature of Gundong Creek. To date there have been two sampling events, one in 2010 during the environmental assessment, and one during the reporting period. The results from these sampling events are shown in Table 8 and Table 9. Baseline groundwater monitoring was required for a six month period from November 2012 to April 2013 as shown in Table 7. Results from this monitoring are provided in Appendix C.

4.6.2 Monitoring results – Water

Surface Water – Gundong Creek

Gundong Creek traverses the north-western section of the mine site. Its headwaters originate in the Herveys Range, approximately 12 km to the east of the mine. Gundong Creek drains an area of approximately 10,600 ha upstream of where it enters the mine site, although it is understood that a significant proportion of the peak flows are diverted away from the creek well before they reach the mine site (SEEC, 2011). It is an ephemeral creek, only flowing following significant rainfall events. This has resulted in only two sampling events, one providing background water quality data during preparation of the environmental assessment and one since mine construction and operation. These two sampling events did not occur at the same upstream location however they were both upstream of the mine and should provide some comparative value. The downstream sampling locations appear to be in the vicinity of one another. The background samples were only analysed for a very limited suite of parameters in the first sampling event. All future sampling events will be at the most recent sampling locations as shown in Figure 4-6 and for the full suite of parameters presented in Table 8 and Table 9. There is limited value in commenting on the results from the two sampling events. More detailed discussion on water quality results in Gundong Creek will be provided in the 2014 Annual Review should further flows occur.

Table 8 Upstream Surface Water Quality Data – Gundong Creek

Parameters	Units	Background 14/07/2010	Reporting Period 14/11/2013
Cyanide (Free)	mg/L		0.011
Electrical conductivity	µS/cm	71	77
pH	pH_Units		5.74
Acidity (total) as $CaCO_3$	mg/L	11	
Total Suspended Solids	mg/L	106	745
WAD Cyanide	mg/L		0.007
Total Nitrogen	mg/L	1.7	
Ammonia	mg/L		3
Nitrate (as N)	mg/L		<0.01
Phosphate	mg/L		0.65
Total Phosphorus	mg/L	0.34	
Alkalinity (total) as $CaCO_3$	mg/L		20
Bicarbonate	mg/L		20
Carbonate	mg/L		<1
Calcium	mg/L		2
Chloride	mg/L		7
Magnesium	mg/L		4
Potassium	mg/L		5
Sodium	mg/L		9
Sulphate	mg/L		8
Arsenic (Filtered)	mg/L		0.0001
Cadmium (Filtered)	mg/L		<0.0001
Copper (Filtered)	mg/L		0.006
Lead (Filtered)	mg/L		0.002
Nickel (Filtered)	mg/L		0.003
Zinc (Filtered)	mg/L		0.053

Table 9 Downstream Surface Water Quality Data – Gundong Creek

Parameters	Units	Background 14/07/2010	Reporting Period 14/11/2013
Cyanide (Free)	mg/L		0.01
Electrical conductivity	µS/cm	73	59
pH	pH_Units		5.96
Acidity (total) as $CaCO_3$	mg/L	9	
Total Suspended Solids	mg/L	<5	586
WAD Cyanide	mg/L		<0.004
Total Nitrogen	mg/L	1.6	
Ammonia	mg/L		3.1
Nitrate (as N)	mg/L		<0.01
Phosphate	mg/L		0.63
Total Phosphorus	mg/L	0.5	
Alkalinity (total) as $CaCO_3$	mg/L		22
Bicarbonate	mg/L		22
Carbonate	mg/L		<1
Calcium	mg/L		2
Chloride	mg/L		4
Magnesium	mg/L		4
Potassium	mg/L		6
Sodium	mg/L		7
Sulphate	mg/L		8
Arsenic (Filtered)	mg/L		0.001
Cadmium (Filtered)	mg/L		<0.0001
Copper (Filtered)	mg/L		0.003
Lead (Filtered)	mg/L		0.001
Nickel (Filtered)	mg/L		0.002
Zinc (Filtered)	mg/L		0.014

Surface Water – Site

The purpose of the water quality monitoring program on site is to monitor the discharge of water from the site to receiving environments. During the reporting period, no water was released offsite via the sediment basins (LDP4-LDP8). TGO initiated a water quality monitoring program at the sediment basins, above and beyond the requirements of their EPL. A summary of the results of this water quality monitoring is presented in Appendix B. Limited data is available for analysis this reporting period with only two sampling events having taken place. More detailed discussion of results and trends in data will be provided in the 2014 Annual Review.

Groundwater

The groundwater assessment conducted as part of the environmental assessment indicated that groundwater is present in the following aquifers underlying the mine site:

- Shallow alluvium
- Deep alluvium, and
- Fractured rock.

Baseline groundwater monitoring was undertaken between November 2012 and May 2013, as required by the project approval at the monitoring locations and dates shown in Table 10. There are some data gaps which resulted from technical difficulties associated with monitoring deep groundwater wells. TGO has since engaged a contractor with specialist equipment and developed a site specific procedure to ensure groundwater is sampled in accordance with the EPL licence requirements. Quarterly groundwater monitoring, as per the project approval, then commenced and samples were taken in September and December 2013. Standing water levels were taken prior to sampling, and samples were analysed for the full range of monitoring parameters specified in EPL20169 as outlined in Table 7. Results from the baseline monitoring are provided in Appendix C. Graphical representation of the baseline and quarterly monitoring

results are also presented in Appendix C. A review of the baseline data will be incorporated in the WMP as required by the project approval and EPL so as to ensure suitable trigger levels are established for the site.

Table 10 Baseline Groundwater Monitoring Data Availability

Monitoring Location	15/11/12	16/12/2012	11/01/2013	12/02/2013	12/04/2013	10/05/2013
GDCMB01	×	×	×	×		
WYMB01	×	×	×	×		
WYMB02	×	×	×	×	×	×
WYMB03			×	×	×	×
WYMB04	×	×	×	×	×	×
WYMB06	×	×	×	×	×	×
WYMB10	×	×	×	×		

4.7 Biodiversity

The Biodiversity Management Plan for TGO was completed in the reporting period using background information from the project's environmental assessment. In the environmental assessment, it is estimated that approximately 82.5 % of the mine site had been cleared prior to construction due to previous agricultural activity (Corkery 2011). Despite this, some habitat loss was still anticipated as part of construction and operation of TGO.

As part of the plan, TGO have committed to the following objectives:

- Protection of the Grey-Crowned Babbler and their nests
- Maximising the protection of remnant inland Grey Box Woodland and Fuzzy Box Woodland EEC
- Minimising the impact to tree dependent microbats
- Minimising the impact to nesting fauna during tree clearing, and
- Preventing cyanide poisoning of fauna.

TGO carried out paddock clearing on the Caloma side, and paddock and tree clearing for road widening and construction of an underpass on the Wyoming side of the operation. An area of 50 m by 5 m was cleared, including five large trees and remaining shrubs and undergrowth.

The majority of the works were scheduled for autumn to minimise the impacts on wildlife breeding patterns. Spring clearing works were kept to a minimum with just some small paddock trees in the Caloma open cut area removed. Some magpie nests and galah hollows were relocated. Wildlife were captured and translocated as required. A small number of birds were taken to the wildlife clinic at the Taronga Western Plans Zoo, and one death was recorded.

In these instances, tree clearing protocols were adhered to including:

- Pre-clearing surveys completed on the day of clearing
- A qualified fauna handler being present during felling, and
- Post-clearing surveys conducted immediately post felling.

No feral animal control was conducted during 2013.

A Vegetation Monitoring Program was designed to meet the requirements of the Biodiversity Management Plan.

TGO engaged an external contractor to undertake boxthorn eradication. Follow up inspections, conducted as part of the biannual weed monitoring program, indicated some regrowth which will be targeted in the next round of weed control in spring 2014.

4.7.1 Biodiversity Offset Management

A Biodiversity Offset Strategy has also been developed to satisfy the requirements of the project approval. This strategy specifies offset areas and protection / ameliorative planting of existing remnants for each impacted community, including securing the sites in perpetuity through a conservation property vegetation plan under the Native Vegetation Act 2003. The Strategy has established a target to conserve at least 66.6 ha of remnant native vegetation and establish at least an additional 61 ha of native vegetation.

Offsite rehabilitation and establishment of the offset areas commenced in April 2013 with direct seeding of trees and shrubs west of the Newell Highway. A 35ha area of previously cropped land was prepared for direct seeding using a grader. Topsoil was graded into a windrow and rip lines were established. Direct seeding was undertaken along the rip lines. Species were selected to mimic the existing Fuzzy Box- Inland Grey Box on alluvial brown loam soils and Inland Grey Box-Polar Box- White Cypress Pine tall woodland on red loams.

4.8 Cultural heritage

The Cultural Heritage Management Plan has been prepared to manage recorded Aboriginal and Non-Aboriginal heritage sites as well as protocols for unidentified finds. The plan was developed based on an assessment conducted by OzArk and subsequent community consultation. The assessment identified 60 Aboriginal sites comprising 54 modified trees, three open artefact sites, two isolated finds and one ceremonial/dreaming site. The assessment identified eight Non-Aboriginal heritage features including four items of moveable heritage, two building remnants and two blazed trees.

During 2013, TGO erected signage, and fenced as appropriate, areas of cultural significance identified through the plan and constructed a keeping place to store those trees that were identified as having to be removed for operational purposes.

4.9 Hazardous materials

TGO submitted a Hazardous Materials Management Plan to DoP&I for approval in June 2013. The plan is due for review by the end of March 2014. It addresses the hazardous chemicals stored and used on site, the establishment and maintenance of a chemical inventory register, training for staff in the use and emergency response related to chemical handling, management of contractors, as well as appropriate storage and bunding.

During 2013 TGO notified WorkCover NSW of the dangerous goods stored on site, and conducted a hazard analysis to identify and control risks associated with hazardous materials storage, handling and transport.

The first cyanide delivery of approximately 20 tonnes occurred on the 17th January 2014. Cyanide was added to the processing plant (leach circuit) on the 24th January 2014. TGO commenced discharging tailings to the residue storage facility on the 23rd January 2014. Tailings samples were collected and analysed in accordance with the Hazardous Material Management Plan. The results of this monitoring program satisfy the project approval and are summarised in Table 11.

Table 11 TGO Cyanide Monitoring 2013

No of Samples	Min WAD Cyanide	Max WAD Cyanide	Average WAD Cyanide
16	0.06	14.36	1.61

4.10 Traffic

TGO developed a Traffic Management Plan to specify measures to minimise the risk of traffic associated risks, particularly related to traffic accessing the mine site and general traffic interacting with mine traffic.

During the reporting period, construction of West Tomingley road was delayed due to weather conditions and was rescheduled to be completed in 2014. This included an amendment of the project approval to allow for the construction delay.

No complaints were received during the reporting period by TGO regarding traffic at the mine site.

4.11 Rehabilitation

4.11.1 Topsoil Management

Topsoil was stockpiled on site with volumes and locations entered into a register. Once finalised, the register will be used to track stockpile usage and across site as rehab progresses. On completion of the topsoil prestripping work, the stockpiles will be shaped and stabilised using cereal rye, Italian rye, oats species to minimise erosion.

4.11.2 Rehabilitation

TGO are still developing plans associated with mine site rehabilitation including weed management and rehabilitation components incorporated into the MOP. The MOP, incorporating the Rehabilitation Plan is being drafted for submission to the Department of Trade and Investment, Regional Infrastructure and Services.

As part of the development of the Weed Management Plan, areas of weed infestation have been mapped and control of boxthorn has been undertaken across the mine site. Follow up boxthorn control will be carried out in Autumn 2014.

Rehabilitation monitoring was not undertaken in the reporting period and will commence in the following reporting period in accordance with the MOP. A rehabilitation monitoring program will be finalised and implemented in conjunction with the biodiversity monitoring program.

4.12 Incident management and non-compliance

The EMS details protocols for identification, investigation and reporting of incidents of non-compliance including exceedances of environmental monitoring criteria and non-compliance with other legislative requirements.

On 20 December 2013, TGO received an official caution from the EPA related to two separate incidents that occurred at the TGO mine site:

- Use of water from Peak Hill for construction and dust suppression purposes

The EPA found that whilst no contamination issue was identified, TGO had failed to ensure that the licensed activities were being carried out in a competent manner, at the time TGO could only provide anecdotal evidence as to the quality of the water.

- Dust emissions originating from the TGO site that impacted on the Newell Highway.

The EPA found that TGO failed to ensure that earthmoving activities were being undertaken in such a manner as to prevent the emission of dust from the premises.

TGO conducted an investigation as per their EMS involving all personnel involved in the incident. The investigation determined that there were a number of factors that contributed to the incident:

- Type of material being mobilised and stockpiled
- Location of stockpiles adjacent to highway
- Insufficient training of contractor in dust management
- Wind direction and speed
- Stand down of the truck fleet, including water carts, due to an unrelated incident on site.

TGO implemented a number of corrective actions to prevent this type of incident from reoccurring:

- Conducted awareness sessions for TGO personnel and earthmoving contractors on the Air Quality and Greenhouse Gas Management Plan
- Conducted specific training for supervisory personnel on the requirements of the Air Quality and Greenhouse Gas Management Plan
- Developed a Site Specific Procedure relating to dust management including a detailed Trigger Action Response Plan that outlines actions and responses in relation to air quality incidents to be a subplan to the Air Quality and Greenhouse Gas Management Plan.
- Trained personnel in the Trigger Action Response Plan
- Updated the EPA with TGO personnel contact details
- Installed a wind sock at the site to allow monitoring of wind direction.

5 Community consultation

TGO have utilised a number of methods of communication/consultation with the community during 2013. This includes:

- Developing and maintaining a website to make information on the mine development and operation available to the public
- Distributing a community newsletter, to provide the Tomingley community with information on the project's construction and now operation
- Establishing a community consultative committee that first met on 9 May 2013 and has met quarterly throughout 2013
- Setting up a 24 hour community information line.

