Northern Resource
CONSULTANTS

Highway Reward

Draft Amended Transitional Environmental Program - MAN17020

September 2017

prepared for

The Mount Windsor Joint Venture partners of Thalanga Copper Mines Pty Ltd and BML Holdings Pty Ltd

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Limitations of this Report

Client: The Mount Windsor Joint Venture partners of Thalanga Copper Mines Pty Ltd and BML Holdings Pty Ltd

Prepared by Northern Resource Consultants (NRC)

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Any advice, opinions or recommendations contained in this document should be read and relied upon only in the context of the document as a whole and are considered current as of the date of this document.

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Introduction

1. Highway Reward site Transitional Environmental Program – amendment request

This document has been prepared by Northern Resource Consultants (NRC) on behalf of The Mount Windsor Joint Venture partners of Thalanga Copper Mines (TCM) and BML Holdings (BML) to amend the Transitional Environmental Program (TEP) MAN17020 currently in place for the Highway Reward site.

On the 27 August 2013, the Department of Environment and Heritage Protection (EHP) approved the draft TEP titled "Draft Transitional Environmental Program, Highway Reward Mine" – dated 22 July 2013.

The TEP was originally approved for a three year period 30 September 2013 – 30 September 2016. The approved TEP was prepared by Caloundra Environmental on behalf of TCM and BML and forms the basis of this amended TEP submission.

A draft amended TEP was lodged with the EHP dated 13 October 2016 and included a proposal to revise the completion of the TEP completion date to 31 December 2017. The draft amended TEP was approved by the EHP on 19 October 2016.

This document is submitted under section 344 of the *Environmental Protection Act 1994* (Qld) as TCM and BML are proposing to extend the TEP completion date until 3 August 2018.

Where possible, the content of the approved TEP (Caloundra Environmental, 2013) has been reiterated exactly in the Amended Transitional Environmental Program section of this document to ensure any amendments requested are minor and there is no significant variance from the approved program. A copy of the current approved TEP is provided in Appendix A.

The TEP includes each of the points required under the guideline. A summary of the TEP document section, which meets the statutory requirements, is provided in Table 1.

Table 1: Summary of guideline requirements within this document

GUIDELINE REQUIREMENT	RELEVANT SECTION IN THIS DOCUMENT
TEP objectives	Amended Transitional Environmental Program Section 2, TEP objectives, page 10.
Actions required to achieve the objectives, and the day by which each action must be carried out, taking into account: - Best practice environmental management - Risks of environmental harm being caused by the activity.	Amended Transitional Environmental Program Section 4, TEP proposed program and actions to meet the objectives, page 11. Table 4.

GUIDELINE REQUIREMENT	RELEVANT SECTION IN THIS DOCUMENT
State how any environmental harm that may be caused by the activity will be prevented or minimised, including any interim measures that are to be implemented.	Amended Transitional Environmental Program Section 5, Management of environmental harm, page 13
If the activity is to transition to an environmental standard, state: - Details of the standard, and - How the activity is to transition to the standard before the TEP ends.	Not Applicable.
If the activity is to transition to comply with a condition of an EA, a development condition or a prescribed condition for carrying out a small scale mining activity, state: - Details of the condition and how the activity does not comply with it; and - How compliance with the condition will be achieved before the TEP ends.	Project Overview, Section 2, Environmental Authority breaches, page 7.
The period over which the TEP is to be carried out.	Amended Transitional Environmental Program Section 3, TEP period, page 11.
State appropriate performance indicators at intervals of not more than 6 months.	Amended Transitional Environmental Program Section 6, Performance indicators, page 14. Table 4.
Provide for monitoring and reporting on compliance with the TEP.	Amended Transitional Environmental Program Section 7, Monitoring and reporting, page 15.

2. Summary of amendments

The TEP has been revised to ensure it meets the requirements set out in section 331 of the *Environmental Protection Act 1994* (EP Act) and EHP guideline ESR/2016/2277.

In summary the amendments to the TEP include:

- TEP timeframe extension.
- Minor changes include formatting, reporting dates and deliverables.

3. Justification for proposed amendments

The original intent of the TEP was to determine sources of contamination at monitoring locations SW5 and SW6. A key aspect of the original surface water flow investigation and analysis was to measure flows at each potential source of contaminated seepage or runoff within the Highway Reward waste rock dumps.

However, the number of flow events recorded on site during the TEP period has been insufficient to determine contamination sources. For example, Figure 1 shows the annual rainfall

received at Charters Towers (Bureau of Meteorology rainfall station 34084). Rainfall in the years 2014 to 2016 has been below average. The flow recorded in on-site flow gauges (Figure 4) also demonstrates a significant lack of flow events since the 2013 to 2014 wet season.

In order to accurately quantify and segregate the contaminated runoff from the Highway Reward waste rock dumps, additional flow measurements are required. Therefore, it is recommended the TEP be extended to 3 August 2018.

All water from the site has now been diverted away from SW5 to the Highway Reward Pit and the surface water quality at SW5 has improved since the enforcement of the original TEP. Subsequently, the revised TEP also removes reference to surface water flows towards SW5.

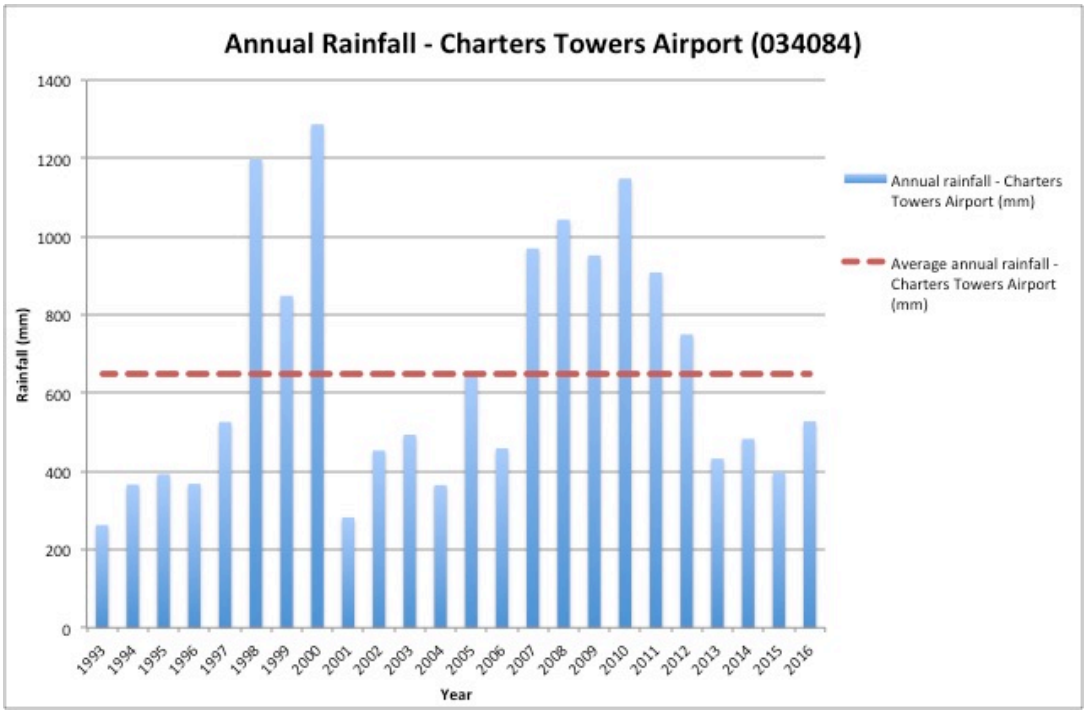

Figure 1: Yearly rainfall totals for Charters Towers compared with historical yearly average (BOM, 2017)

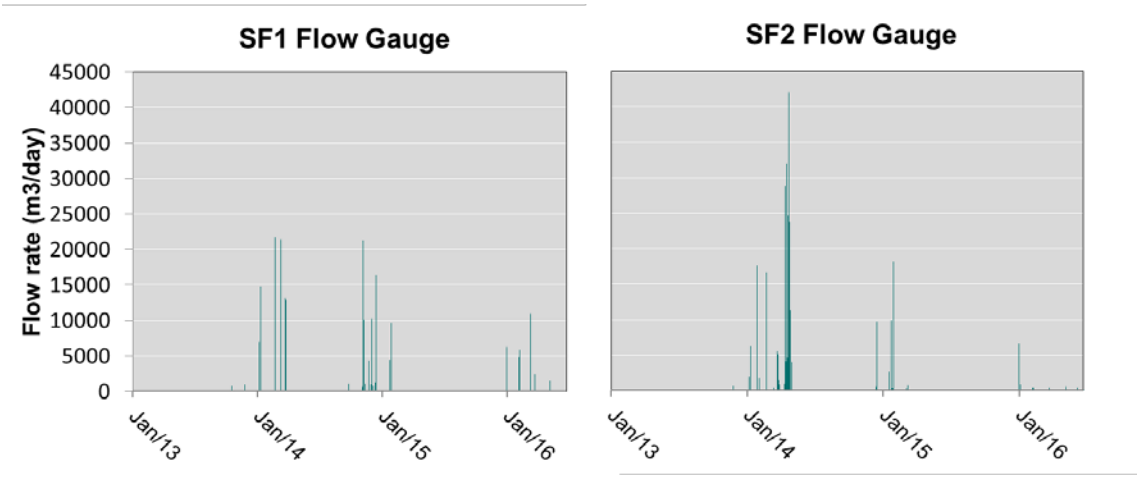

Figure 2: Flow rates measured in flow gauges SF1 and SF2 between May 2013 and June 2016

4. Determining if TEP amendments will increase environmental harm

In accordance with EHP guideline ESR/2016/2277 a TEP applicant must state details of:

> "…how any environmental harm that may be caused by the activity will be prevented or minimised, including any interim measures that are to be implemented" (ESR/2016/2277, p. 8).

Details on the management of environmental harm are contained within the revised TEP.

It is proposed the potential TEP amendments will not cause environmental harm, for example:

- The additional time proposed for the TEP is necessary to enable sufficient data collection to achieve the objectives of the original TEP and facilitate reliable data prior to the commencement of major diversion works.
- Due to the dry conditions within the region there has been insufficient flow to gain a comprehensive understanding of preferential pathways and potential contaminant sources at Highway Reward. As shown in Figure 1 – 2014 and 2015 were the two driest years in more than eight years (experienced in the Charters Towers region). This has subsequently been followed by below average rainfall for 2016.

The proposed TEP amendments will result in the TEP running over another wet season interim measures will be developed to prevent contaminants are released from the site towards SW6. This strategy will be to either treat any water flowing from the site towards SW6 or capture acidic mine affected water generated on site. These actions were completed before the onset of the 2016/2017 wet season, by 1 November 2016.

The interim measure will ensure that the risk of environmental harm is minimised until all actions required to inform a considered earthworks program are completed. Such actions include:

- surface water quality review;
- surface water flow monitoring and runoff model calibration.

In addition to the information provided above, EHP requested further information from the MWJV regarding the potential for environmental harm associated with the proposed actions to be completed under the TEP. A response to the information request, which was provided, to EHP on 6 October 2016 is included in Appendix D of this program.

Project Overview

1. Background

The Highway Reward mine site previously operated as an open cut and underground copper mine. The site is located 40km south of Charters Towers on the Gregory Development Road and is situated within the Burdekin River Catchment. A map of the site location is provided in Figure 3 below.

Open cut mining commenced at the site in 1997 and ceased in 2002. The operations formed a single residual void with a surface area covering 35ha.

The waste rock extracted during operations was placed within two waste rock dumps at the site. These waste rock dumps are known as the Highway Dump and the Reward Dump and are located adjacent to the open cut pit. The dumps cover an area of 132ha and were rehabilitated from 2005 onwards.

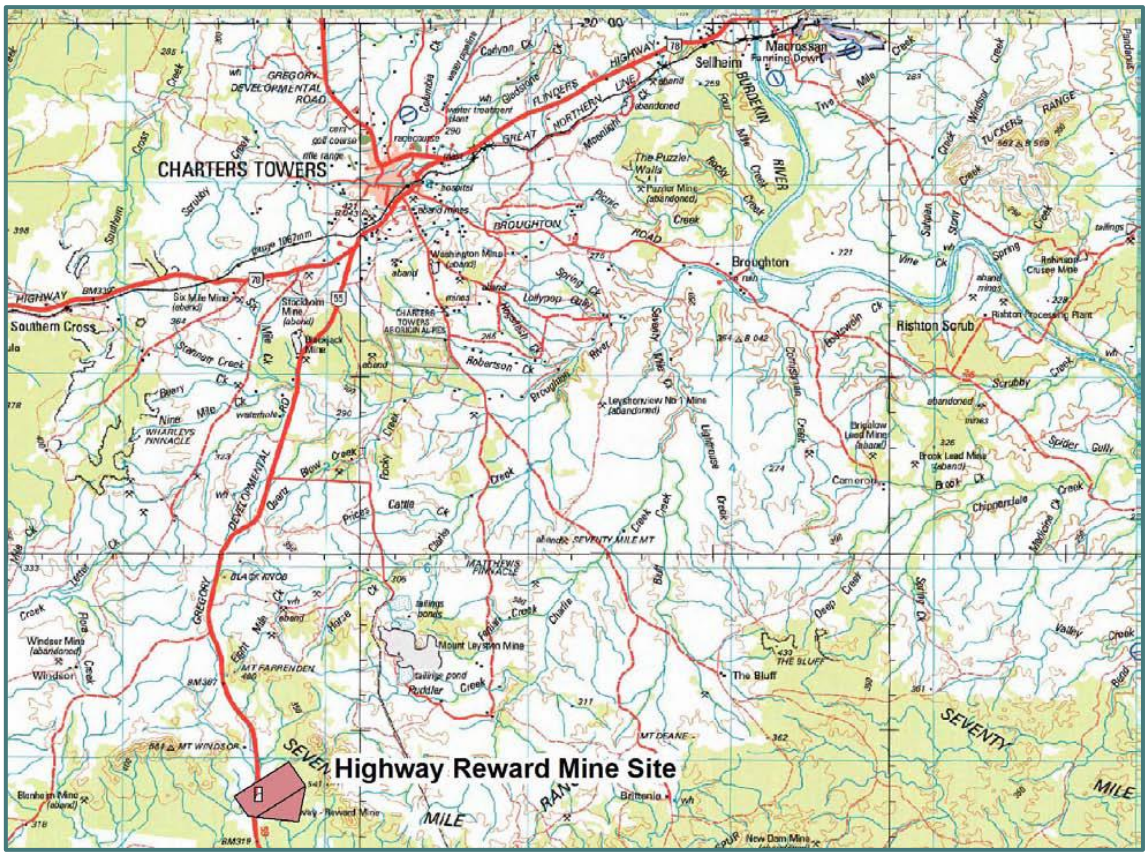

Figure 3: Highway Reward Mine Site location.

2. Environmental Authority breaches

The Highway Reward Mine operates as a rehabilitation project under the Environmental Authority (EA) EPML00550413.

Condition C1-1 of the EA (shown in the following section "Receiving Water Contaminant Limits") was subject to non-compliance in the past and resulted in the submission of the original draft TEP in 2013. A summary of the non-compliances are provided in the following sub-section as a requirement of ESR/2016/2277.

2.1 Receiving Water Contaminant Limits

The condition in the EA relating to receiving waters and contaminant limits (Table 2) is as follows:

"(C1-1) Receiving waters affected by the release of process water or storm water contaminated by the mining activities or both must be monitored at the locations and frequencies defined in Schedule C – Table 1 and Schedule J – Map 1 and comply with the **contaminant limits defined in Schedule C – Table 2.**" (Environmental Authority EPML00550413, p. 7).

Table 2: Copy of Schedule C – Table 2 (Receiving water contaminant limits)

PARAMETER	UNITS	LIMIT TYPE	CONTAMINANT TRIGGER LEVELS
pH		Acceptable range	6 - 9
Total Dissolved Solids	mg/L	Maximum	4000
Sulfate	mg/L	Maximum	1000
Copper	mg/L	Maximum	1
Molybdenum	mg/L	Maximum	0.15
Arsenic	mg/L	Maximum	0.5
Selenium	mg/L	Maximum	0.02
Mercury	mg/L	Maximum	0.002
Lead	mg/L	Maximum	0.1
Zinc	mg/L	Maximum	20
Cyanide (WAD)	mg/L	Maximum	0.01
Cadmium	mg/L	Maximum	0.01

NOTE: It is assumed that this table of the EA contains an error and the last column is in fact contaminant "limits".

Summary of the non-compliances

Breaches of the EA contaminant limits for surface water receiving sites have occurred at SW5 and SW6. A map of the surface water sites and all EA compliance points is provided in Appendix B.

Surface water results collected from the EA points have been collated since 2008 and reviewed against the EA limits. A summary of exceedance of the surface water limits as per the original TEP and summarised exceedances since the submission of the TEP in 2013 is provided in Appendix C of this amended TEP.

Since 2008 and 2011, SW5 and SW6 respectively, have exceeded EA limits on various occasions for the following parameters:

- pH (SW5 and SW6)
- total copper (SW5 and SW6)
- total cadmium (SW5 and SW6)
- total lead (SW5)
- total zinc (SW5)

The downstream EA site in Policeman's Creek (SW4) has recorded no recent exceedances of the EA limits.

Since February 2014, after the implementation of the TEP, pH at SW5 has remained near neutral ranging from 6.83 to 7.39 (Figure 4). Between January 2005 and February 2014, pH at this location used to be below 6.0. Improvement in pH was brought about by diverting mine impacted runoff flowing to this location into the pit. The sulfate concentration at this location has also remained below the EA limit. The only breach of EA conditions recorded at SW5 since February 2014 was in July 2016 when total lead concentration of 0.11 mg/L (slightly above the EA limit of 0.1 mg/L) was recorded. Since SW5 has generally been compliant with the EA since February 2014, it was recommended that references to this monitoring location be removed in the amended TEP. The amended TEP continues focus on SW6 water quality compliance.

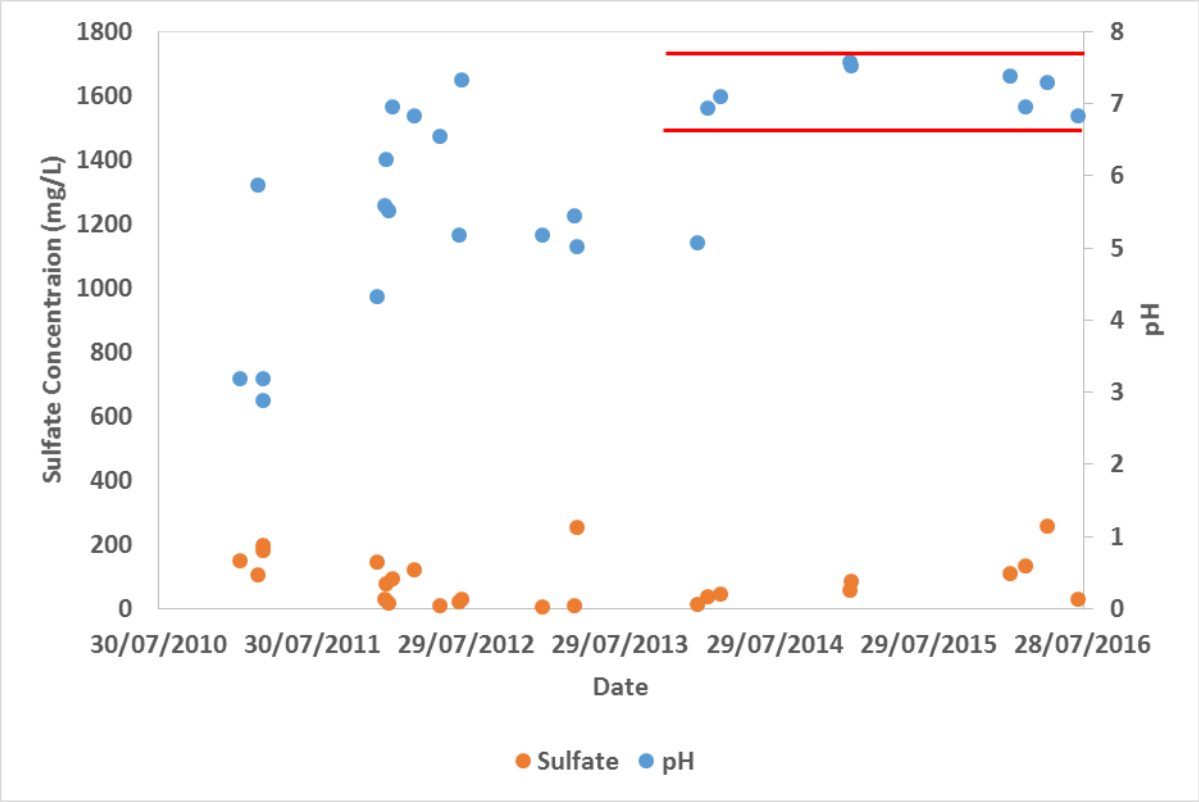

Figure 4: Sulfate and pH concentration at SW5

Amended Transitional Environmental Program

1. Overview

Following an internal site evaluation and investigation in response to the continuing exceedances, The Mount Windsor Joint Venture submitted a program Notice to the Department of Environment and Heritage Protection (EHP) on 7 June 2013. In return EHP served a notice of the JV requiring submission of a draft Transitional Environmental Program (TEP) by 9 August 2013. The draft TEP was duly submitted and approved by the DEHP on 27 August 2013. The existing TEP covers up until 31 December 2017.

The original intent of the TEP was to determine the sources of contamination at monitoring locations SW5 and SW6. Significant improvements in water quality at SW5 have been achieved. However, water at SW6 remains problematic with elevated levels of dissolved copper and low pH. A key aspect of the original surface water flow investigation and analysis was to measure flows at each potential source of contaminated seepage or runoff resulting from the Highway Reward waste rock dumps.

Whilst monitoring and gauge infrastructure has been installed during the initial TEP period, insignificant flows have been recorded on site, and as a consequence surface runoff models and source identification has not been able to be undertaken.

2. TEP objectives

As per the approved TEP, the objectives of the proposed amended TEP remain the same except for the exclusion of SW5 from the TEP.

The objective of the continued program is to prevent the release of contaminants, being low pH water and heavy metals, from the Highway Reward Mine Site, which have caused breaches of conditions of the Environmental Authority (EPML00550413) at designated monitoring point SW6.

The TEP activities will transition to compliance by:

- determining sources of contamination
- carrying out earthworks
- undertaking revegetation and rehabilitation activities to prevent the further release of contaminants and,
- ensuring flow off-site is within compliance with the limits set in the EA and the future risk of surface water or groundwater contamination reoccurring is acceptable – if the end

resulting scenario is one where contamination cannot be prevented through cost-effective works.

3. TEP period

The original TEP prepared and submitted to EHP in 2013 proposed for the program to run over three years with an expiry date of 30 September 2016. The current amended TEP is proposed to run until 31 December 2017.