Public meetings were held prior to significant events such as mine start up and the commencement of blasting at TGP.

5.1 Complaints and enquiries

TGO manage complaints in accordance with the protocols and procedures contained in the EMS. During the reporting period, 10 enquiries were lodged through the community information line, one enquiry was lodged via the project email and two enquiries were lodged in person at the TGO offices. The majority of complaints were regarding the emission of dust from the mine site and access to private property during pipeline construction.

TGO staff communicated with the complainants and conducted site visits as part of each investigation. All enquiries and complaints have been closed out to the satisfaction of the parties involved.

5.2 Community Consultative Committee

The Community Consultative Committee (CCC) was established in early 2013. The CCC is made up of 10 people representing TGO, the local community, the Aboriginal community as well as an independent chairperson. The CCC first met on 9 May 2013 and subsequently met quarterly throughout 2013. The CCC members were updated by TGO personnel on the progress of mine construction and operation, the community representatives were given the opportunity to raise concerns regarding the project and to offer advice regarding TGO's consultation with the community.

Minutes of the meetings are available via the Tomingley Gold website.

During the reporting period, the independent chair resigned and TGO are in the process of recruiting to fill this position. CCC meetings are continuing quarterly.

6 Activities proposed for 2014

The Tomingley Gold Mine's operations only commenced in late 2013 and 2014 will see an expansion of operations across the site. Environmental activities in 2014 will focus on the management and monitoring of biodiversity and completion of water management infrastructure as shown in Table 12.

Table 12 Activities proposed for 2014

Prescribed Works	Location	Proposed Completion Date
Biodiversity & Rehabilitation		
Establish a monitoring program for bats, frogs, dunnarts and grey-crowned babblers	Across site	July and December 2014
Control of Box Thorn	Across site	August 2014
Carry out tree and shrub planting in accordance with the biodiversity management plan	Mine entrance road	September 2014
Review Landscape Function Analysis monitoring points and analogue sites. Carry out LFA of biodiversity and rehabilitation areas. Prepare a Rehabilitation Strategy for the conduct of physical works.	Biodiversity and rehabilitation areas	October 2014
Conduct weed management and follow up planting where necessary	Biodiversity offset area	November 2014
Commence rehabilitation of the first tier of WRE2 and WRE3	Waste rock emplacements	November 2014
Surface Water Management		
Finalise Surface Water Management and pit dewatering infrastructure	Across Site	October 2014

7 References

Noise and Sound Services (NSS) 2013. *Construction Noise Compliance Report at Tomingley Gold Project*.

NSW Department of Planning and Infrastructure (DoP&I) 2013. *Tomingley Gold Project Project Approval 09_0155* under Section 75J of the *Environmental Planning and Assessment Act 1979.*

NSW Office of Environment and Heritage (OEH) 2013. *Environment Protection Licence 20169* issued under Section 55 of the *Protection of the Environment Operations Act 1997.* Licence version date: 4 September 2013.

R.W. Corkery & Co. Pty Ltd 2011. *Tomingley Gold Project Environmental Assessment.*

SEEC 2011. *Tomingley Gold Project Surface Water Assessment*.