The proposed extension to the current amended TEP is to 3 August 2018.

This will result in a total TEP period of less than 5 years.

4. TEP proposed program and actions to meet the objectives

During the TEP period in order to meet the proposed objectives, the following measures/actions will continue to be undertaken which are as per the approved TEP as follows (Appendix A):

1. Review of surface water and sediment quality data and the monitoring program currently in place and recommendations for the surface water and sediment-monitoring program such as monitoring locations, frequency, parameters and contaminant limits.
2. Surface water flows monitoring and study to identify potential offsite release paths and reference to water quality data.
3. Development and implementation of a surface water diversion earthworks program incorporating findings of the surface water flow modelling and need to redirect potentially mine impacted flows from SW6 and other areas of the site to the pit.

The program including the activities to be undertaken for each of these components is described below and presented as a project schedule in Table 4 with deliverables and TEP performance reporting dates.

4.1 Review of surface water and sediment quality and monitoring program

Investigation and analysis

- Continuing critical review the surface water quality data collected to date.
- Continuing critical review the stream sediment quality data collected to date.
- Undertake additional analyses for major ions to assist in interpretation.
- Ongoing investigation into potential sources of contamination and risk of contaminants impacting the receiving environment downstream of the site (SW4).
- Develop recommendations for monitoring at the site to ensure any “mine related” impacts are detected.
- Undertake a study to inform the earthworks program.

4.2 Surface water flow modeling (Incorporating SW6)

Investigation and analysis

Carrying out a program of surface water monitoring to identify sources of metal concentrations and low pH affecting runoff at monitoring point SW6. This involves expansion of the current program and will include:

- Ground-truthing the location of drains on waste rock dumps and across the site using a differential GPS and developing a flow direction map.
- Longitudinal sampling along the flow path after rain events.
- Measuring major drainage flows from the Highway Reward waste rock dumps at a dedicated v-notch weir.
- Measuring rainfall on site.
- Measuring flows at each potentially contaminated seep/runoff emanating portion the Highway waste rock dump.
- Sampling standing pools of water after rain.
- Analysing the results of the sampling programs and flow measurements to quantify pollutant sources and fluxes and different sources of contamination.

4.3 Surface water diversion earthworks program

Investigation and analysis

- Instigating earthworks programs to repair erosion problems, which could be exposing sulfides.
- Assessing bare patches on waste rock dumps for growth in size, which might indicate scalding, and the scale of the remedial works needed as part of the rehabilitation-monitoring program.
- Continue visual inspections of the Highway and Reward waste rock dumps to identify flaws in the capping which could cause contamination to inform the earthworks program.
- Instigating earthworks programs to recap areas of the waste rock dump found to have thin or potentially underperforming capping.
- Instigating re-vegetation programs to stabilise surfaces and prevent further erosion.
- Carrying out a program of visual inspections in the areas to the south and west of the Highway Reward pit void, which could cause contamination.
- Investigating earthworks programs to cap or dispose of exposed sulfides and redirect contaminated flows into the pit void.
- Completing earthworks and diversion programs to prevent contaminated flows from the lease towards SW6.
- Determining which areas of the site provide a stable contaminant-free runoff.
- Determining which areas of the site do not provide a stable contaminant-free runoff.

- Developing measures to prevent off-site release of contaminants, such as diverting contaminated water into the pit, maximising evaporation on site, or using earthworks and re-vegetation to minimise waste rock dump seepage development.
- Determining a scope to ensure long-term pit stability.

Implementation

Following investigations, develop a program/schedule of actions for earthworks to ensure:

- "Contaminated" water is captured on site and directed away from SW6 or managed to ensure it does not reach SW6.
- "Clean" water is appropriately diverted and managed effectively.
- Major erosion gullies determined to be a source of contamination are repaired.

5. Management of environmental harm

No amendments to this section of the TEP are proposed. The following is as per the approved TEP.

The risk of environmental harm is characterised by:

- The impact of low pH and high metal concentration surface water flows entering Policeman's Creek.
- The impact of contaminated water from the pit void either flowing from the pit into surface water systems or into regional groundwater aquifers.

The risk of environmental harm occurring during the TEP period will be managed by:

- Minimising flows into the pit until the surface and groundwater models have been calibrated and conservative allowances have been made for into-pit flows.
- Measuring flows into the pit.
- Initiating to prevent "contaminated" flows offsite.

As described earlier and in the approved TEP, the poor quality water emanating from the site in recent years as sampled at SW5 and SW6 (Appendix C) has not shown up downstream at SW4 in Policeman's Creek (Appendix C).

In addition to the actions proposed within the TEP, the MWJV will undertake works to ensure calibration of the pit water balance at the site. The following two sub-sections detail the works to be undertaken outside of the TEP requirements; however, will inform components of the TEP and closure of the Highway Reward Site.

5.1 Preliminary residual void water balance (incorporating surface water – groundwater Interaction)

Investigation and analysis

- Measuring surface water flows at v-notch weirs.
- Assessing the flows against rainfall events.

- Calculating the runoff co-efficient from various areas of the site.
- Assessing the runoff expected from different areas and calculating the maximum flows expected.
- Measuring the pit height and calculating the pit volume on a quarterly basis.
- Calibrating the pit water balance based on the measured results and analysis.
- Measuring the groundwater height and quality at dedicated groundwater bores on a quarterly basis.
- Calibrating the current groundwater model.
- Developing a model for surface water runoff versus evaporation.
- Submission of a preliminary residual void balance prior to commencement of earthworks that considers maximum expected inflows from planned works.

Implementation

The surface and groundwater water balance will be calibrated to determine a long-term site water balance. Monitoring will determine the inflow of water to the pit which will not result in a positive long-term pit water balance, or that the water level in the pit does not reach a level, which will impact on groundwater. Modeling will use conservative parameters that will result in a significant factor of safety.

Earthworks for diversion of “contaminated” water to the Highway Reward Pit will be designed and implemented based on the outcomes of the preliminary pit water balance modeling.

5.2 Final residual void water balance

Following completion of earthworks for diversion of “contaminated” water to the Highway Reward Pit. The water balance will be calibrated to determine a long-term site water balance. This will ensure that the inflow of water does not result in a positive long-term pit water balance, or that the water level in the pit does not reach a level, which may impact on groundwater. This works will be undertaken outside of the TEP program of actions; however, will ensure that the long-term risk of environmental harm is minimised.

6. Performance indicators

The performance indicators proposed for the original TEP were:

- Stable self-sustaining vegetation on the waste rock dumps.
- Reduction of contaminated flows off site.
- No breaches of EA conditions Schedule C – Tables 1 and 2.

In reviewing the TEP for Highway Reward the following performance indicators as outlined in Table 3 are proposed to replace the original performance indicators as part of this amended TEP. The performance indicators have been revised to meet the requirements of EHP Guideline EM1635 and section 331 of the EP Act. A comprehensive reporting table for the performance indicators is provided later in this report in Table 4.

Table 3: TEP performance indicators and due dates

TASK	PERFORMANCE INDICATOR	DUE DATE
1	Report on installation of interim water management strategy	1 November 2016
2	Completion of technical report on surface water and sediment quality monitoring program	31 December 2016
3	Completion of technical report on surface water flow directions and estimated rates.	30 May 2017
4	Report on required earthworks. Including schedule for completion of tasks within TEP timeframe.	30 May 2017
5	Completion of Earthworks and TEP performance report.	1 November 2017
6	TEP performance report including summary of surface water quality and flow monitoring for 2017/2018 wet season.	30 May 2018
7	Completion of final TEP performance report including completion report for earthworks undertaken by 1 November 2017.	3 August 2018

7. Monitoring and reporting

7.1 Monitoring

Environmental Authority

For the duration of the TEP, monitoring will continue to be undertaken in accordance with the environmental authority for sediment, surface water and groundwater.

Surface water flow quality

In addition to the EA requirement and in accordance with the original TEP, surface water monitoring will also be undertaken at a number of designated TEP surface water points between November and May each year. However, this monitoring will be restricted to flow events.

The location of the TEP surface water sites is provided in Appendix B. Parameters, which will be monitored at the TEP locations for the duration of the program, are:

- pH
- total dissolved solids
- major ions (sulfate, chloride, carbonate, bicarbonate, calcium, magnesium, sodium and potassium)
- cyanide (WAD)
- metals: copper, molybdenum, arsenic, selenium, mercury, lead, zinc, cadmium.

Groundwater

Groundwater monitoring proposed under the surface water – groundwater interaction section of this TEP involves quarterly monitoring of groundwater quality and standing water levels; this is in accordance with requirements of the EA.

A map of these locations is provided in Appendix B. Parameters, which will be monitored at these locations for the duration of the TEP and in accordance with the EA are:

- pH
- total dissolved solids
- major ions (sulfate, chloride, carbonate, bicarbonate, calcium, magnesium, sodium and potassium)
- cyanide (WAD)
- metals: copper, molybdenum, arsenic, selenium, mercury, lead, zinc, cadmium.

7.2 Reporting

As indicated within the report there are a number of reporting commitments contained within the TEP therefore this section is provided to summarise these reporting requirements. Where a reporting requirement from the current approved TEP has passed and was completed by TCM and BML, it has been removed from the revised TEP reporting requirements.

The following reporting as presented in Table 4 is proposed under the amended TEP.

Table 4: Schedule of actions, performance indicator deliverables and reporting for the TEP

TASK	ACTION ITEM	DESCRIPTION OF ACTION ITEM	PERFORMANCE INDICATOR/ DELIVERABLE	RELEVANT TEP PERFORMANCE REPORT	DUE DATE
1. Interim Measure to Prevent Environmental Harm					
1.1	Interim earthworks to treat releases to SW6 or capture all water on site.	By 1 November 2016, A strategy will be implemented as an interim measure to prevent the release of contaminants to SW6. This will involve either treatment of water releasing from the site or capturing all water on site until completion of other actions under the TEP, which inform the earthworks, program design.	Report on installation of interim water management strategy	N/A – Report submitted to EHP by 15 November 2016.	**1 November 2016**
2. Review of Surface Water and Sediment Quality Monitoring Program					
2.1	Technical Review of surface water and sediment quality data	An appropriately qualified third party will review the surface water and sediment quality data available for the highway reward site. The review will investigate elevated parameters to determine if there is contamination from the site or if there are other contributing factors. Major components of this action: - Continuing critical review the surface water quality, - Continuing critical review the stream sediment quality, - Analyses for major ions to assist in interpretation, - Ongoing investigation into potential sources of contamination and risk of contaminants impacting the receiving environment downstream of the site (SW4).	Technical Report on surface water sediment quality monitoring program.	6-monthly TEP performance report No.1	**31 December 2016**
2.2	Development of recommendations	Recommendations will be developed (if applicable) for changes/improvements to the current surface water and sediment monitoring program and compliance monitoring approach.			
3. Surface Water Flow Modelling (Incorporating SW6)					
3.1	Surface water flow monitoring at site.	Using data collected to date and the ground truthing with a differential GPS, complete surface water flow modelling for the site to identify potential pathways and rates of flow. This will inform the diversion earthworks program. Major components of this action: - Obtaining survey data of drainage network, - Re-calibration of the digital elevation model, - Installation of gauging stations at key drainage areas, - Measurement of a minimum of 5 flow events, - Development of the conceptual runoff model, - Calibration of the conceptual model with real time data from a minimum of 5 flow events. *Note: SW5 excluded from amended TEP as diversion works have been completed.*	Technical report on surface water flow directions and estimated rates. Including topographic flow path map.	6-monthly TEP performance report No.2	**30 May 2017**