Appendix A

Wind Roses

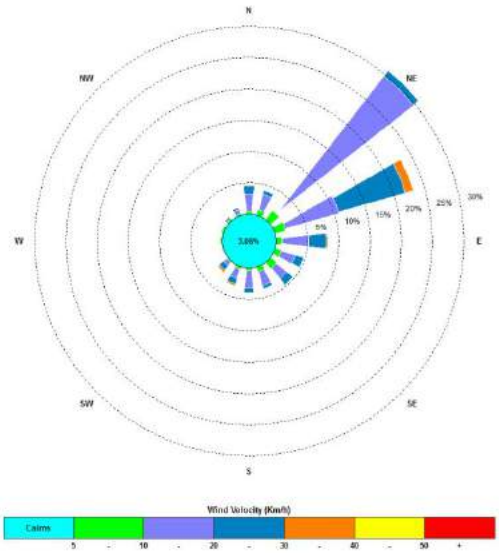


Figure 7-1 Monthly Windrose 1 February to 28 February 2013

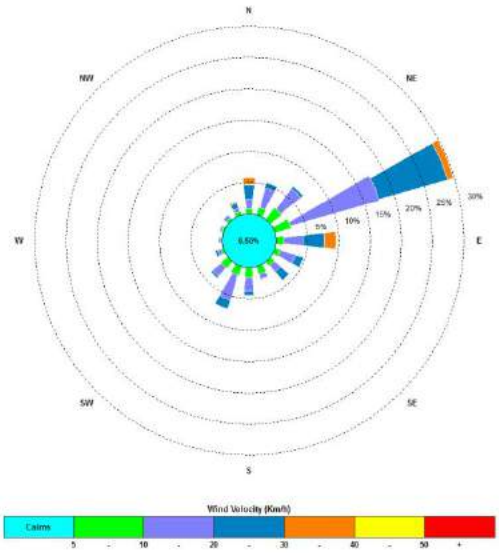


Figure 7-2 Monthly Windrose 1 March to 31 March 2013

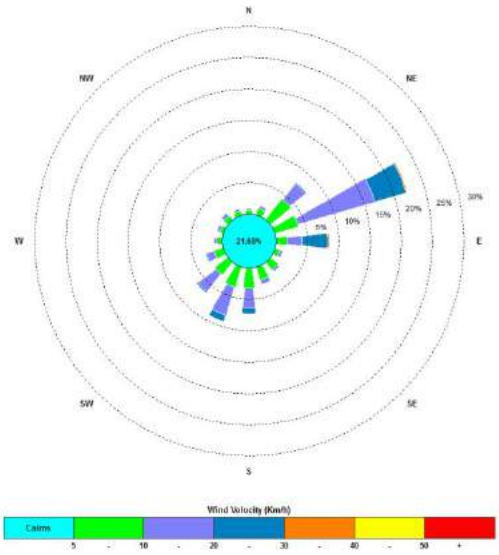


Figure 7-3 Monthly Windrose 1 April to 30 April 2013

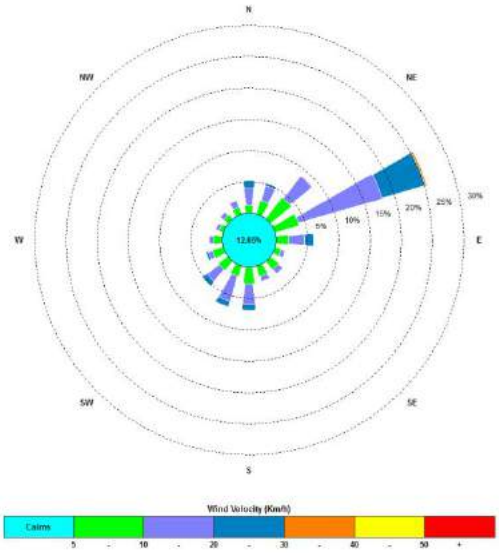


Figure 7-4 Monthly Windrose 1 May to 31 May 2013

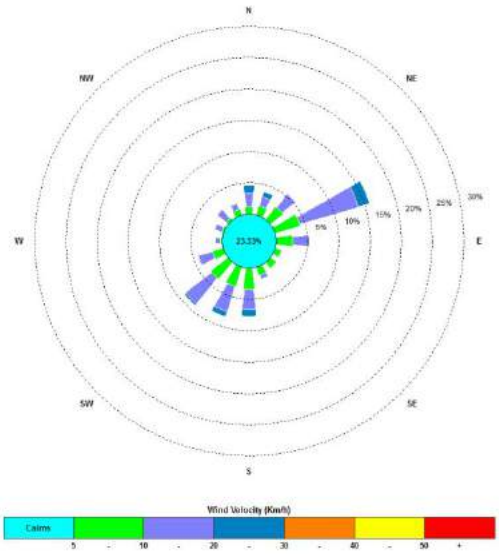


Figure 7-5 Monthly Windrose 1 June to 30 June 2013

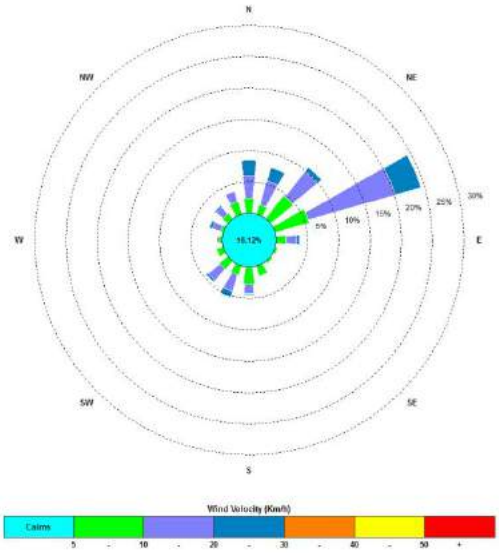


Figure 7-6 Monthly Windrose 1 July to 31 July 2013

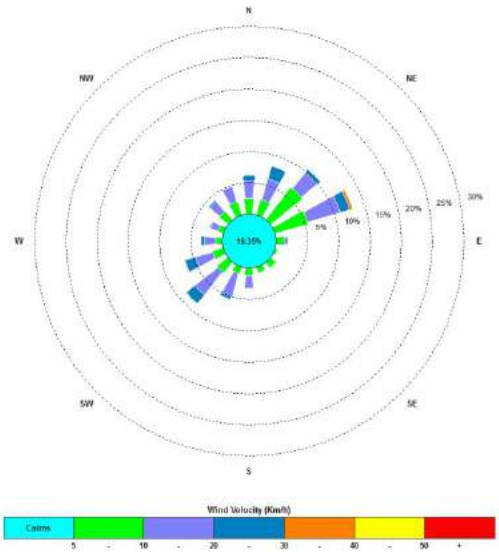


Figure 7-7 Monthly Windrose 1 August to 31 August 2013

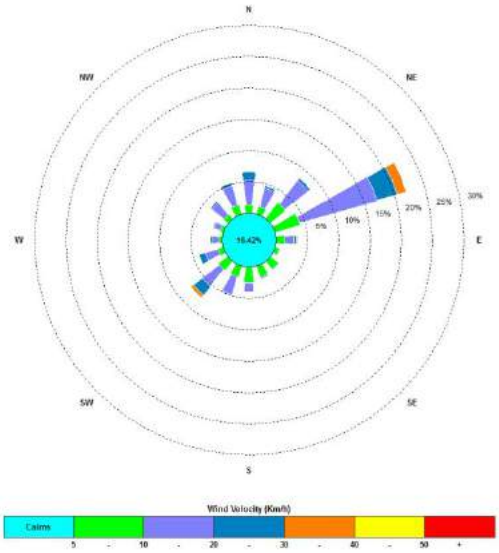


Figure 7-8 Monthly Windrose 1 September to 30 September 2013

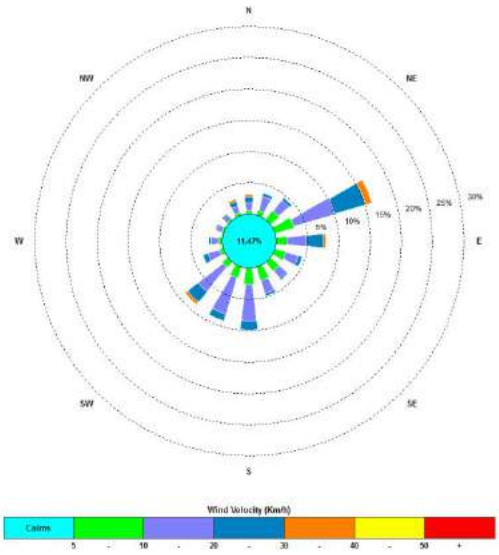


Figure 7-9 Monthly Windrose 1 October to 31 October 2013

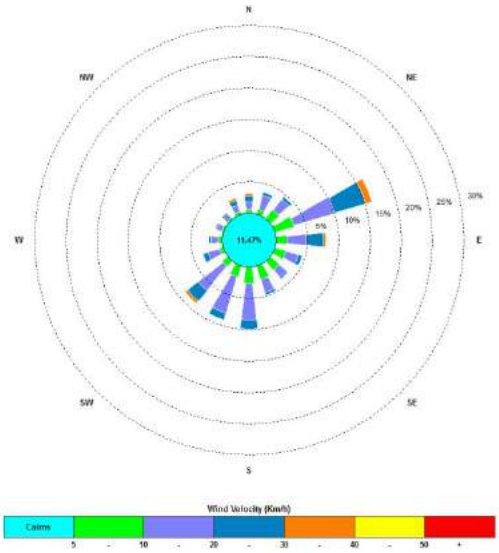


Figure 7-10 Monthly Windrose 1 November to 30 November 2013

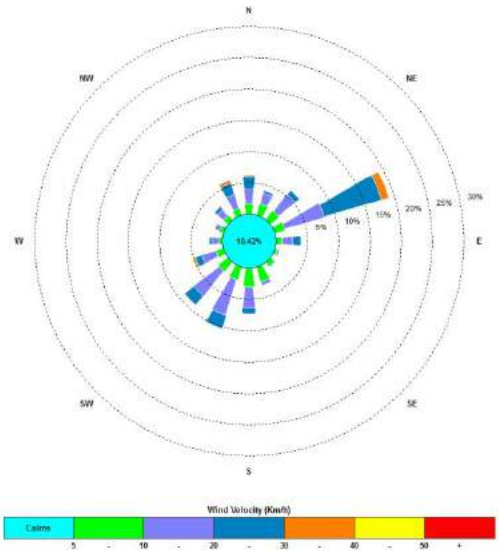


Figure 7-11 Monthly Windrose 1 December to 31 December 2013

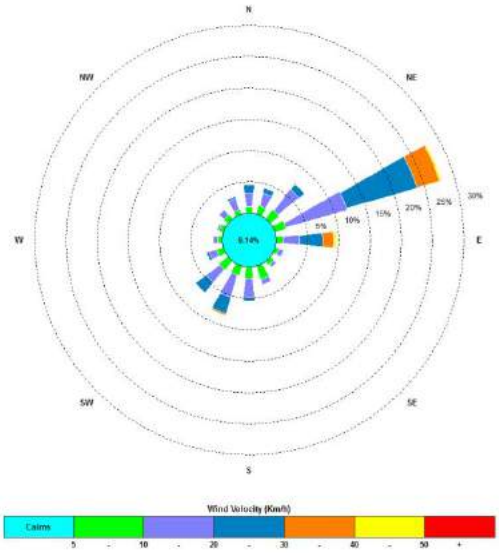


Figure 7-12 Monthly Windrose 1 January to 31 January 2014

Appendix B

Surface Water Quality

Table 13 Sediment Pond 1 Water Quality Summary 2013

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical conductivity *(lab)	µS/cm	2	150	192		171
Cyanide (Free)	mg/L	2	<0.004	<0.004		0.002
Kjeldahl Nitrogen Total	mg/L	1	5.8	5.8		5.8
Total Dissolved Solids	mg/L	2	58	933		495.5
WAD Cyanide	mg/L	2	<0.004	<0.004		0.002
pH (Lab)	pH_Units	2	7.44	7.61		7.525
Ammonia	mg/L	1	6.6	6.6		6.6
Nitrate (as N)	mg/L	2	0.96	1.24		1.1
Phosphate	mg/L	2	1.62	2.38		2
Alkalinity (total) as CaCO3	mg/L	2	57	68		62.5
Bicarbonate	mg/L	2	57	68		62.5
Carbonate	mg/L	2	<1	<1		0.5
Calcium (Filtered)	mg/L	2	<1	1		0.75
Chloride	mg/L	2	10	18		14
Magnesium	mg/L	2	3	3		3
Potassium (Filtered)	mg/L	2	3	6		4.5
Ionic Balance	%	1	48.6	48.6		48.6
Sodium (Filtered)	mg/L	2	30	37		33.5
Sulphate	mg/L	2	24	196		110
Arsenic	mg/L	1	0.035	0.035		0.035
Arsenic (Filtered)	mg/L	1	<0.001	<0.001		0.0005
Cadmium	mg/L	1	<0.0001	<0.0001		0.00005
Cadmium (Filtered)	mg/L	1	<0.0001	<0.0001		0.00005
Copper	mg/L	1	0.145	0.145		0.145
Copper (Filtered)	mg/L	1	0.003	0.003		0.003
Lead	mg/L	1	0.141	0.141		0.141
Lead (Filtered)	mg/L	1	<0.001	<0.001		0.0005
Nickel	mg/L	1	0.168	0.168		0.168
Nickel (Filtered)	mg/L	1	0.002	0.002		0.002
Zinc	mg/L	1	0.269	0.269		0.269
Zinc (Filtered)	mg/L	1	0.007	0.007		0.007

Table 14 Sediment Pond 2 Water Quality Summary 2013

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical conductivity *(lab)	µS/cm	2	112	251		181.5
Cyanide (Free)	mg/L	2	<0.004	0.01		0.006
Kjeldahl Nitrogen Total	mg/L	1	10.4	10.4		10.4
Total Dissolved Solids	mg/L	2	36	480		258
WAD Cyanide	mg/L	2	<0.004	0.005		0.0035
pH (Lab)	pH_Units	2	7.16	7.57		7.365
Ammonia	mg/L	1	7.5	7.5		7.5
Nitrate (as N)	mg/L	2	0.45	0.86		0.655
Phosphate	mg/L	2	3.57	3.93		3.75
Alkalinity (total) as CaCO3	mg/L	2	48	110		79
Bicarbonate	mg/L	2	48	110		79
Carbonate	mg/L	2	<1	<1		0.5
Calcium (Filtered)	mg/L	2	<1	1		0.75
Chloride	mg/L	2	8	21		14.5
Magnesium	mg/L	2	3	3		3
Potassium (Filtered)	mg/L	2	3	6		4.5
Ionic Balance	%	1	16.7	16.7		16.7
Sodium (Filtered)	mg/L	2	20	45		32.5
Sulphate	mg/L	2	20	28		24
Arsenic	mg/L	1	0.049	0.049		0.049
Arsenic (Filtered)	mg/L	1	<0.001	<0.001		0.0005
Cadmium	mg/L	1	0.0002	0.0002		0.0002
Cadmium (Filtered)	mg/L	1	<0.0001	<0.0001		0.00005
Copper	mg/L	1	0.334	0.334		0.334
Copper (Filtered)	mg/L	1	0.004	0.004		0.004
Lead	mg/L	1	0.323	0.323		0.323
Lead (Filtered)	mg/L	1	<0.001	<0.001		0.0005
Nickel	mg/L	1	0.378	0.378		0.378
Nickel (Filtered)	mg/L	1	0.002	0.002		0.002
Zinc	mg/L	1	0.5	0.5		0.5
Zinc (Filtered)	mg/L	1	0.006	0.006		0.006

Table 15 Sediment Pond 3 Water Quality Summary 2013

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical conductivity *(lab)	µS/cm	2	269	455		362
Cyanide (Free)	mg/L	2	<0.004	<0.004		0.002
Kjeldahl Nitrogen Total	mg/L	1	7.9	7.9		7.9
Total Dissolved Solids	mg/L	2	44	365		204.5
WAD Cyanide	mg/L	2	<0.004	<0.004		0.002
pH (Lab)	pH_Units	2	7.73	8.22		7.975
Ammonia	mg/L	1	6	6		6
Nitrate (as N)	mg/L	2	0.89	1.76		1.325
Phosphate	mg/L	2	2.36	5.2		3.78
Alkalinity (total) as CaCO3	mg/L	2	96	164		130
Bicarbonate	mg/L	2	96	164		130
Carbonate	mg/L	2	<1	<1		0.5
Calcium (Filtered)	mg/L	2	<1	<1		0.5
Chloride	mg/L	2	20	30		25
Magnesium	mg/L	2	<1	<1		0.5
Potassium (Filtered)	mg/L	2	1	2		1.5
Ionic Balance	%	1	14.3	14.3		14.3
Sodium (Filtered)	mg/L	2	54	94		74
Sulphate	mg/L	2	7	67		37
Arsenic	mg/L	1	0.063	0.063		0.063
Arsenic (Filtered)	mg/L	1	0.004	0.004		0.004
Cadmium	mg/L	1	<0.0001	<0.0001		0.00005
Cadmium (Filtered)	mg/L	1	<0.0001	<0.0001		0.00005
Copper	mg/L	1	0.2	0.2		0.2
Copper (Filtered)	mg/L	1	0.006	0.006		0.006
Lead	mg/L	1	0.142	0.142		0.142
Lead (Filtered)	mg/L	1	<0.001	<0.001		0.0005
Nickel	mg/L	1	0.203	0.203		0.203
Nickel (Filtered)	mg/L	1	0.004	0.004		0.004
Zinc	mg/L	1	0.326	0.326		0.326
Zinc (Filtered)	mg/L	1	<0.005	<0.005		0.0025

Table 16 Sediment Pond 4 Water Quality Summary 2013

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical conductivity *(lab)	µS/cm	1	236	236		236
Cyanide (Free)	mg/L	1	<0.004	<0.004		0.002
Kjeldahl Nitrogen Total	mg/L	1	5.3	5.3		5.3
Total Dissolved Solids	mg/L	1	20	20		20
WAD Cyanide	mg/L	1	<0.004	<0.004		0.002
pH (Lab)	pH_Units	1	7.51	7.51		7.51
Nitrate (as N)	mg/L	1	1.73	1.73		1.73
Phosphate	mg/L	1	1.48	1.48		1.48
Alkalinity (total) as CaCO3	mg/L	1	69	69		69
Bicarbonate	mg/L	1	69	69		69
Carbonate	mg/L	1	<1	<1		0.5
Calcium (Filtered)	mg/L	1	2	2		2
Chloride	mg/L	1	21	21		21
Magnesium	mg/L	1	5	5		5
Potassium (Filtered)	mg/L	1	11	11		11
Ionic Balance	%	1	1.98	1.98		1.98
Sodium (Filtered)	mg/L	1	62	62		62
Sulphate	mg/L	1	42	42		42
Arsenic	mg/L	1	0.026	0.026		0.026
Cadmium	mg/L	1	<0.0001	<0.0001		0.00005
Copper	mg/L	1	0.086	0.086		0.086
Lead	mg/L	1	0.073	0.073		0.073
Nickel	mg/L	1	0.1	0.1		0.1
Zinc	mg/L	1	0.19	0.19		0.19

Appendix C

Baseline Groundwater Data

Table 17 GDCMB01 Baseline Groundwater Quality Summary

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical Conductivity (Field)	µS/cm	4	400	706	557	560.5
Dissolved Oxygen (Field)	mg/L	4	2.55	5.56	3.9	3.74
Redox	mV	4	85	187	135	133
Temp (Field)	°C	4	19.9	25	23	23.25
pH (Field)	pH_Units	4	5.85	7.09	6.5	6.575
Electrical conductivity *(lab)	µS/cm	4	470	510	483	475
Cyanide (Free)	mg/L	4	<0.004	<0.004	0.002	0.002
Cyanide Total	mg/L	4	<0.004	<0.004	0.002	0.002
Total Dissolved Solids	mg/L	4	280	1000	670	700
Total Suspended Solids	mg/L	4	<5	820	436	460
WAD Cyanide	mg/L	4	<0.004	<0.004	0.002	0.002
pH (Lab)	pH_Units	4	6.8	7	6.9	6.9
Ammonia	mg/L	4	<0.005	0.029	0.015	0.015
Nitrate (as N)	mg/L	4	14	16	15	14.5
Phosphate	mg/L	4	0.067	0.14	0.093	0.082
Alkalinity (total) as CaCO3	mg/L	4	67	78	73	72.5
Bicarbonate	mg/L	4	67	78	73	72.5
Carbonate	mg/L	4	<5	<5	2.5	2.5
Hardness as CaCO3	mg/L	4	7	12	10	10.5
Calcium	mg/L	4	1.1	2.2	1.6	1.55
Chloride	mg/L	4	55	66	59	57.5
Magnesium (Filtered)	mg/L	4	1	1.7	1.5	1.6
Potassium	mg/L	4	0.5	0.7	0.63	0.65
Ionic Balance	%	4	-5.2	17	8	10
Sodium	mg/L	4	64	100	88	94
Sulphate	mg/L	4	12	17	14	13.5
Arsenic (Filtered)	mg/L	4	0.001	0.002	0.0015	0.0015
Cadmium (Filtered)	mg/L	4	<0.0001	<0.0001	0.00005	0.00005
Chromium (III+VI) (Filtered)	mg/L	4	<0.001	0.003	0.0016	0.0015
Copper (Filtered)	mg/L	4	<0.001	0.002	0.00088	0.0005
Iron (Filtered)	mg/L	4	0.16	2.5	1.2	1.11
Lead (Filtered)	mg/L	4	<0.001	<0.001	0.0005	0.0005
Mercury (Filtered)	mg/L	4	<0.00005	<0.00005	0.000025	0.000025
Nickel (Filtered)	mg/L	4	<0.001	0.002	0.00088	0.0005
Zinc (Filtered)	mg/L	4	0.002	0.011	0.0068	0.007

Table 18 WYMB01 Baseline Groundwater Quality Summary

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical Conductivity (Field)	µS/cm	4	6420	18,100	11,705	11,150
Dissolved Oxygen (Field)	mg/L	4	4.23	7.26	5.7	5.705
Redox	mV	4	59	87	74	75.5
Temp (Field)	^{o}C	4	22.1	25	24	23.9
pH (Field)	pH_Units	4	7.41	7.76	7.6	7.7
Electrical conductivity *(lab)	µS/cm	4	12,000	12,000	12,000	12,000
Cyanide (Free)	mg/L	4	<0.004	<0.004	0.002	0.002
Cyanide Total	mg/L	4	<0.004	0.021	0.0068	0.002
Total Dissolved Solids	mg/L	4	6400	8400	7700	8000
Total Suspended Solids	mg/L	4	6	1100	489	425
WAD Cyanide	mg/L	4	<0.004	0.006	0.003	0.002
pH (Lab)	pH_Units	4	7.7	8	7.8	7.7
Ammonia	mg/L	4	0.094	0.28	0.17	0.15
Nitrate (as N)	mg/L	4	0.022	0.058	0.026	0.01725
Phosphate	mg/L	4	0.07	0.088	0.075	0.0715
Alkalinity (total) as CaCO3	mg/L	4	300	320	308	305
Bicarbonate	mg/L	4	300	320	308	305
Carbonate	mg/L	4	<5	<5	2.5	2.5
Hardness as CaCO3	mg/L	4	1400	1700	1575	1600
Calcium	mg/L	4	220	240	230	230
Chloride	mg/L	4	3300	4000	3675	3700
Magnesium (Filtered)	mg/L	4	210	260	240	245
Potassium	mg/L	4	5.7	8.1	7.3	7.65
Ionic Balance	%	4	-3.7	1.4	-1.1	-1.025
Sodium	mg/L	4	2100	2300	2225	2250
Sulphate	mg/L	4	1000	1100	1050	1050
Arsenic (Filtered)	mg/L	4	0.002	0.005	0.0035	0.0035
Cadmium (Filtered)	mg/L	4	0.0001	0.0002	0.00015	0.00015
Chromium (III+VI) (Filtered)	mg/L	4	<0.0001	<0.0001	0.00005	0.00005
Copper (Filtered)	mg/L	4	<0.001	0.001	0.00063	0.0005
Iron (Filtered)	mg/L	4	<0.01	<0.01	0.005	0.005
Lead (Filtered)	mg/L	4	<0.001	0.005	0.0023	0.00175
Mercury (Filtered)	mg/L	4	<0.00005	<0.00005	0.000025	0.000025
Nickel (Filtered)	mg/L	4	0.004	0.29	0.078	0.008
Zinc (Filtered)	mg/L	4	0.003	0.007	0.005	0.005