4. Surface water diversion earthworks design					
4.1	Development of earthworks program	Following identification of potential flow paths, sources of contamination, and water balance estimates, develop an earthworks program/schedule for completion, which includes diversion of all “mine affected” water to the pit which does not compromise the future environmental performance of the site. Major components of this action: - Instigating earthworks programs to repair erosion problems or bare patches on the WRD, which could be exposing sulfides. - Instigating re-vegetation programs to stabilise surfaces and prevent further erosion. - Investigating earthworks programs to cap or dispose of exposed sulfides and redirect contaminated flows into the pit void. - Determining which areas of the site do and do not provide a stable contaminant-free runoff. - Developing measures to prevent off-site release of contaminants, such as diverting contaminated water into the pit, maximising evaporation on site, or using earthworks and re-vegetation to minimise waste rock dump seepage development. - Determining a scope to ensure long-term pit stability.	Report on required earthworks. Including schedule for completion of tasks within TEP timeframe.	6-monthly TEP performance report No.3	**30 May 2017**
5. Surface water diversion earthworks program					
5.1	Completion of earthworks.	Report to be included in the final TEP report, which provides a completion report on the earthworks undertaken and the anticipated success. - Major components of this action: “Contaminated” water is captured on site and directed away from SW6 or managed to ensure it does not reach SW6. - “Clean” water is appropriately diverted and managed effectively. - Major erosion gullies determined to be a source of contamination are repaired.	Earthworks completion report including third party inspection of earthworks.	6-monthly TEP performance report No.4	**1 November 2017**
6. Surface water quality and flow monitoring report for 2017/2018 wet season					
6.1	Technical Review of surface water and sediment quality data	An appropriately qualified third party will review the surface water and sediment quality data available for the highway reward site following the 2017/2018 wet season. The review will investigate elevated parameters to determine if there is contamination from the site or if there are other contributing factors. Major components of this action: - Continuing critical review the surface water quality, - Continuing critical review the stream sediment quality, - Analyses for major ions to assist in interpretation.	Technical Report on surface water sediment quality monitoring program.	6-monthly TEP performance report No.5	**30 May 2018**
7. TEP Completion Report					
7.1	Submission of TEP completion report to EHP.		Tabulated performance reporting for each component of the TEP and associated commitments and dates within submitted reports such as the earthworks program.	Final TEP Completion Report	**3 August 2018**

References

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Appendix summary

Appendix A	Current Approved TEP 2013
Appendix B	Maps
Appendix C	Collated Surface Water Data
Appendix D	Response to EHP information request – 6 October 2016.

Appendix A

Current Approved TEP 2013

Thalanga Copper Mines Pty Ltd

ACN 004 797 335 ABN 72 004 797 335

Locked Bag 1
Queenstown
Tasmania 7467

22 July 2013

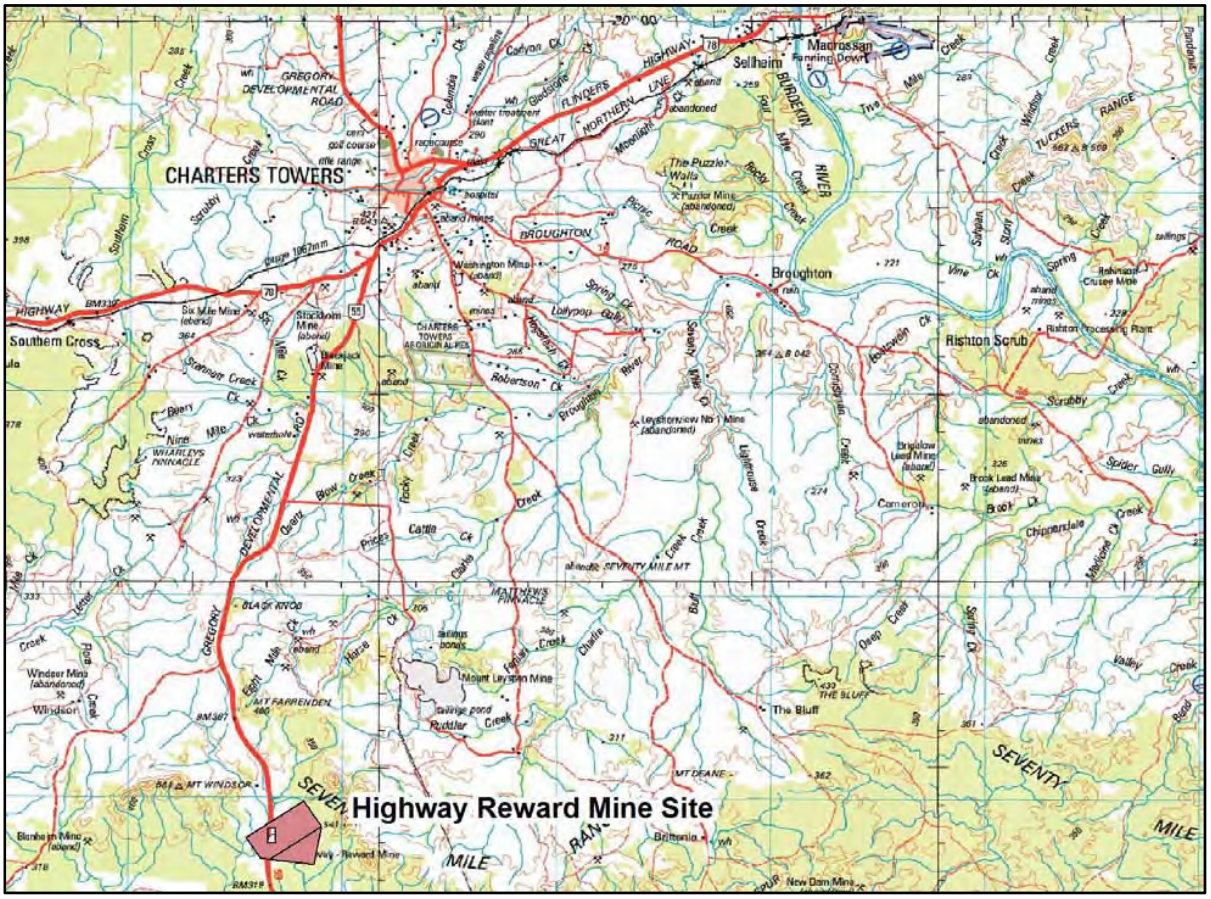
Draft Transitional Environmental Program Highway Reward Mine

Introduction

Background

The Highway Reward mine was an open cut and underground mining operation, 40 km south-west of Charter Towers, Queensland, in the Burdekin River Catchment (Figure 1). Open cut mining commenced in 1997 and ceased in early 2002. Open cut mining formed a single residual void with a surface area of 35ha. Waste rock from open pit mining was stored within two waste rock dumps on site: Highway dump and Reward dump, both adjacent to the open cut pit (Figure 2). These dumps occupied a total area of 132 ha and were rehabilitated from 2005 onwards.

Figure 1 Regional Location Highway Reward Mine



Underground mining of copper ore below the existing open cut began in July 2002. Copper ore mining was completed in June 2005. These mining operations involved underground mining of copper ore from the Reward Deeps, Lower Reward Deeps and Conviction ore bodies. Highway South was subject to mining in 2004 following dewatering from the pit into the temporary water storage. Approximately 300,000 tonnes of ore were mined up to December 2004. During this time all waste rock from the underground operations was utilised as fill or stored within the open cut pit.

Copper ore was stockpiled on site before being transported by road to be processed at the Thalanga mine site concentrator.

Environmental Authority Breaches

The Highway Reward mine operates as a rehabilitation project under Environmental Authority number EPML00550413.

Conditions of EA subject to non-compliance

Schedule C – Table 1 (Receiving water monitoring locations and frequency)

Monitoring point	**Easting**	**Northing**	**Monitoring frequency**
SW1	418050	7748020	Event
SW2	417871	7746641	Event
SW3	416430	7748344	Event
SW4	415644	7746879	Event
SW5	416340	7747350	Event
SW6	416580	7748350	Event

Schedule C – Table 2 (Receiving water contaminant limits)

Parameter	Units	Limit type	Contaminant trigger levels
pH		Acceptable range	6–9
Total Dissolved Solids	mg/L	Maximum	4,000
Sulfate	mg/L	Maximum	1,000
Copper	mg/L	Maximum	1
Molybdenum	mg/L	Maximum	0.15
Arsenic	mg/L	Maximum	0.5
Selenium (Total)	mg/L	Maximum	0.02
Mercury	mg/L	Maximum	0.002
Lead	mg/L	Maximum	0.1
Zinc	mg/L	Maximum	20
Cyanide (WAD)	mg/L	Maximum	0.01
Cadmium	mg/L	Maximum	0.01

Breaches of EA conditions relating to surface water have occurred at sites SW5 and SW6 over recent years (See Figure 2).

Since 2008, SW5 has experienced EA exceedances on 16 occasions. These are shown highlighted in rose with red font in Table 1. Exceedances were due to low pH, and high concentrations of Total Cu, Cd, Pb and Zn.

SW6 has experienced exceedances on seven occasions (Table 2). These have all occurred since January 2011 and relate to low pH, high concentrations of Total Cd and, recently, high Total Cu.

The downstream sampling site in Policemans Creek at SW4, however only shows one high reading, that being in January 2008 (Table 3). The high concentrations of Pb and Cu at this time may have been influenced by high concentrations of Total Dissolved Solids (TDS) and Sulphate at SW3 which also flows into Policemans Creek upstream of SW4 (Table 4, Figure 2).

These results indicate that although the concentrations have occasionally been high as the surface flow paths leave the site (at SW5 and SW6), the flows are sufficiently low that the exceedances do not lead to environmental harm downstream (as indicated by no corresponding EA licence limit breaches).

Table 1 SW5 Water Quality

Limits	6-9	1000	0.5	0.01	1.0	0.1	0.15	0.02	20
Date	pH	SO4 mg/L	Total As mg/L	Total Cd mg/L	Total Cu mg/L	Total Pb mg/L	Total Mo mg/L	Total Se mg/L	Total Zn mg/L
30-Jan-08	6.24	261	0.009	0.0006	0.07	0.061	0.001	0.01	0.12
13-Feb-08	5.06	580	0.001	0.0779	16.90	0.013	0.001	0.01	5.54
22-Jul-08	4.36	236	0.001	0.0296	9.97	0.008	0.001	0.01	4.79
28-Jan-09	5.34	415	0.025	0.0362	11.00	0.173	0.001	0.01	5.36
14-Dec-10	6.2	97	0.001	0.0694	0.39	0.004	0.001	0.01	0.29
20-Jan-11	6.23	76	0.002	0.0062	0.50	0.006	0.001	0.01	0.33
05-Feb-11	3.18	149	0.003	0.0028	3.25	0.004	0.001	0.01	0.51
22-Mar-11	5.88	106	0.002	0.0054	1.00	0.007	0.001	0.01	0.66
05-Apr-11	2.89	181	0.002	0.0028	4.22	0.008	0.001	0.01	0.59
05-Apr-11	3.19	199	0.003	0.0031	5.83	0.003	<0.001	<0.01	0.84
29-Dec-11	4.32	144	<0.001	0.0079	1.77	0.006	<0.001	<0.01	1.16
16-Jan-12	5.59	31	0.007	0.0023	1.41	0.110	<0.001	<0.01	0.33
20-Jan-12	6.23	76	0.002	0.0062	0.50	0.006	<0.001	<0.01	0.33
26-Jan-12	5.51	19	0.008	0.0017	0.98	0.120	<0.001	<0.01	0.22
04-Feb-12	6.95	93	0.002	0.0021	0.53	0.012	0.001	<0.01	0.29
09-Feb-12	3.18	149	0.003	0.0028	3.25	0.004	<0.001	<0.01	0.51
27-Mar-12	6.83	121	0.001	0.0023	0.44	0.163	<0.001	<0.01	0.31
26-May-12	6.54	11	0.003	0.0007	0.73	0.059	<0.001	<0.01	0.11
10-Jul-12	5.17	21	0.008	0.0014	1.04	0.117	0.001	<0.01	0.21
17-Jul-12	7.33	28	<0.001	<0.0001	0.00	0.004	0.069	<0.01	0.03
24-Jan-13	5.18	5	0.002	0.0004	0.35	0.030	<0.001	<0.01	0.06
17-Jul-12	7.33	28	<0.001	<0.0001	0.00	0.004	0.069	<0.01	0.03
17-Jul-12	7.33	28	<0.001	<0.0001	0.00	0.004	0.069	<0.01	0.03
12-Apr-13	5.45	9	0.003	0.0004	0.36	0.047	<0.001	<0.01	0.05