Table 19 WYMB02 Baseline Groundwater Quality Summary

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical Conductivity (Field)	µS/cm	4	16,790	32,200	22,128	19,760
Dissolved Oxygen (Field)	mg/L	4	3.65	8.84	6.5	6.68
Redox	mV	4	-33	110	64	90
Temp (Field)	^{o}C	4	21.8	24.9	23	23.25
pH (Field)	pH_Units	4	6.81	7.76	7.3	7.375
Electrical conductivity *(lab)	µS/cm	6	22,000	23,400	22,417	22,000
Cyanide (Free)	mg/L	5	<0.004	<0.004	0.002	0.002
Cyanide Total	mg/L	6	<0.004	<0.004	0.002	0.002
Total Dissolved Solids	mg/L	5	14,100	16,000	15,020	15,000
Total Suspended Solids	mg/L	6	<5	87	21	7
WAD Cyanide	mg/L	5	<0.004	<0.004	0.002	0.002
pH (Lab)	pH_Units	6	7.2	8.33	7.7	7.695
Ammonia	mg/L	5	<0.005	<0.05	0.011	0.0025
Nitrate (as N)	mg/L	6	0.54	0.79	0.61	0.585
Phosphate	mg/L	6	<0.01	0.08	0.056	0.06
Alkalinity (total) as CaCO3	mg/L	6	940	1100	1039	1050
Bicarbonate	mg/L	6	940	1100	1035	1050
Carbonate	mg/L	6	<1	21	5.3	2.5
Hardness as CaCO3	mg/L	5	2000	2360	2192	2200
Calcium	mg/L	6	120	170	144	142
Chloride	mg/L	6	6300	7700	6880	6650
Magnesium (Filtered)	mg/L	6	410	491	451	450
Potassium	mg/L	6	8.7	13	11	12
Ionic Balance	%	6	-5.3	6.9	2.3	3.08
Sodium	mg/L	6	4470	6300	5080	4805
Sulphate	mg/L	6	1690	2000	1880	1895
Arsenic (Filtered)	mg/L	6	0.002	0.002	0.002	0.002
Cadmium (Filtered)	mg/L	6	<0.0001	0.0001	0.000058	0.00005
Chromium (III+VI) (Filtered)	mg/L	6	<0.0001	0.001	0.00043	0.0005
Copper (Filtered)	mg/L	6	<0.001	0.005	0.0013	0.0005
Iron (Filtered)	mg/L	5	<0.01	<0.05	0.009	0.005
Lead (Filtered)	mg/L	6	<0.001	0.003	0.0013	0.00075
Mercury (Filtered)	mg/L	6	<0.0001	0.00041	0.00022	0.000255
Nickel (Filtered)	mg/L	6	<0.001	<0.001	0.0005	0.0005
Zinc (Filtered)	mg/L	6	0.003	0.052	0.017	0.0055

Table 20 WYMB03 Baseline Groundwater Quality Summary

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical Conductivity (Field)	µS/cm	2	16,500	28,800		22,650
Dissolved Oxygen (Field)	mg/L	2	7.48	15.1		11.29
Redox	mV	2	76	118		97
Temp (Field)	°C	2	21.9	22.7		22.3
pH (Field)	pH_Units	2	7.19	7.51		7.35
Electrical conductivity *(lab)	µS/cm	4	20,000	21,400	20,650	20,600
Cyanide (Free)	mg/L	3	<0.004	<0.004	0.002	0.002
Cyanide Total	mg/L	4	<0.004	<0.004	0.002	0.002
Total Dissolved Solids	mg/L	3	13,500	14,000	13,833	14,000
Total Suspended Solids	mg/L	4	24	100	52	41.5
WAD Cyanide	mg/L	3	<0.004	<0.004	0.002	0.002
pH (Lab)	pH_Units	4	7.3	8.12	7.6	7.4
Ammonia	mg/L	3	<0.005	<0.05	0.019	0.025
Nitrate (as N)	mg/L	4	0.26	0.86	0.51	0.46
Phosphate	mg/L	4	0.02	0.11	0.073	0.0805
Alkalinity (total) as CaCO3	mg/L	4	1070	1200	1153	1170
Bicarbonate	mg/L	4	1070	1200	1153	1170
Carbonate	mg/L	4	<1	<5	1.5	1.5
Hardness as CaCO3	mg/L	3	2270	2500	2390	2400
Calcium	mg/L	4	164	190	177	176
Chloride	mg/L	4	5570	6800	6018	5850
Magnesium (Filtered)	mg/L	4	453	551	491	480
Potassium	mg/L	4	18	21	19	18.5
Ionic Balance	%	4	3.4	5	4.2	4.155
Sodium	mg/L	4	4330	5400	4718	4570
Sulphate	mg/L	4	1920	2100	2005	2000
Arsenic (Filtered)	mg/L	4	0.002	0.004	0.003	0.003
Cadmium (Filtered)	mg/L	4	<0.0001	<0.0001	0.00005	0.00005
Chromium (III+VI) (Filtered)	mg/L	4	<0.001	0.001	0.00063	0.0005
Copper (Filtered)	mg/L	4	<0.001	0.003	0.0011	0.0005
Iron	mg/L	1	<0.05	<0.05		0.025
Iron (Filtered)	mg/L	3	<0.01	<0.05	0.012	0.005
Lead (Filtered)	mg/L	4	<0.001	0.009	0.0031	0.0015
Mercury (Filtered)	mg/L	4	<0.00005	<0.0001	0.000038	0.0000375
Nickel (Filtered)	mg/L	4	<0.001	0.004	0.0015	0.00075
Zinc (Filtered)	mg/L	4	0.004	0.06	0.028	0.0245

Table 21 WYMB04 Baseline Groundwater Quality Summary

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical Conductivity (Field)	µS/cm	4	20,350	32,000	25,013	23,850
Dissolved Oxygen (Field)	mg/L	4	3.2	8.81	6	6.01
Redox	mV	3	59	170	102	77
Temp (Field)	^{o}C	4	21.6	24.7	23	22.3
pH (Field)	pH_Units	4	6.71	8.13	7.3	7.11
Electrical conductivity *(lab)	µS/cm	6	25,000	27,900	26,367	26,000
Cyanide (Free)	mg/L	5	<0.004	<0.004	0.002	0.002
Cyanide Total	mg/L	6	<0.004	<0.004	0.002	0.002
Total Dissolved Solids	mg/L	5	17,700	19,000	18,540	19,000
Total Suspended Solids	mg/L	6	17	260	86	47
WAD Cyanide	mg/L	5	<0.004	<0.004	0.002	0.002
pH (Lab)	pH_Units	6	7.1	8.05	7.5	7.39
Ammonia	mg/L	5	<0.005	<0.05	0.016	0.009
Nitrate (as N)	mg/L	6	0.027	0.29	0.18	0.22
Phosphate	mg/L	6	<0.01	0.016	0.0097	0.01
Alkalinity (total) as CaCO3	mg/L	6	931	1000	969	967
Bicarbonate	mg/L	6	931	1000	969	967
Carbonate	mg/L	6	<1	<5	1.8	2.5
Hardness as CaCO3	mg/L	5	3200	4050	3490	3400
Calcium	mg/L	6	240	321	285	290
Chloride	mg/L	6	7530	9400	8452	8400
Magnesium (Filtered)	mg/L	6	620	789	696	675
Potassium	mg/L	6	14	23	19	20
Ionic Balance	%	6	-2.9	4.96	1.7	3.1
Sodium	mg/L	6	5100	6500	5695	5610
Sulphate	mg/L	6	2400	2450	2412	2400
Arsenic (Filtered)	mg/L	6	<0.001	<0.001	0.0005	0.0005
Cadmium (Filtered)	mg/L	6	<0.0001	<0.0001	0.00005	0.00005
Chromium (III+VI) (Filtered)	mg/L	6	<0.001	<0.001	0.0005	0.0005
Copper (Filtered)	mg/L	6	<0.001	0.003	0.00092	0.0005
Iron (Filtered)	mg/L	5	<0.01	<0.05	0.01	0.005
Lead (Filtered)	mg/L	6	<0.001	<0.001	0.0005	0.0005
Mercury (Filtered)	mg/L	6	<0.00005	<0.001	0.00011	0.000025
Nickel (Filtered)	mg/L	6	<0.001	0.011	0.0039	0.003
Zinc (Filtered)	mg/L	6	0.004	0.07	0.019	0.0095

Table 22 WYMB06 Baseline Groundwater Quality Summary

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical Conductivity (Field)	µS/cm	4	10,800	20,500	14,255	12,860
Dissolved Oxygen (Field)	mg/L	4	3.39	10.5	5.7	4.51
Redox	mV	4	-9	106	59	68.5
Temp (Field)	°C	4	21.4	24.1	23	23.4
pH (Field)	pH_Units	4	6.55	7.24	6.9	6.96
Electrical conductivity *(lab)	µS/cm	6	12,500	14,000	13,183	13,000
Cyanide (Free)	mg/L	5	<0.004	<0.004	0.002	0.002
Cyanide Total	mg/L	6	0.005	0.051	0.031	0.035
Total Dissolved Solids	mg/L	5	7420	10,000	9204	9400
Total Suspended Solids	mg/L	6	<5	57	22	17.5
WAD Cyanide	mg/L	5	<0.004	0.007	0.0044	0.005
pH (Lab)	pH_Units	6	7.1	8.21	7.5	7.35
Ammonia	mg/L	5	0.08	0.19	0.14	0.15
Nitrate (as N)	mg/L	6	<0.01	0.35	0.22	0.25
Phosphate	mg/L	6	0.03	0.23	0.074	0.0445
Alkalinity (total) as CaCO3	mg/L	6	293	1300	903	1150
Bicarbonate	mg/L	6	293	1300	903	1150
Carbonate	mg/L	6	<1	<5	1.8	2.5
Hardness as CaCO3	mg/L	5	1640	1900	1748	1700
Calcium	mg/L	6	140	242	182	160
Chloride	mg/L	6	3300	4800	3678	3475
Magnesium (Filtered)	mg/L	6	249	350	307	325
Potassium	mg/L	6	4.8	8	6.8	7.1
Ionic Balance	%	6	-14	0.91	-2.8	-0.435
Sodium	mg/L	6	1980	3100	2633	2850
Sulphate	mg/L	6	860	2500	1884	2300
Arsenic (Filtered)	mg/L	6	0.002	0.048	0.025	0.032
Cadmium (Filtered)	mg/L	6	<0.0001	0.0002	0.000075	0.00005
Chromium (III+VI) (Filtered)	mg/L	6	<0.001	<0.001	0.0005	0.0005
Copper (Filtered)	mg/L	6	<0.001	0.002	0.0012	0.001
Iron (Filtered)	mg/L	5	<0.01	<0.05	0.013	0.011
Lead (Filtered)	mg/L	6	<0.001	0.015	0.0029	0.0005
Mercury (Filtered)	mg/L	6	<0.00005	<0.0001	0.000033	0.000025
Nickel (Filtered)	mg/L	6	<0.001	0.004	0.0029	0.003
Zinc (Filtered)	mg/L	6	0.004	0.045	0.016	0.007

Table 23 WYMB10 Baseline Groundwater Quality Summary

Parameter	Units	Number of Results	Minimum	Maximum	Average	Median
Electrical Conductivity (Field)	µS/cm	4	20,200	26,600	24,188	24,975
Dissolved Oxygen (Field)	mg/L	4	2.56	7.13	3.9	2.87
Redox	mV	4	60	162	122	132.5
Temp (Field)	^{o}C	4	21.6	24.4	23	23.55
pH (Field)	pH_Units	4	6.67	7.01	6.8	6.75
Electrical conductivity *(lab)	µS/cm	4	26,000	28,000	27,000	27,000
Cyanide (Free)	mg/L	4	<0.004	<0.004	0.002	0.002
Cyanide Total	mg/L	4	<0.004	<0.004	0.002	0.002
Total Dissolved Solids	mg/L	4	19,000	20,000	19,500	19,500
Total Suspended Solids	mg/L	4	<5	27	14	13.5
WAD Cyanide	mg/L	4	<0.004	<0.004	0.002	0.002
pH (Lab)	pH_Units	4	7	7.4	7.2	7.1
Ammonia	mg/L	4	<0.005	0.044	0.015	0.00625
Nitrate (as N)	mg/L	4	0.52	0.61	0.58	0.59
Phosphate	mg/L	4	0.043	0.071	0.06	0.0635
Alkalinity (total) as CaCO3	mg/L	4	970	1000	988	990
Bicarbonate	mg/L	4	970	1000	988	990
Carbonate	mg/L	4	<5	<5	2.5	2.5
Hardness as CaCO3	mg/L	4	2800	3100	2975	3000
Calcium	mg/L	4	210	240	225	225
Chloride	mg/L	4	8500	9800	9100	9050
Magnesium (Filtered)	mg/L	4	560	600	585	590
Potassium	mg/L	4	20	31	25	23.5
Ionic Balance	%	4	-1.9	6.4	1.8	1.3
Sodium	mg/L	4	5900	7100	6575	6650
Sulphate	mg/L	4	2500	2800	2700	2750
Arsenic (Filtered)	mg/L	4	<0.001	<0.001	0.0005	0.0005
Cadmium (Filtered)	mg/L	4	<0.0001	0.0001	0.000075	0.000075
Chromium (III+VI) (Filtered)	mg/L	4	<0.001	<0.001	0.0005	0.0005
Copper (Filtered)	mg/L	4	<0.001	0.002	0.001	0.00075
Iron (Filtered)	mg/L	4	<0.01	0.021	0.009	0.005
Lead (Filtered)	mg/L	4	<0.001	<0.001	0.0005	0.0005
Mercury (Filtered)	mg/L	4	<0.00005	0.00012	0.00007	0.0000675
Nickel (Filtered)	mg/L	4	<0.001	0.003	0.0021	0.0025
Zinc (Filtered)	mg/L	4	0.003	0.009	0.006	0.006

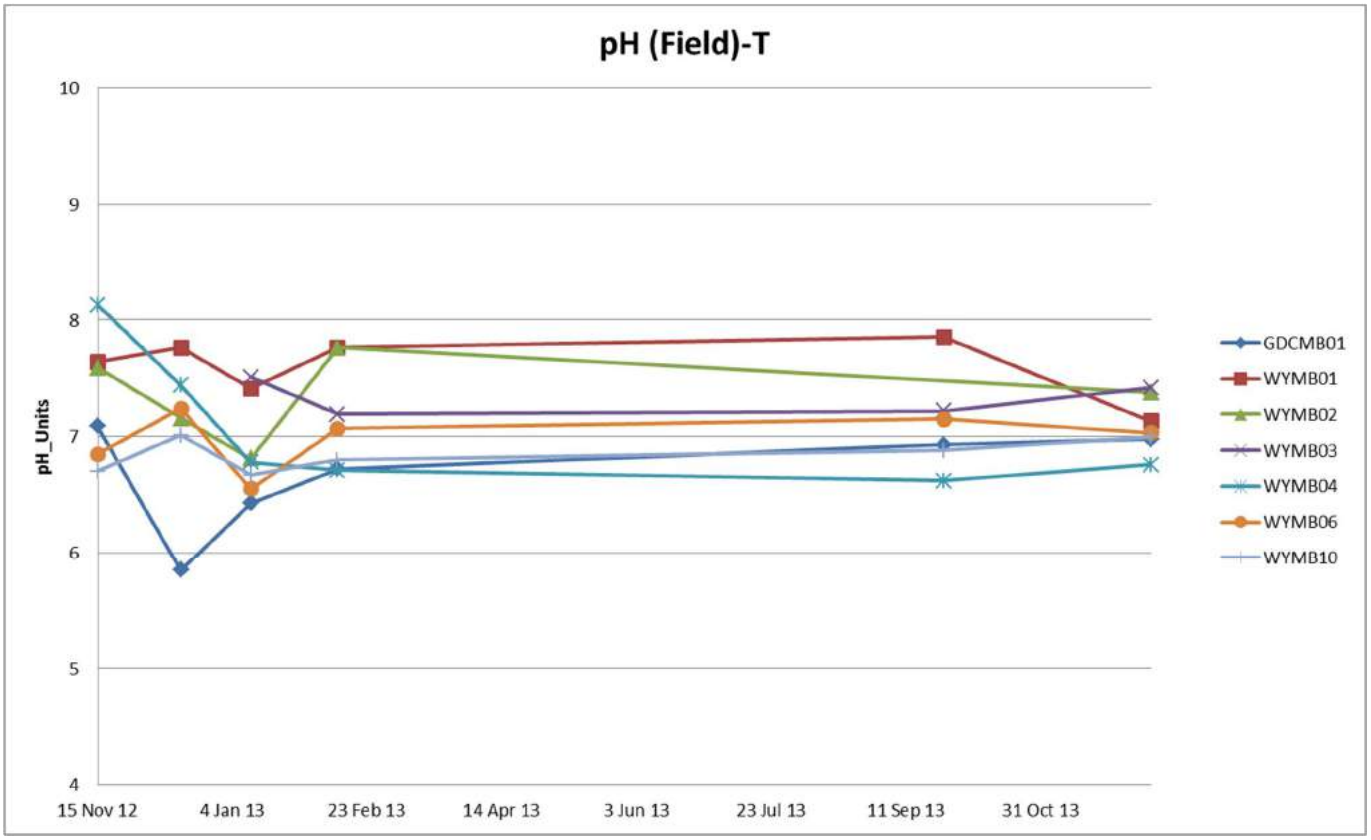


Figure 7-13 Groundwater monitoring results – pH (field)

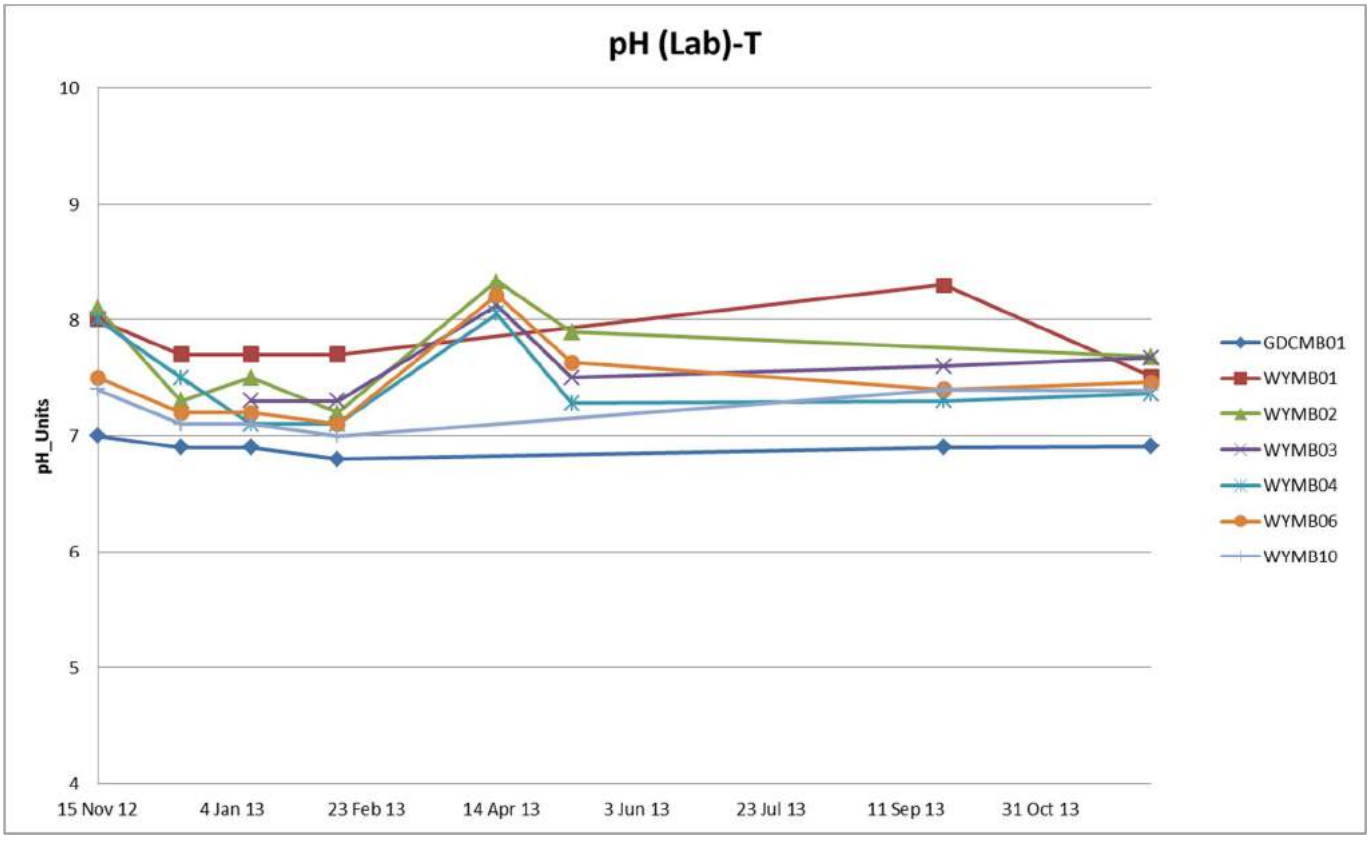


Figure 7-14 Groundwater monitoring results – pH (lab)

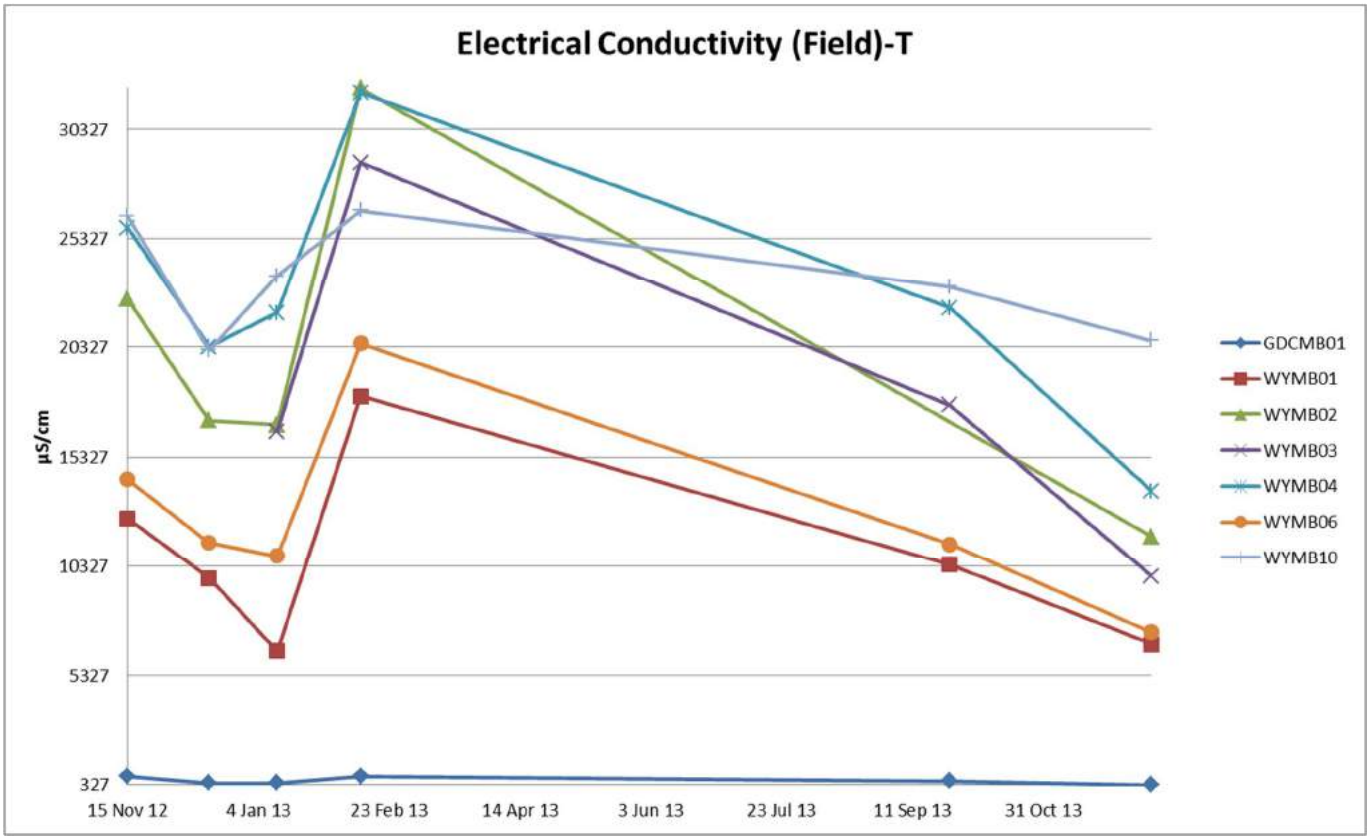


Figure 7-15 Groundwater monitoring results – EC (field)