Table 2 **SW6 Water Quality**

Limits	6-9	1000	0.5	0.01	1.0	0.1	0.15	0.02	20
Date	pH	SO4 mg/L	Total As mg/L	Total Cd mg/L	Total Cu mg/L	Total Pb mg/L	Total Mo mg/L	Total Se mg/L	Total Zn mg/L
30-Jan-08	6.84	29	0.041	0.0007	0.073	0.072	0.001	0.01	0.33
13-Feb-08	6.29	85	0.004	0.0071	0.512	0.022	0.001	0.01	0.82
22-Jul-08	7.43	23	0.003	0.0004	0.086	0.005	0.001	0.01	0.04
28-Jan-09	7.11	47	0.005	0.0036	0.314	0.021	0.001	0.01	0.29
14-Dec-10	7.13	146	0.001	0.0084	0.269	0.001	0.001	0.01	0.67
20-Jan-11	7.47	127	0.001	0.1280	0.300	0.003	0.001	0.01	0.63
09-Feb-11	7.34	98	0.001	0.0023	0.108	0.002	0.001	0.01	0.12
22-Mar-11	6.40	182	0.001	0.0162	0.720	0.001	0.001	0.01	1.50
05-Apr-11	7.18	150	0.001	0.0050	0.095	0.001	0.001	0.01	0.39
05-Apr-11	7.46	15	0.003	0.0006	0.203	0.003	<0.001	<0.01	0.08
29-Dec-11	4.10	15	<0.001	0.0003	0.276	0.003	<0.001	<0.01	0.06
29-Dec-11	6.77	247	0.002	0.0171	0.987	0.007	<0.001	<0.01	1.68
16-Jan-12	7.00	101	0.004	0.0074	0.712	0.035	<0.001	<0.01	0.82
20-Jan-12	7.47	127	0.001	0.1280	0.300	0.003	<0.001	<0.01	0.63
26-Jan-12	7.28	56	0.001	0.0053	0.246	0.004	<0.001	<0.01	0.47
04-Feb-12	7.32	83	0.004	0.0041	0.783	0.035	0.001	<0.01	0.45
09-Feb-12	7.34	98	<0.001	0.0023	0.108	0.002	<0.001	<0.01	0.12
27-Mar-12	7.95	117	0.001	0.0009	0.075	0.064	<0.001	<0.01	0.07
26-May-12	7.35	40	0.001	0.0009	0.152	0.004	<0.001	<0.01	0.08
10-Jul-12	7.84	<1	0.004	0.0004	0.097	0.005	0.001	<0.01	0.10
24-Jan-13	5.18	5	0.002	0.0004	0.345	0.030	<0.001	<0.01	0.06
12-Apr-13	5.11	237	<0.001	0.0432	7.020	0.007	<0.001	<0.01	2.66

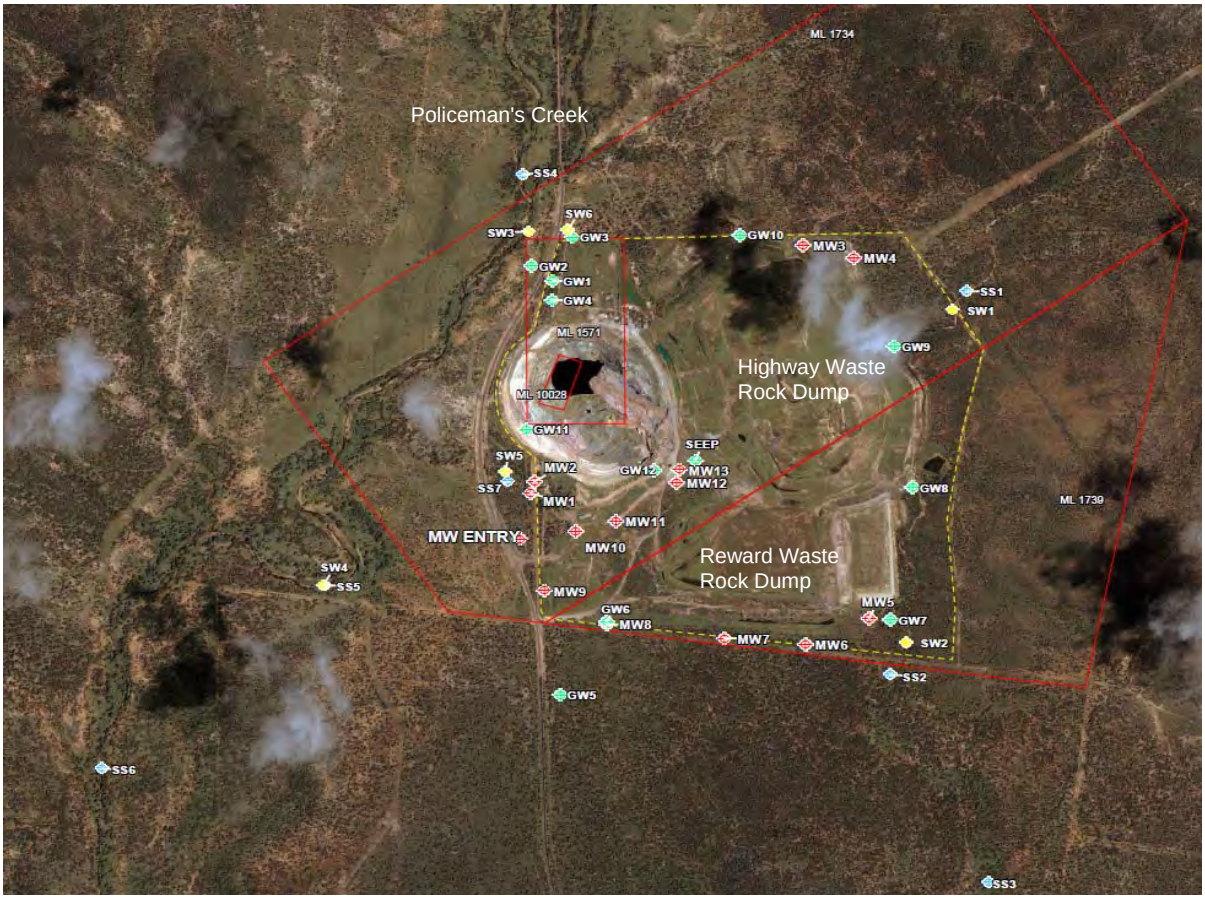
Table 3 **Downstream Water Quality at SW4**

Limits	6-9	1000	0.5	0.01	1.0	0.1	0.15	0.02	20
Date	pH	SO4 mg/L	Total As mg/L	Total Cd mg/L	Total Cu mg/L	Total Pb mg/L	Total Mo mg/L	Total Se mg/L	Total Zn mg/L
30-Jan-08	7.00	123	0.016	0.0062	2.750	0.488	0.001	0.01	0.954
13-Feb-08	7.10	14	0.001	0.0002	0.013	0.001	0.001	0.01	0.011
01-Apr-08	7.72	51	0.001	0.0001	0.005	0.001	0.001	0.01	0.005
28-Jan-09	7.46	4	0.002	0.0010	0.025	0.010	0.001	0.01	0.042
14-Dec-10	7.81	30	0.001	0.0003	0.004	0.001	0.001	0.01	0.003
20-Jan-11	8.14	31	0.001	0.0015	0.007	0.001	0.001	0.01	0.023
09-Feb-11	7.99	41	0.001	0.0002	0.005	0.001	0.001	0.01	0.031
22-Mar-11	7.97	39	0.001	0.0004	0.008	0.001	0.001	0.01	0.011
05-Apr-11	8.29	39	0.001	0.0001	0.003	0.013	0.001	0.01	0.003
05-Apr-11	7.88	67	0.001	<0.0001	0.027	0.002	0.001	<0.01	0.013
29-Dec-11	7.93	<1	<0.001	<0.0001	0.014	<0.001	0.001	<0.01	<0.005
16-Jan-12	7.91	44	<0.001	0.0001	0.030	0.003	<0.001	<0.01	0.028
20-Jan-12	8.14	31	<0.001	0.0015	0.007	<0.001	<0.001	<0.01	0.023
26-Jan-12	8.11	34	<0.001	<0.0001	0.006	<0.001	0.001	<0.01	<0.005
04-Feb-12	7.81	14	<0.001	<0.0001	0.021	0.006	<0.001	<0.01	0.017
09-Feb-12	7.99	41	<0.001	0.0002	0.005	<0.001	<0.001	<0.01	0.031
27-Mar-12	8.21	53	<0.001	<0.0001	0.002	0.019	0.001	<0.01	<0.005
26-May-12	7.98	96	<0.001	<0.0001	0.016	0.002	0.002	<0.01	<0.005
10-Jul-12	8.21	129	<0.001	<0.0001	0.023	<0.001	0.002	<0.01	0.006
12-Apr-13	7.92	34	0.002	0.0022	0.416	0.014	<0.001	<0.01	0.186

Table 4 **Jan 2008 SW Results**

Site	Date	pH	TDS mg/L	SO4 mg/L	Total As mg/L	Total Cd mg/L	Total Cu mg/L	Total Pb mg/L	Total Mo mg/L	Total Se mg/L	Total Zn mg/L
SW1	30-Jan-08	6.77	1,900	455	0.001	0.0220	0.016	0.007	0.001	0.01	0.014
SW2	30-Jan-08	6.34	732	18	0.001	0.0007	0.021	0.011	0.001	0.01	0.003
SW3	30-Jan-08	7.49	12,900	2,930	0.001	0.0002	0.005	0.001	0.001	0.01	0.003
SW4	30-Jan-08	7.00	2,160	123	0.016	0.0062	2.750	0.488	0.001	0.01	0.954
SW5	30-Jan-08	6.24	1,430	261	0.009	0.0006	0.073	0.061	0.001	0.01	0.118
SW6	30-Jan-08	6.84	3,490	29	0.041	0.0007	0.073	0.072	0.001	0.01	0.326

Figure 2 **Highway Reward Monitoring Locations**



Transitional Environmental Program

Following an internal site evaluation and investigation in response to the continuing exceedances, Thalanga Copper Mines Joint Venture (TCMJV) submitted a Program Notice on 7 June 2013. In return the Department of Environment and Heritage Protection (DEHP) served notice on the JV, requiring submission of a draft Transitional Environment Program (TEP) by 9 August 2013.

The investigation noted that several previously unknown seeps appeared to be leaching high-acidity water from the base of the Highway waste rock dump into the flow path to the SW6 sampling site (Figure 3). This contaminated water contained high concentrations of Total Cu as well as low pH water and indicated acid rock drainage formation. A recently eroded structure was also showing signs of sulphide oxidation along the drain in question (Figure 4).

Figure 3 Potential Highway Waste Rock Dump Seepage

The site in question is situated at the north-western end of the Highway waste rock dump and was exposed during maintenance works to recut a drain in late 2011. The yellow discolouration and signs of bubbling indicate exposed sulphidic material is oxidising, producing acid rock drainage (ARD). Solutions to this are to remove exposed boulders containing sulphides to the pit void and cap the remaining sulphidic material to prevent oxygen access. This would provide an effective solution if the exposed sulphidic material is the sole source of ARD. The JV is concerned however, that this may not provide a long-term solution if the waste rock dump contains stored acidity and is leaching the ARD. As a result, a TEP has been proposed to provide time for the JV to monitor water quality and flows from the site. This will enable the JV to determine whether the ARD is being produced from localised rainfall seeping over the sulphidic material or whether the ARD is from dump seepage and thus requires a different long-term solution.

Figure 4 Eroded Structure with Exposed Sulphides

The yellow discolouration above the drain again shows evidence of ARD formation. In this case the drop structure which was repaired in 2012 has eroded, exposing the sulphides. As a localised source of ARD this area is undergoing reconstruction in 2013 to provide a stable long-term solution for this problem.

Other potential sources of contamination along this drain are to be investigated during the coming wet seasons. Given the ephemeral nature of surface flows at the site and the short flow periods experienced, at least two wet seasons are proposed to allow the JV to find all sources of contamination through an on-site upstream monitoring program. This will then be followed by a works program to remedy the problems. Areas where the capping surface over the Highway and Reward waste rock dumps is known to be bare of vegetation are already scheduled for recapping and revegetation in the 2013 works program currently underway.

Figure 5 shows the previous flow path between the site and the SW5 sample site. This flow on site has already been redirected into the pit void to eliminate the possibility of contamination on site flowing overland towards SW5 and then Policemans Creek to the immediate west of the site. A line of rocks just inside the fence line appear to contain sulphides as evidenced by yellow discolouration. As such these rocks are being removed to the pit void during the 2013 works program on site to prevent environmental harm for occurring. The TEP program proposes to monitor the site to demonstrate, over the coming wet seasons, that no contaminated flow from the site now runs towards SW5.

Figure 5 SW5 Flow Path from the site

Much rehabilitation on site is structured around the pit void into which some contaminated water flows. Previous studies have indicated that the pit void will act as a sink with no adverse impact on groundwater or surface water. During the TEP the JV plans to confirm this through surface flow measurements and calibration of the site's pit water balance model and groundwater model.

Given that the JV has good knowledge of the site and its problems, and that the exceedances which led to the submission of a Program Notice are not causing environmental harm downstream, and as such are relatively low risk, the JV contends that emission limits at SW5 and SW6 should not apply for the duration of the TEP.

The draft TEP is proposed for a period of three years, notionally commencing in September 2013 with completion by September 2016.

TEP Objectives

To prevent the release of contaminants, being low pH water and heavy metals, from the Highway Reward mine which have caused breaches of conditions of Environmental Authority EPML00550413 at designated monitoring points SW5 and SW6.

The TEP activities will transition to compliance by discovering sources of contamination, carrying out earthworks and revegetation to prevent further release of contaminants and, where contamination cannot be prevented through cost-effective works, ensuring that there is no flow of contaminants off site and that the future risk of surface water or groundwater contamination re-occurring is acceptable.

TEP Proposed Program

The proposed TEP runs over three years and contains measures for three areas:

- surface flow towards SW6 on the north-west of the site.
- surface flow towards SW5 to the west of the site.
- surface water-groundwater interactions which impact on the amount of contaminated water which can be directed into the pit void.

The program is described below and presented as a project schedule in Table 5 and in tabular format in Table 6.

Surface Water Flow towards SW6

Investigation and Analysis

Carrying out a program of surface water monitoring to identifying sources of metal concentrations and low pH affecting runoff at monitoring point SW6. This will include:

- longitudinal sampling along the flow path after rain events
- measuring major drainage flows from the Highway waste rock dump at a dedicated v-notch weir
- measuring rainfall on site
- measuring flows at each potentially contaminated seep emanating or potentially emanating from the Highway waste rock dump
- sampling standing pools of water after rain
- analysing the results of the sampling programs and flow measurements to quantify pollutant sources and fluxes and differente sources of contamination
- carrying out a program of visually inspecting the Highway and Reward waste rock dumps to identify flaws in the capping which could cause contamination
- assessing bare patches on waste rock dumps for growth in size which might indicate scalding and the scale of the remedial works needed.

Monitoring to be undertaken over a two-year period from the TEP commencement - sampling will, by necessity, be restricted to flows after rain events and will coincide with the wet season between November and May each year.

Reporting to DEHP is proposed on a six monthly basis —reports provided by 30 December and 30 June for each year of the TEP.

Remedial Works

- Instigating earthworks programs to repair erosion problems which could be exposing sulphides
- Instigating earthworks programs to recap area of waste rock dump found to have thin or potentially underperforming capping

- Instigating revegetation programs to stabilise surfaces and prevent further erosion.

Initial earthworks are to be undertaken before 30 September 2013 with a report on the works to be provided to DEHP by 30 October 2013. A follow up works program is to be undertaken before 30 September 2014 with a report on the works to be provided to DEHP by 30 October 2014.

Surface water flow towards SW5

Investigation and Analysis

- Implementing a program of surface water sampling on the western side of the mining lease including flows directed into the pit
- Developing a record of photographic monitoring to show and accompany surface water flow sampling for identification of surface water flow or pooling
- Analysing results to confirm presence or absence of contaminated water flows on site towards monitoring point SW5.

Reporting to DEHP is proposed on a six-monthly basis with reports to be provided to DEHP by 30 December and 30 June for each year of the TEP.

Remedial Works

- Carrying out a program of visually inspecting the areas to the south and west of the Highway Reward pit void which could cause contamination
- Instigating earthworks programs to repair erosion problems which could be exposing sulphides
- Instigating earthworks programs to cap or dispose of exposed sulphides and redirect contaminated flows into the pit void
- Instigating revegetation programs to stabilise surfaces and prevent further erosion
- Completing earthworks and diversion programs to prevent contaminated flows from the lease towards SW5.

Surface Water - Groundwater Interaction

- Measuring surface water flows at v-notch weirs
- Assessing the flows against rainfall events
- Calculating the runoff co-efficient from various areas of the site
- Assessing the runoff expected from different areas and calculating the maximum flows expected
- Measuring the pit height and calculating the pit volume on a quarterly basis
- Calibrating the pit water balance based on the measured results and analysis
- Measuring the groundwater height and quality at dedicated groundwater bores on a quarterly basis
- Calibrating the current groundwater model
- Developing a model for surface water runoff versus evaporation.

Reporting to DEHP is proposed by 30 December in each year of the TEP.

Future Surface Water Flows

- Determining which areas of the site provide a stable contaminant-free runoff

- Determining which areas of the site do not provide a stable contaminant-free runoff
- Developing measures to prevent off-site release of contaminants, such as diverting contaminated water into the pit, maximising evaporation on site, or using earthworks and revegetation to minimise waste rock dump seepage development.

A report will be provided to DEHP by 30 September 2015 after monitoring flows for two wet seasons and assessing the interaction between surface water and groundwater. The report shall evaluate prospective earthworks which can maximise clean water flows off site and contaminated water into the pit void between October 2015 and August 2016 and commit to a works program to be completed by September 2016.

Management of Environmental Harm

The risk of environmental harm occurring is characterised by:

- the impact of low pH and high metal concentration surface water flows entering Policemans Creek
- the impact of contaminated water from the pit void either flowing from the pit into surface water systems or into regional groundwater aquifers.

The risk of environmental harm occurring during the TEP will be managed by:

- minimising flows into the pit until the surface and groundwater models have been calibrated and conservative allowances have been made for into-pit flows
- measuring flows into the pit
- initiating earthworks and revegetation works to identify and cap exposed sulphides on site as soon as practicable.

As described earlier, the poor quality water emanating from the site in recent years as sampled at SW5 and SW6 (Table 1 and Table 2) has not shown up downstream at SW4 in Policeman's Creek (Table 3).

TEP Performance Indicators

- Stable self-sustaining vegetation on waste rock dumps
- Reduction of contaminated flows off site
- No breaches of EA conditions Schedule C – Tables 1 and 2.

Monitoring and Reporting

- Reporting on surface water flows to DEHP on a six-monthly basis. Reports to be provided to DEHP by 30 December and 30 June for each year of the TEP.
- Report to DEHP on surface water - groundwater interactions by 30 December in each year of the TEP.
- Report on proposed earthworks (rationale, list of proposed actions) for each year to be provided with 30 June Surface flow reports in 2014 and 2015.
- Report on the initial earthworks works to DEHP by 30 November 2013.
- Report on follow up earthworks program to DEHP by 30 November 2014.
- Report on final proposed remedial works to DEHP by 30 September 2015.
- Final TEP Report by 30 September 2016.

Table 5 TEP Timetable

Task Name	Start	Finish
Surface Flow Sampling	**Fri 1/11/13**	**Thu 1/05/14**
SW6 flow path drain	Fri 1/11/13	Thu 1/05/14
SW6 flow path WRD	Fri 1/11/13	Thu 1/05/14
SW5 flow path	Fri 1/11/13	Thu 1/05/14
Pit v notch	Fri 1/11/13	Thu 1/05/14
Earthworks	**Tue 17/09/13**	**Mon 5/09/16**
Remedial drainage and cap repairs	Tue 17/09/13	Mon 28/10/13
2014 earthworks program	Thu 15/05/14	Wed 17/09/14
2015 earthworks program	Mon 18/05/15	Fri 18/09/15
2016 earthworks and surface diversion pr	Tue 17/05/16	Mon 5/09/16
Groundwater / Pit water Balance	**Tue 17/09/13**	**Mon 20/06/16**
Measure surface flwos at V notches	Tue 17/09/13	Mon 20/06/16
Survey pit water height	Tue 1/10/13	Mon 14/10/13
Survey pit water height	Wed 1/01/14	Tue 14/01/14
Survey pit water height	Tue 1/04/14	Mon 14/04/14
Survey pit water height	Tue 1/07/14	Mon 14/07/14
Survey pit water height	Wed 1/10/14	Tue 14/10/14
Survey pit water height	Thu 1/01/15	Wed 14/01/15
Survey pit water height	Wed 1/04/15	Tue 14/04/15
Survey pit water height	Wed 1/07/15	Tue 14/07/15
Survey pit water height	Thu 1/10/15	Wed 14/10/15
Survey pit water height	Fri 1/01/16	Thu 14/01/16
Survey pit water height	Fri 1/04/16	Thu 14/04/16
Survey pit water height	Wed 24/06/15	Tue 7/07/15
Groundwater model calibration	Wed 15/04/15	Tue 7/07/15
Surface water model calibration	Wed 15/04/15	Tue 7/07/15
Surfacer diversion assessment	Wed 8/07/15	Tue 18/08/15
Surface Flow Sampling	**Mon 3/11/14**	**Fri 1/05/15**
SW6 flow path drain	Mon 3/11/14	Fri 1/05/15
SW6 flow path WRD	Mon 3/11/14	Fri 1/05/15
SW5 flow path	Mon 3/11/14	Fri 1/05/15
Pit v notch	Mon 3/11/14	Fri 1/05/15
DEHP Reporting	**Tue 29/10/13**	**Fri 30/09/16**
Surface flow sampling update report	Mon 30/12/13	Mon 30/12/13
Surface flow sampling update report	Mon 30/06/14	Mon 30/06/14
Surface flow sampling update report	Tue 30/12/14	Tue 30/12/14
Surface flow sampling update report	Tue 30/06/15	Tue 30/06/15
Surface flow sampling update report	Wed 30/12/15	Wed 30/12/15
Runoff & pit water report	Fri 20/12/13	Mon 30/12/13
Runoff & pit water report	Mon 21/12/15	Wed 30/12/15
2013 Eatrhworks update report	Tue 29/10/13	Wed 30/10/13
2014 earthworks update report	Thu 18/09/14	Wed 29/10/14
Surface water diversion asessment report	Wed 19/08/15	Tue 29/09/15
Final TEP Report	Tue 6/09/16	Fri 30/09/16