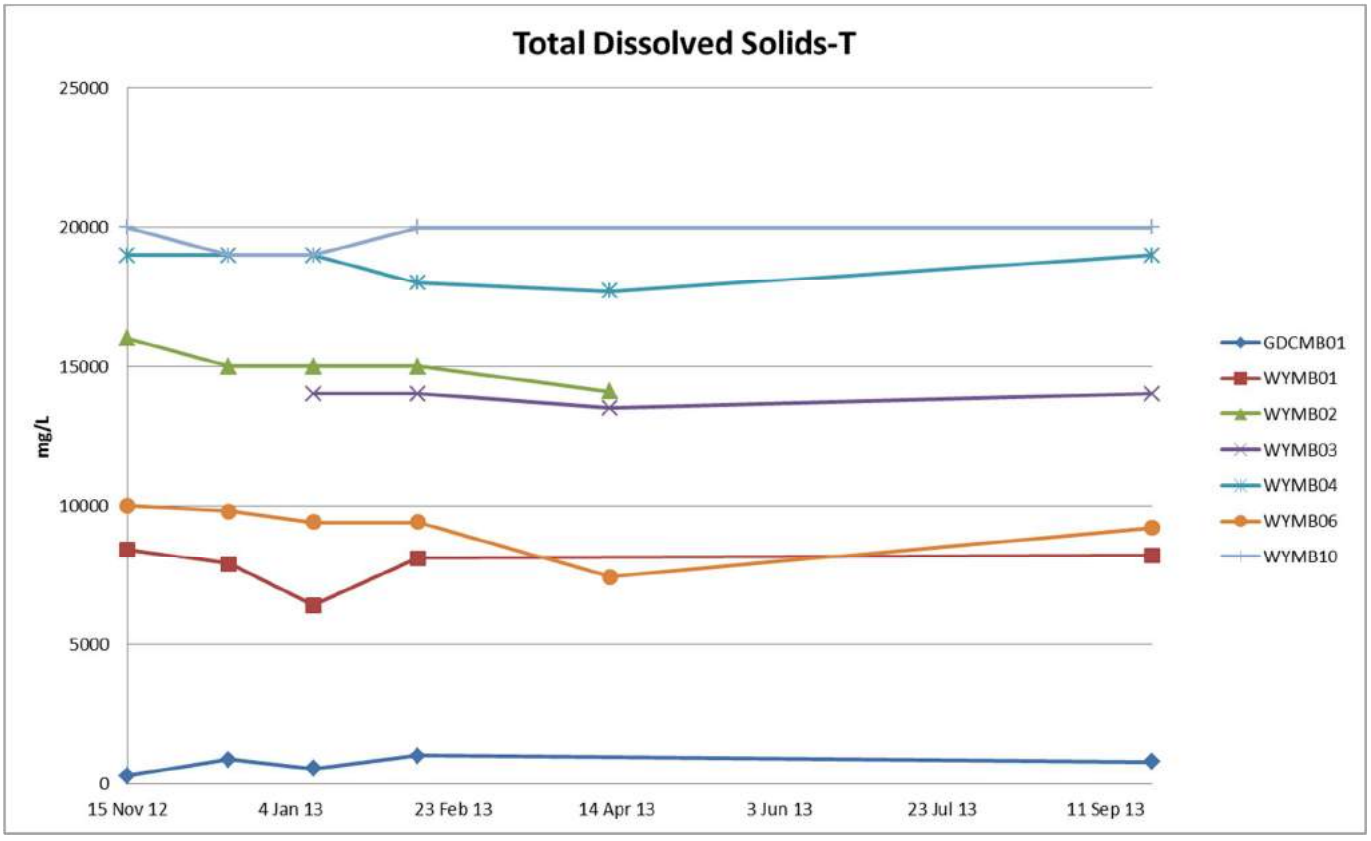


Figure 7-16 Groundwater monitoring results – TDS

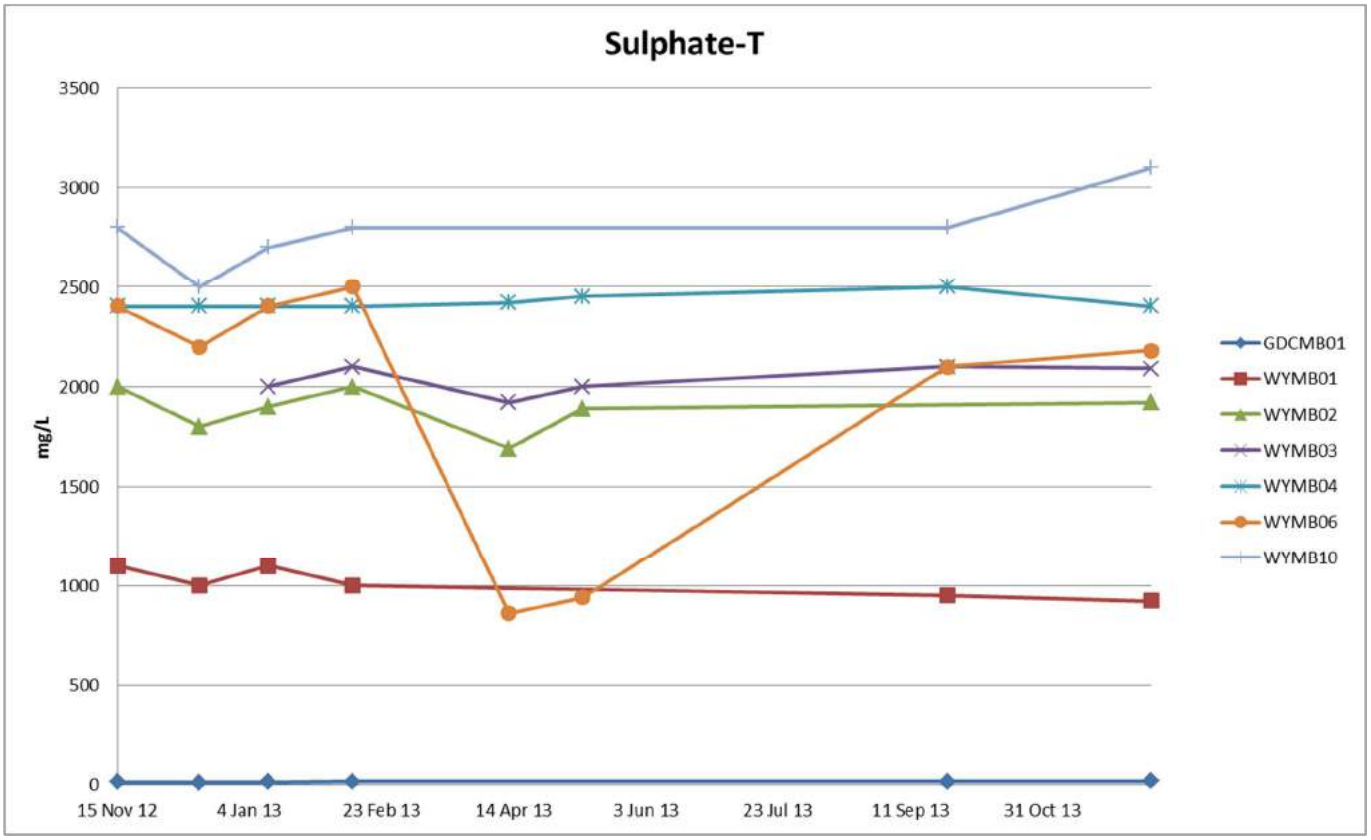


Figure 7-17 Groundwater monitoring results – Sulphate

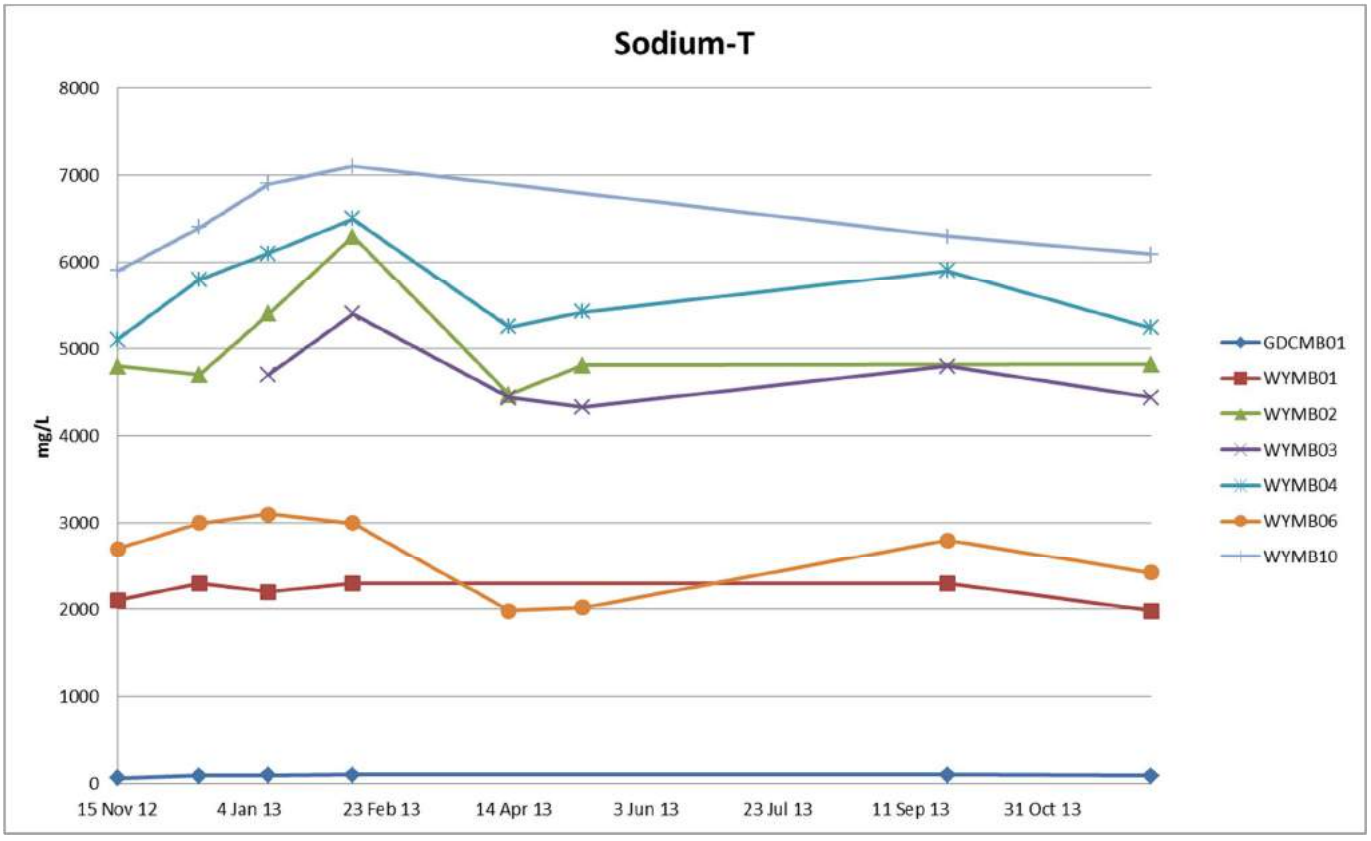


Figure 7-18 Groundwater monitoring results – Sodium

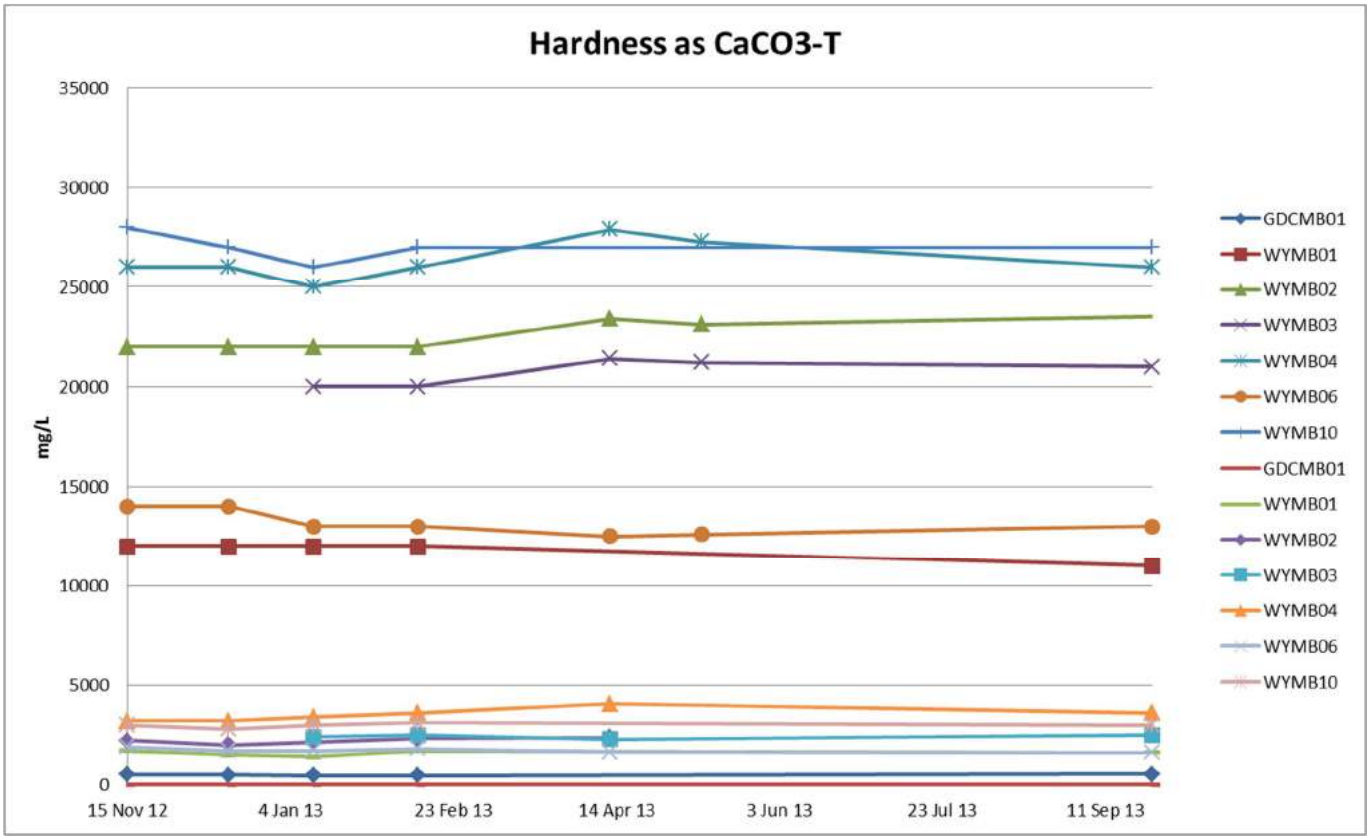


Figure 7-19 Groundwater monitoring results – Hardness

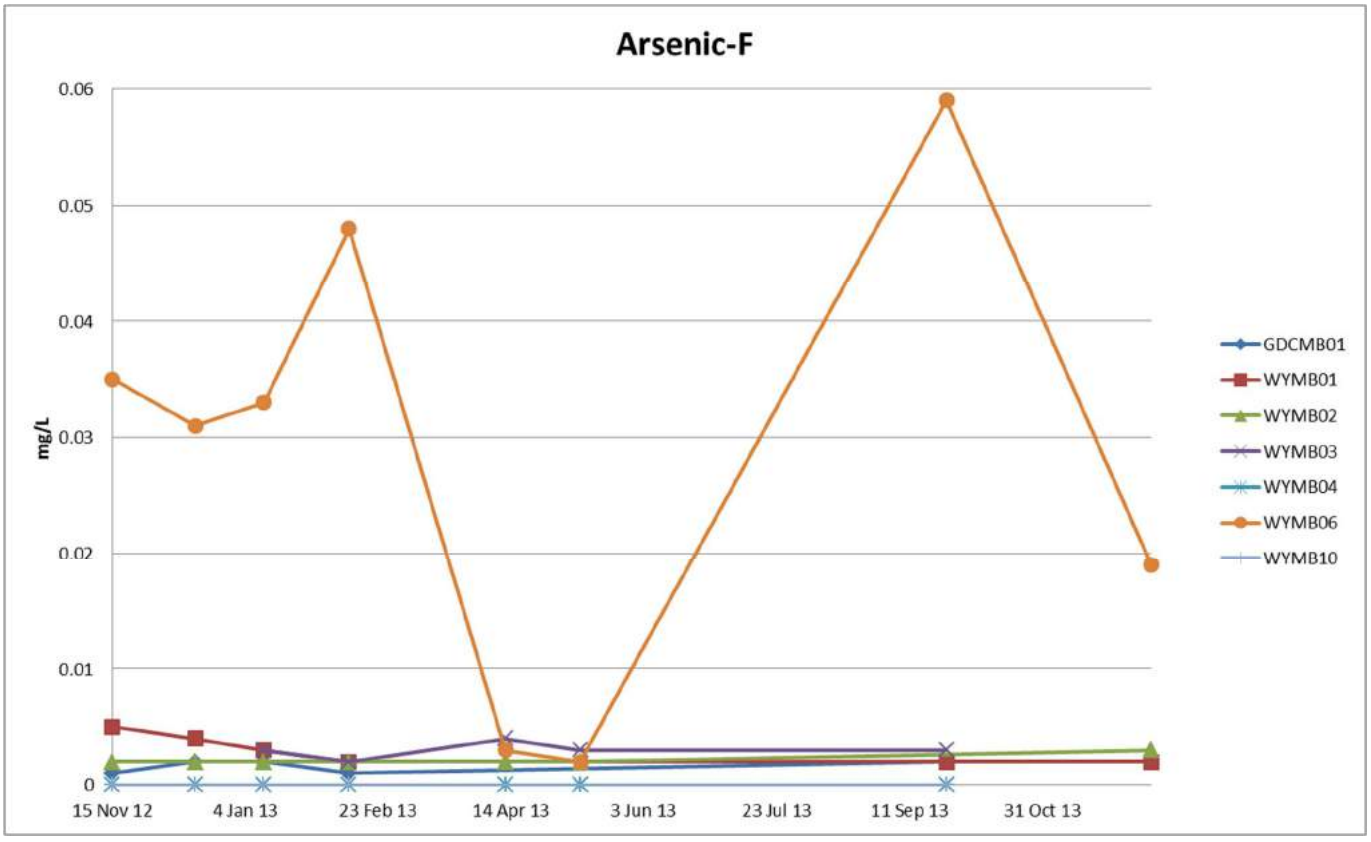


Figure 7-20 Groundwater monitoring results – Arsenic

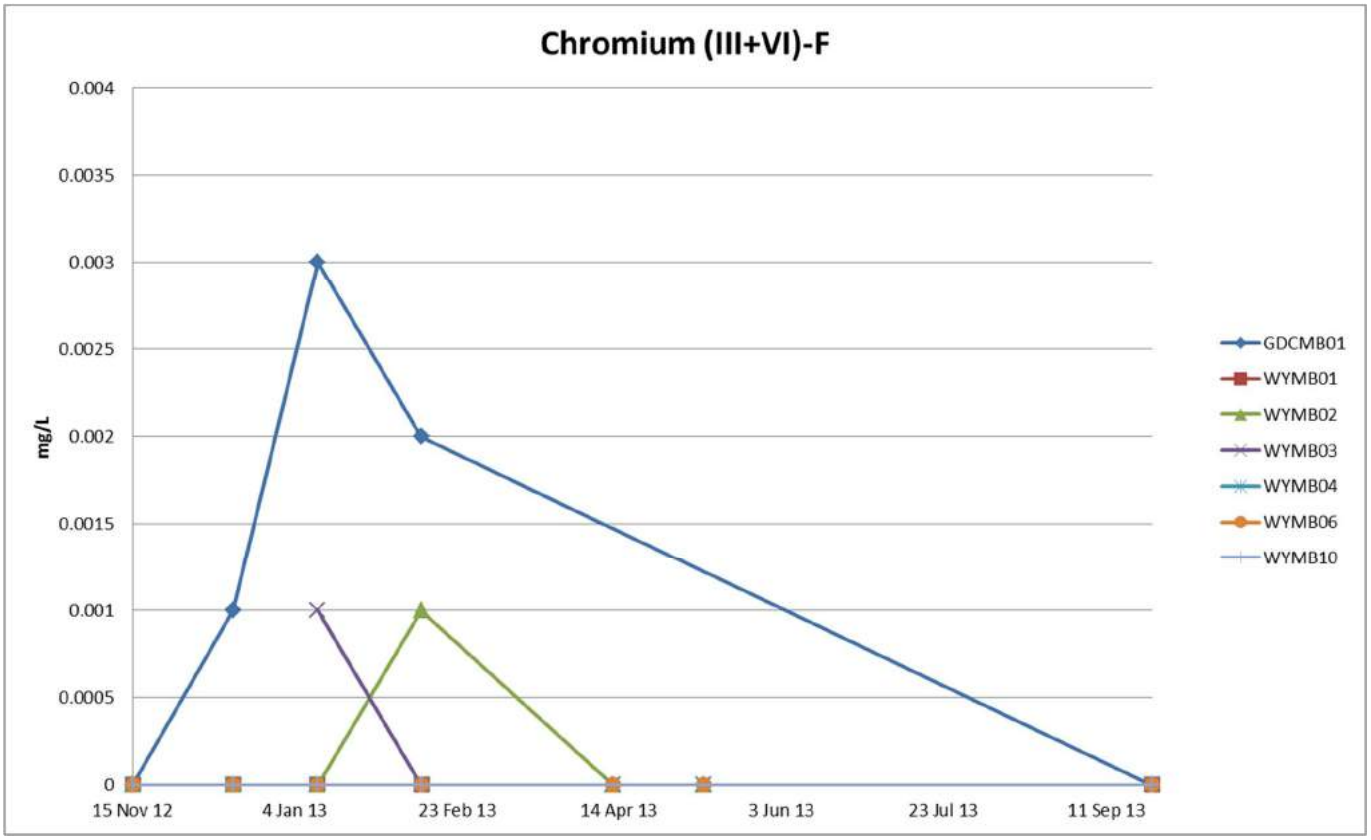


Figure 7-21 Groundwater monitoring results – Chromium (III + VI)

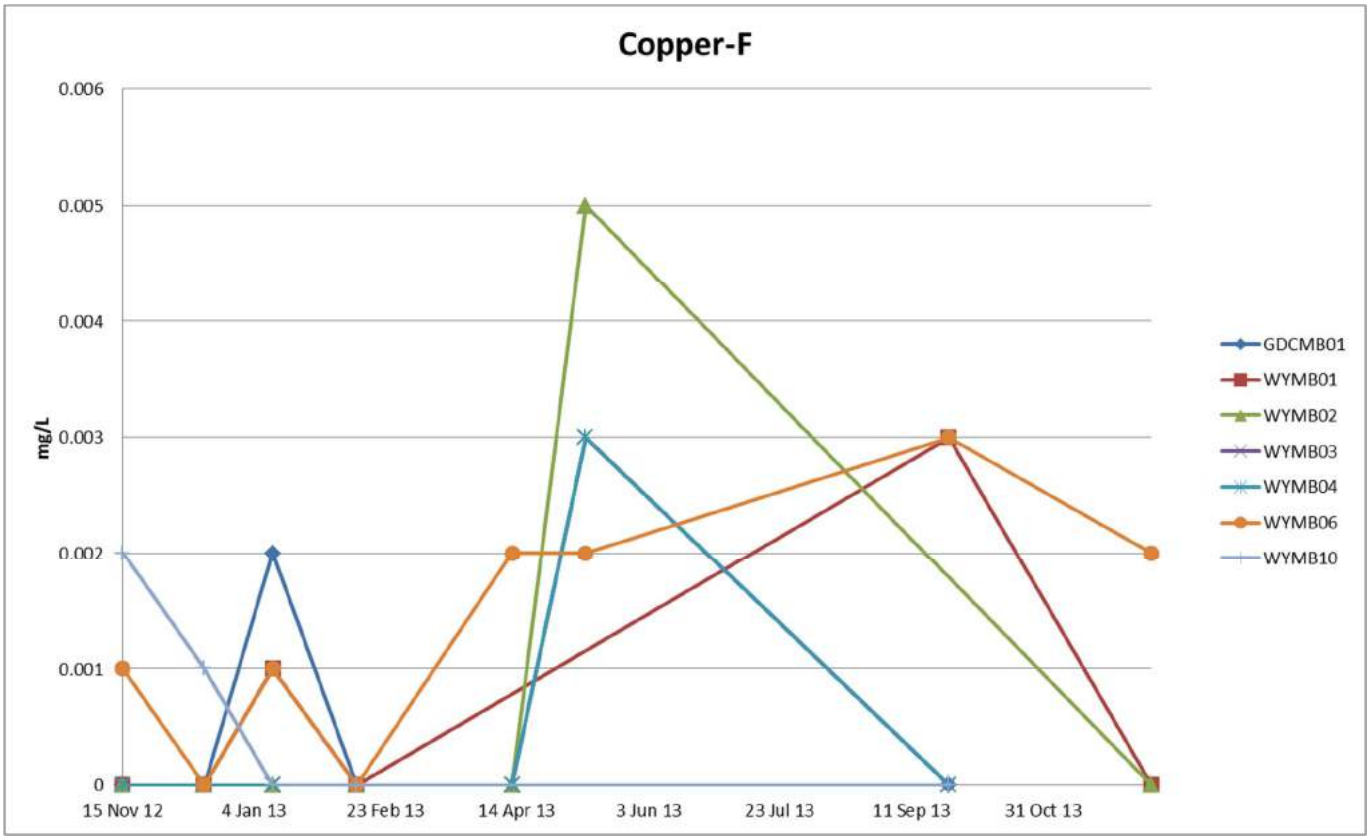


Figure 7-22 Groundwater monitoring results – Copper

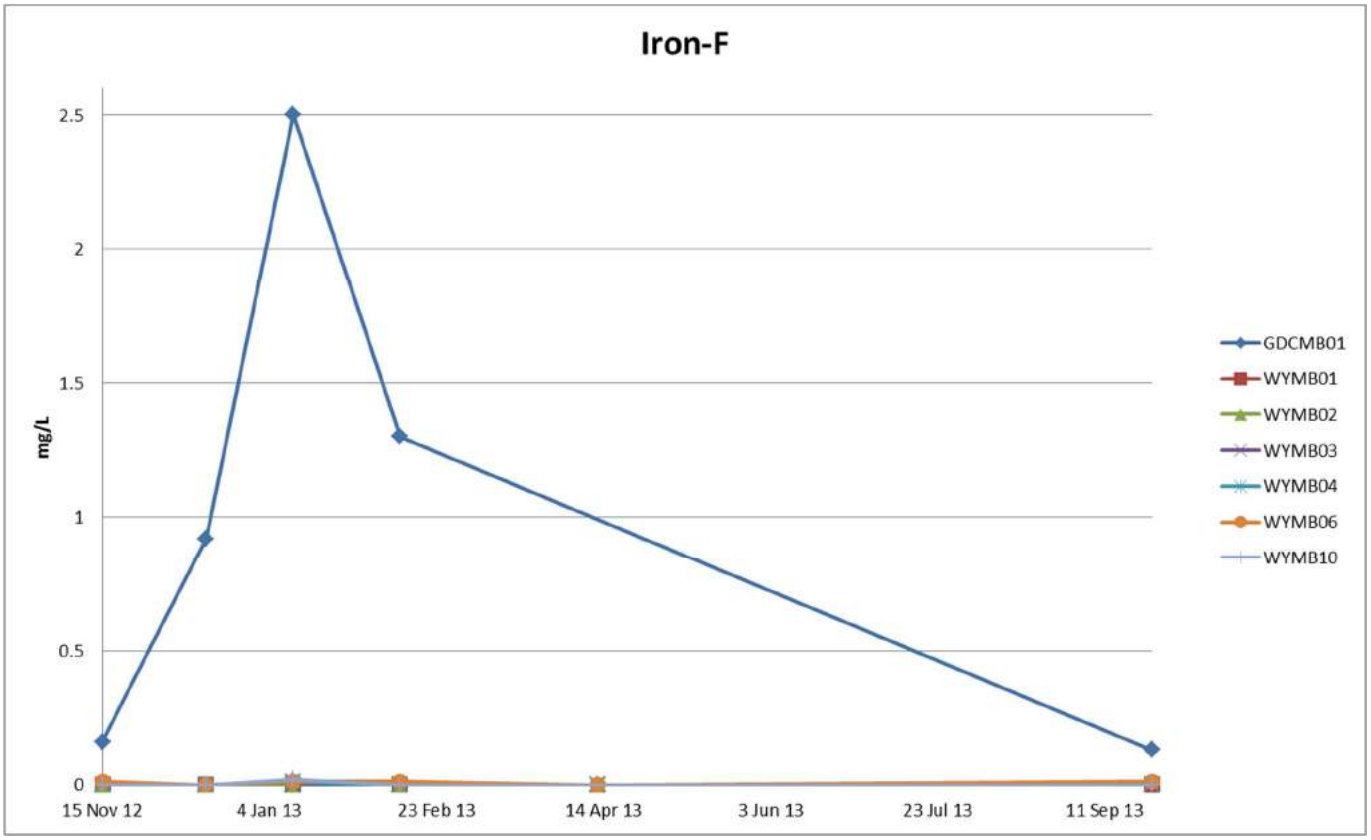


Figure 7-23 Groundwater monitoring results – Iron

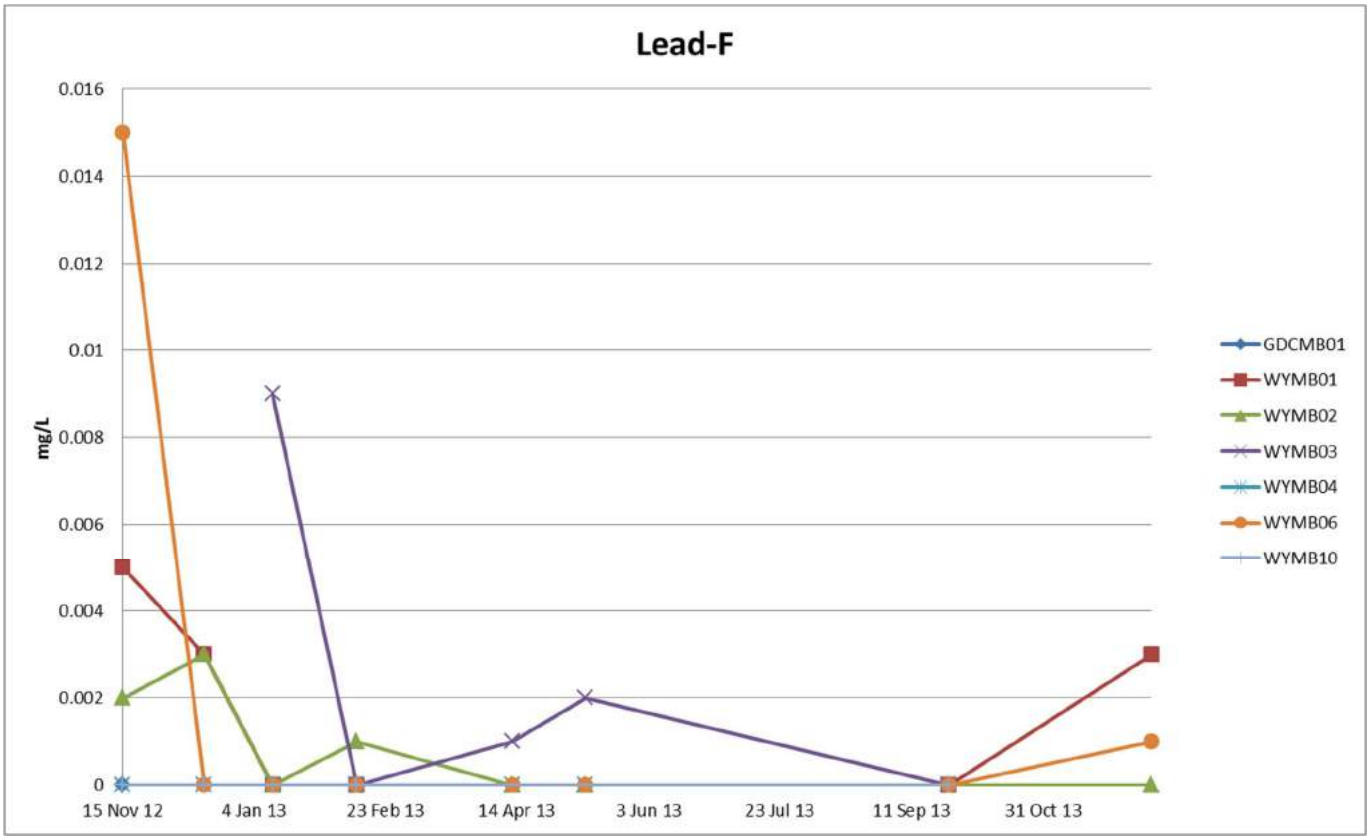


Figure 7-24 Groundwater monitoring results – Lead

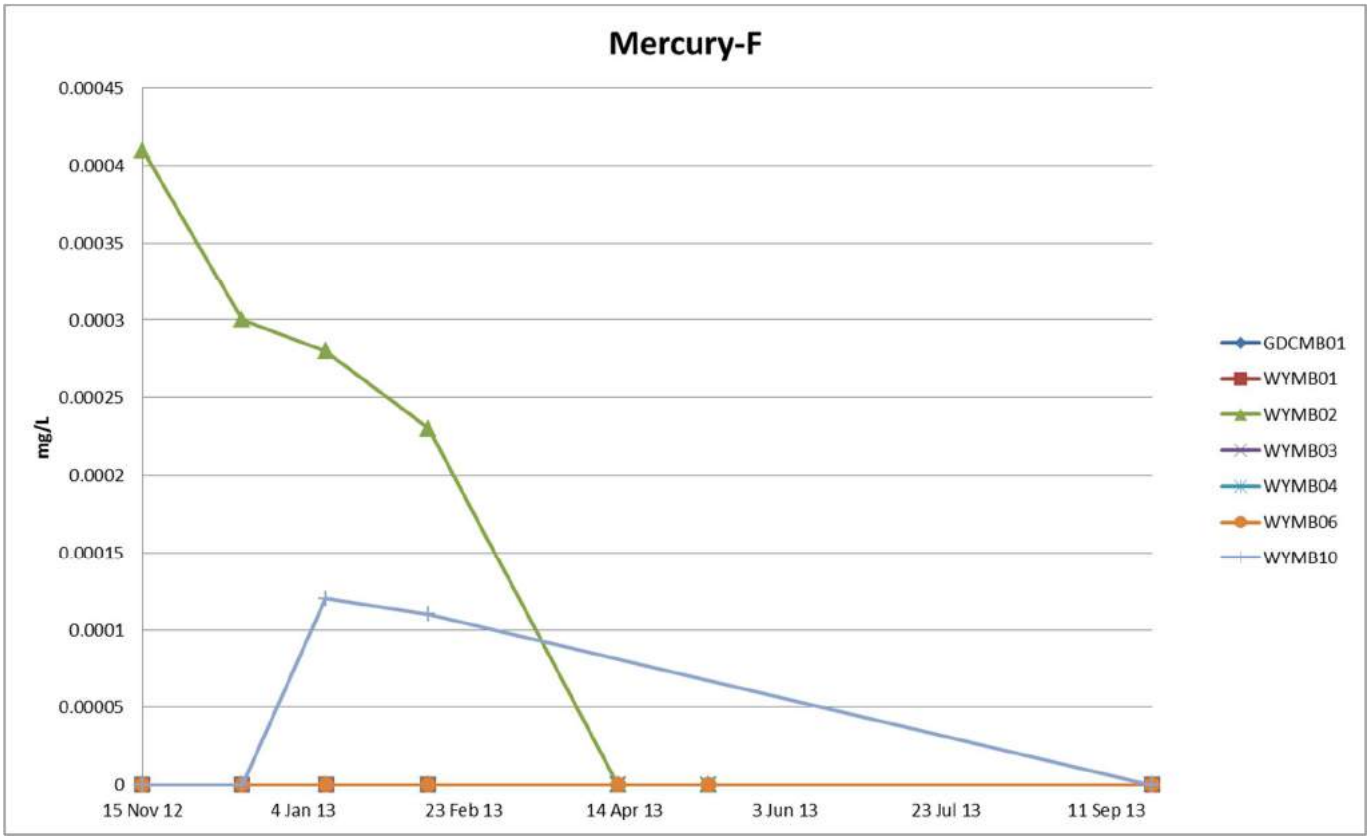


Figure 7-25 Groundwater monitoring results – Mercury

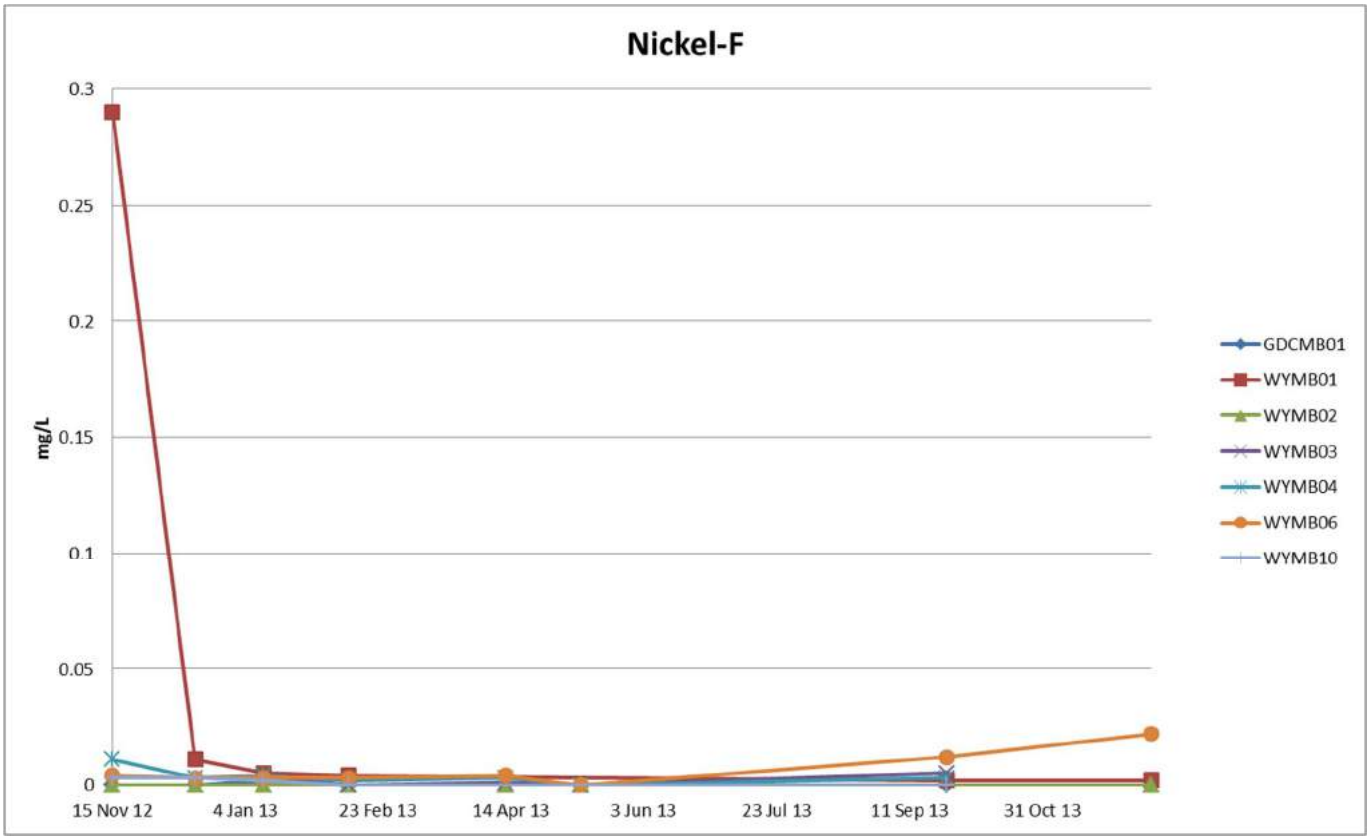


Figure 7-26 Groundwater monitoring results – Nickel

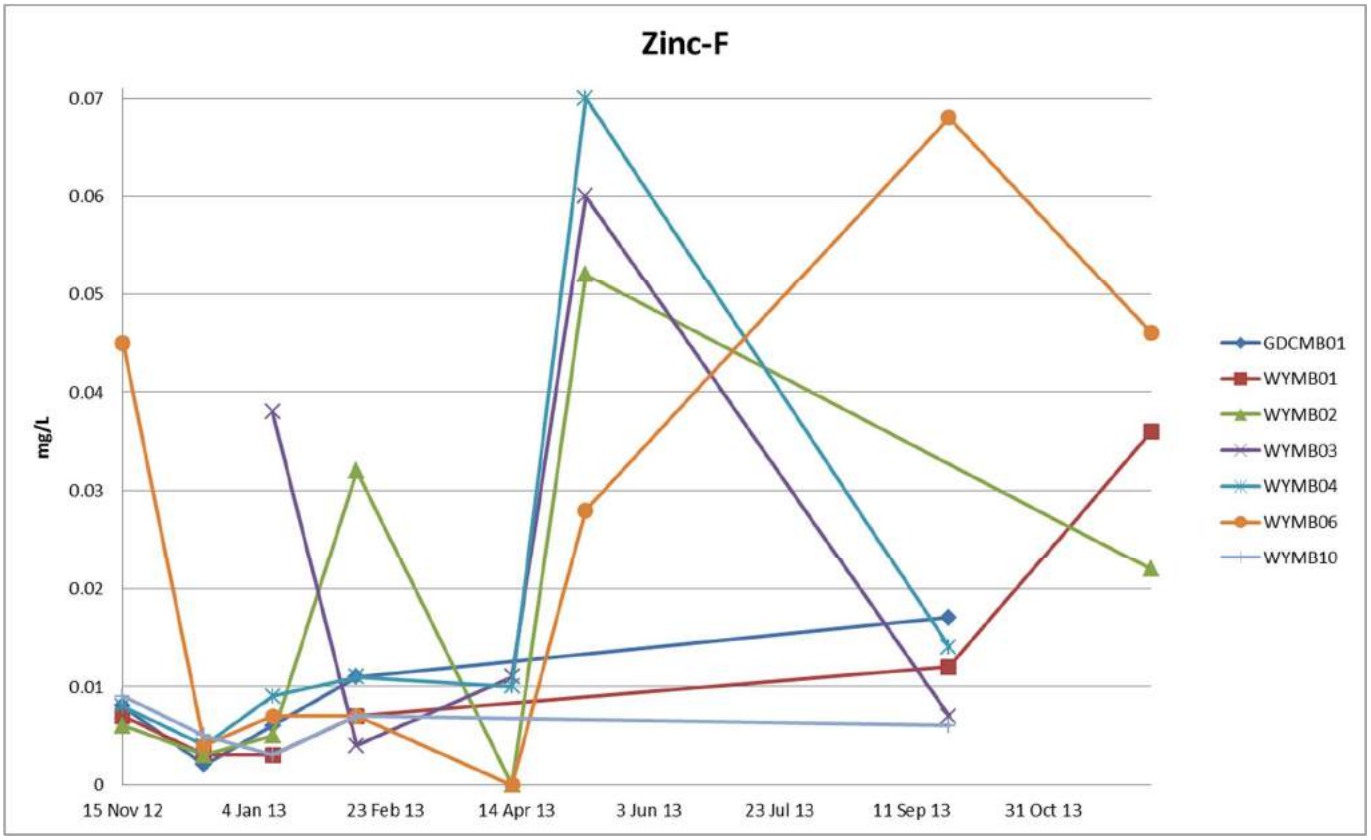


Figure 7-27 Groundwater monitoring results – Zinc