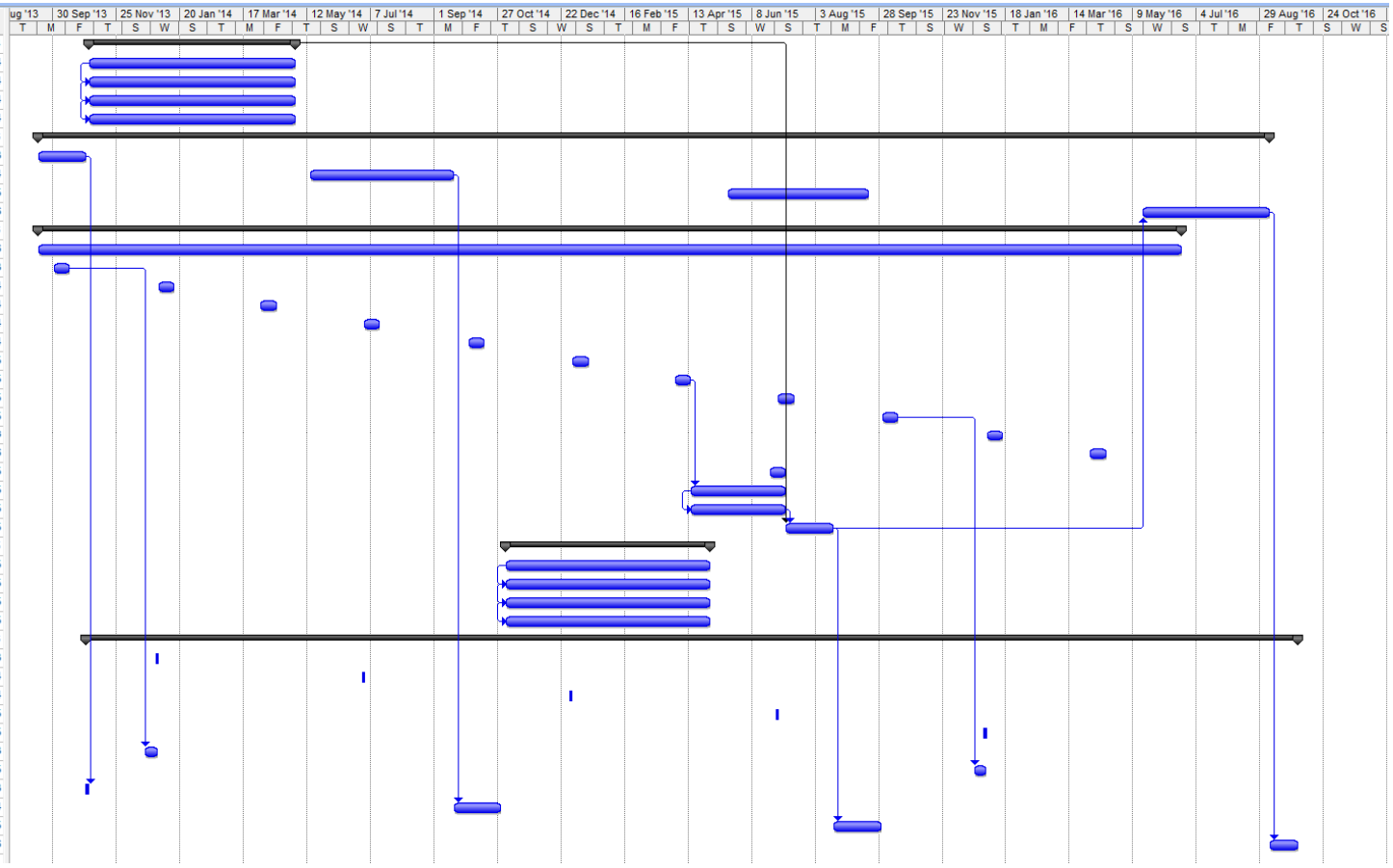


Table 6 TEP Tabular Format

Task	Action Item	Description of action item	Date	Performance Indicator/Reporting
1. Surface Flow Sampling	1.1 SW6 Flow path drain		1 November 2013 – 1 May 2014	6 monthly 'surface flow sampling update' report to DEHP by 30 December 2013
				6 monthly 'surface flow sampling update' report to DEHP by 30 June 2014
	1.2 SW6 flow path WRD		1 November 2013 – 1 May 2014	6 monthly 'surface flow sampling update' report to DEHP by 30 December 2013
				6 monthly 'surface flow sampling update' report to DEHP by 30 June 2014
	1.3 SW5 flow path		1 November 2013 – 1 May 2014	6 monthly 'surface flow sampling update' report to DEHP by 30 December 2013
				6 monthly 'surface flow sampling update' report to DEHP by 30 June 2014
	1.4 Pit V-notch		1 November 2013 – 1 May 2014	6 monthly 'surface flow sampling update' report to DEHP by 30 December 2013
				6 monthly 'surface flow sampling update' report to DEHP by 30 June 2014
	1.5 SW6 Flow path drain		1 November 2014 – 1 May 2015	Provision of 6 monthly 'surface flow sampling update' report to DEHP by 30 December 2014
				Provision of 6 monthly 'surface flow sampling update' report to DEHP by 30 June 2015
	1.6 SW6 flow path WRD		1 November 2014 – 1 May 2015	Provision of 6 monthly 'surface flow sampling update' report to DEHP by 30 December 2014

				Provision of 6 monthly 'surface flow sampling update' report to DEHP by 30 June 2015
	1.7 SW5 flow path		1 November 2014 – 1 May 2015	Provision of 6 monthly 'surface flow sampling update' report to DEHP by 30 December 2014
				Provision of 6 monthly 'surface flow sampling update' report to DEHP by 30 June 2015
	1.8 Pit V-notch		1 November 2014 – 1 May 2015	Provision of 6 monthly 'surface flow sampling update' report to DEHP by 30 December 2014
				Provision of 6 monthly 'surface flow sampling update' report to DEHP by 30 June 2015
2. Earthworks	2.1 Remedial drainage and cap repairs	2.1.1 Remove exposed boulders containing sulphides from NW of Highway WRD to the pit 2.1.2 Cap remaining sulphidic material at Highway WRD 2.1.3 Revegetation of bare patches on Highway and Reward WRD 2.1.4 Removal of sulphidic rocks from fence line at SW5 to pit.	17 September 2013 – 28 October 2013	Earthworks update report by 30 October 2013
	2.2 2014 earthworks program		15 May 2014 – 17 September 2014	Earthworks update report by 29 October 2014
	2.3 2015 earthworks program		18 May 2015 – 18 September 2015	Earthworks update report by 29 October 2015 including proposed surface water diversion assessment

				report
	2.4 2016 earthworks and surface diversion program		17 May 2016 – 5 September 2016	Earthworks update and Surface water diversion works report by 29 September 2016
3. Groundwater / Pit Balance	3.1 Measure surface flows at V notches		17 September 2013 – 20 June 2016	Proposed surface water diversion assessment report by 29 October 2015
	3.2 Survey pit water height		1 October 2013 – 14 October 2013	Runoff and pit water report by 30 December 2013
	3.3 Survey pit water height		1 January 2014 – 14 January 2014	Runoff and pit water report by 30 December 2014
	3.4 Survey pit water height		1 April 2014 – 14 April 2014	
	3.5 Survey pit water height		1 July 2014 – 14 July 2014	
	3.6 Survey pit water height		1 October 2014 – 14 October 2014	
	3.7 Survey pit water height		1 January 2015 – 14 January 2015	Runoff and pit water report by 30 December 2015
	3.8 Survey pit water height		1 April 2015 – 14 April 2015	
	3.9 Survey pit water height		1 July 2015 – 14 July 2015	
	3.10 Survey pit water height		1 October 2015 – 14 October 2015	
	3.11 Survey pit water height		1 January 2016 – 14 January 2016	Runoff and pit water report by 30 September 2016
	3.12 Survey pit water height		1 April 2016 – 14 April 2016	
	3.13 Survey pit water height		24 June 2016 – 7 July 2016	
	3.14 Groundwater model calibration		15 April 2015 – 7 July 2015	Proposed surface water diversion assessment report by 29 October

				2015
	3.15 Surface water model calibration		15 April 2015 – 7 July 2015	Proposed surface water diversion assessment report by 29 October 2015
	3.16 Surface diversion assessment		8 July 2015 – 18 August 2015	Proposed surface water diversion assessment report by 29 October 2015
4. Final TEP report	4.1 Submission of final TEP report		30 September 2016	Submit final TEP report to DEHP by 30 September 2016

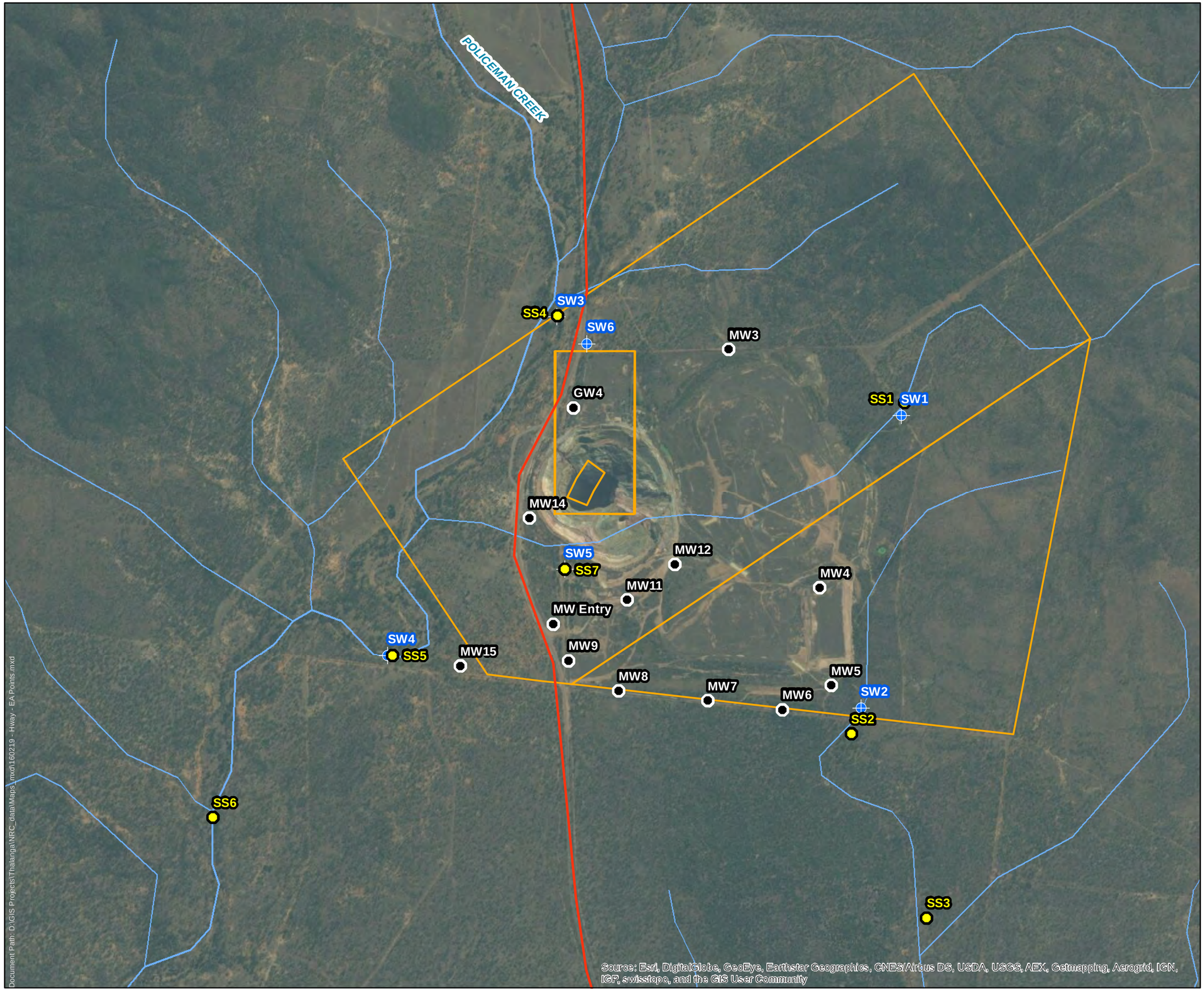
2013 task
2014 task
2015 task
2016 task

Appendix B

Maps

Incorporating:

- EA monitoring locations
- TEP monitoring locations



HIGHWAY REWARD

EA COMPLIANCE POINTS

Legend

Roads

- Principal Road

EA Points

- Groundwater
- Receiving Water
- Stream Sediment
- Mining Lease

Streams and Watercourses

- Major Stream
- Minor Stream

Mine Lease boundary extracted from ml.shp, from IRTM State of Queensland.

0 125 250 500

Metres

Scale: 1:17,000 at A3

N

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
Date: 19/02/2016

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northern resource consultants

HIGHWAY REWARD

TEP MONITORING POINTS

SW3
SW6
TEP2015-7
TEP2015-8
TEP2015-9
TEP2015-1
SW1
TEP2015-6
TEP2015-2
TEP2015-3
TEP2015-10
TEP2015-4
TEL-011
- SF2
TEL-011
- SF1
SW5
TEP2015-5
TEP2015-11
SW2

Legend

- TEP Surface Water Locations
- V-Notch Weirs
- EA Surface Water Sites
- Mining Lease

Mine Lease boundary extracted from ml.shp, from IRTM State of Queensland.

0 75 150 300
Metres

Scale: 1:8,000 at A3

N

Coordinate System: GDA 1994 MGA Zone 55
Projection: Transverse Mercator
Datum: GDA 1994
Date: 29/06/2016

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northern resource consultants

Document Path: O:\GIS Projects\Highway_Reward\169622 - Highway - TEP.mxd

Appendix C

Collated Surface Water Data

SampleID	Sample_category	Date	Sample #	pH Value	Electrical Conductivity @ 25°C	Total Dissolved Solids @180°C	Sulfate as SO4 Turbidimetric	Total Arsenic	Total Cadmium	Total Copper	Total Lead	Total Manganese	Total Molybdenum	Total Selenium	Total Zinc	Total Mercury	Total Cyanide	Weak Acid Dissociable Cyanide
	Surfacewater	16/01/1998	SW6	6.99	175	80	9.0	0.001	0.00025	0.0050	0.002	0.04			0.005		0.00025	0.00025
	Surfacewater	3/06/1998	SW6	7.2	265	184	5.0	0.001	0.00025	0.0050	0.001	1.39			0.005		0.00025	0.00025
	Surfacewater	14/08/1998	SW6	7.2	246	132	2.0	0.002	0.00025	0.0050	0.002	2.29			0.005		0.00025	0.00025
	Surfacewater	15/10/1998	SW6	6.68	216	188	7.0	0.002	0.00025	0.010	0.003	1.79			0.005		0.00025	0.00025
	Surfacewater	23/11/1998	SW6	8.24	239	180	6.0	0.001	0.00025	0.0050	0.001	0.99			0.005		0.00025	0.00025
	Surfacewater	14/12/1998	SW6	7.11	141	60	6.0	0.001	0.00025	0.0050	0.004	0.03			0.005		0.00025	0.00025
	Surfacewater	7/01/1999	SW2	7.3	141	158	6.0	0.002	0.00025	0.0050	0.004	0.07			0.020		0.00025	0.00025
	Surfacewater	7/01/1999	SW3	7.56	240	164	6.0	0.001	0.00025	0.0050	0.018	0.15			0.030		0.005	0.00025
	Surfacewater	11/01/1999	SW6	6.88	240	160	6.0	0.001	0.00025	0.050	0.001	0.70			0.005		0.005	0.00025
	Surfacewater	14/01/1999	SW2	6.98	67	136	5.0	0.002	0.00025	0.020	0.012	0.14			0.010		0.00025	0.00025
	Surfacewater	14/01/1999	SW3	7.39	151	178	5.0	0.001	0.00025	0.0050	0.002	0.06			0.005		0.015	0.00025
	Surfacewater	25/02/1999	SW2	7.48	180	128	6.0	0.002	0.00025	0.0050	0.004	0.07			0.005		0.02	0.00025
	Surfacewater	25/02/1999	SW6	7.05	221	144	5.0	0.001	0.00025	0.0050	0.001	0.88			0.005		0.005	0.00025
	Surfacewater	9/03/1999	SW2	7.27	88	448	8.0	0.001	0.00025	0.020	0.014	0.22			0.020	0.00003	0.01	0.00500
	Surfacewater	9/03/1999	SW3	6.99	210	228	5.0	0.001	0.00025	0.0050	0.001	0.03			0.005	0.00003	0.00025	0.00025
	Surfacewater	9/03/1999	SW4	7.16	147	248	9.0	0.001	0.00025	0.010	0.002	0.05			0.005	0.00003	0.00025	0.00025
	Surfacewater	27/04/1999	SW2	7.26	251	148	9.0	0.002	0.00025	0.010	0.006	0.15			0.005	0.00003	0.01	0.00025
	Surfacewater	25/05/1999	SW6	7.58	291	212	4.0	0.001	0.00025	0.0050	0.001	1.08			0.005	0.00003	0.00025	0.00025
	Surfacewater	22/06/1999	SW6	7.13	316	180	2.0	0.001	0.00025	0.0050	0.001	0.70			0.005	0.00003	0.00025	0.00025
	Surfacewater	28/07/1999	SW6	7.7	330	140	6.0	0.011	0.00025	0.020	0.029	0.56			0.040	0.00003	0.00025	0.00025
	Surfacewater	23/11/1999	SW2	6.58	105	200	7.0	0.001	0.00025	0.010	0.007	0.05		0.005	0.010	0.00003	0.00025	0.00025
	Surfacewater	23/11/1999	SW4	7.26	274	304	29	0.001	0.00025	0.13	0.005	0.09		0.005	0.050	0.00003	0.00025	0.00025
	Surfacewater	30/11/1999	SW2	6.91	88	80	7.0	0.001	0.00025	0.12	0.004	0.02		0.005	0.030	0.00003	0.00025	0.00025
	Surfacewater	11/01/2000	SW4	8.1	742	416	113	0.001	0.00025	0.020	0.001	0.06		0.005	0.010	0.00003	0.00025	0.00025
	Surfacewater	3/02/2000	SW4	7.54	1,340	816	244	0.001	0.00025	0.14	0.001	0.38		0.005	0.100	0.00003	0.00025	0.00025
	Surfacewater	22/02/2000	SW4	7.79	223	192	14	0.001	0.00025	0.38	0.002	0.09		0.005	0.130	0.00003	0.01	0.00025
	Surfacewater	17/03/2000	SW2	7.5	162	196	22	0.002	0.00025	0.11	0.009	0.11		0.005	0.040	0.00003	0.005	0.00025
	Surfacewater	17/03/2000	SW3	6.9	218	188	8.0	0.001	0.00025	0.060	0.002	0.27		0.005	0.005	0.00003	0.00025	0.00025
	Surfacewater	17/03/2000	SW4	7.65	260	212	7.0	0.001	0.00025	0.070	0.005	0.16		0.005	0.005	0.00003	0.00025	0.00025
	Surfacewater	30/03/2000	SW2	7.3	201	204	11	0.002	0.00025	0.44	0.002	0.18		0.005	0.010	0.00003	0.00025	0.00025
	Surfacewater	30/03/2000	SW3	7.63	356	252	9.0	0.001	0.00025	0.050	0.001	0.20		0.005	0.005	0.00003	0.00025	0.00025
	Surfacewater	30/03/2000	SW4	7.99	693	392	77	0.001	0.00025	0.090	0.001	0.07		0.005	0.020	0.00003	0.00025	0.00025
	Surfacewater	28/04/2000	SW2	7.04	142	224	21	0.001	0.00025	0.030	0.007	0.06		0.005	0.020	0.00003	0.005	0.00025
	Surfacewater	28/04/2000	SW3	7.86	471	280	23	0.001	0.00025	0.0050	0.001	0.03		0.005	0.005	0.00003	0.00025	0.00025
	Surfacewater	28/04/2000	SW4	7.84	484	332	29	0.001	0.00025	0.23	0.002	0.05		0.005	0.040	0.00003	0.00025	0.00025
	Surfacewater	23/05/2000	SW2	7.67	183	160	12	0.001	0.00025	0.14	0.004	0.14		0.005	0.060	0.00003	0.00025	0.00025
	Surfacewater	23/05/2000	SW4	7.19	1,680	1,180	433	0.001	0.02000	1.9	0.001	1.12		0.005	1.480	0.00003	0.00025	0.00025
	Surfacewater	23/05/2000	SW6	7.14	374	264	13	0.001	0.00025	0.0050	0.001	0.83		0.005	0.005	0.00003	0.00025	0.00025
	Surfacewater	6/06/2000	SW4	7.1						0.30								
	Surfacewater	13/06/2000	SW4	7.67	846	524	83	0.001	0.00025	0.64	0.001	0.14		0.005	0.120	0.00003	0.00025	0.00025
	Surfacewater	19/07/2000	SW3	7.85	647	300	26	0.001	0.00025	0.0050	0.001	0.42		0.005	0.020	0.00003	0.00025	0.00025
	Surfacewater	19/07/2000	SW4	7.63	865	420	94	0.001	0.00025	0.38	0.001	0.48		0.005	0.050	0.00003	0.00025	0.00025
	Surfacewater	13/11/2000	SW2	7.01	309	260	78	0.005	0.00025	0.52	0.005	0.12		0.005	0.120	0.00005	0.025	0.00025
	Surfacewater	13/11/2000	SW3	7.83	829	472	49	0.005	0.00025	0.010	0.005	0.09		0.005	0.005	0.00005	0.005	0.00025
	Surfacewater	13/11/2000	SW4	7.64	649	392	56	0.005	0.00025	0.13	0.005	0.09		0.005	0.060	0.00005	0.01	0.00025
	Surfacewater	28/11/2000	SW2	6.92	102	116	12	0.005	0.00025	0.060	0.005	0.02		0.005	0.010		0.04	0.00025
	Surfacewater	28/11/2000	SW3	7.72	472	276	45	0.005	0.00025	0.15	0.005	0.20		0.005	0.240		0.01	0.00025
	Surfacewater	28/11/2000	SW4	7.71	503	300	34	0.005	0.00025	0.040	0.005	0.03		0.005	0.030		0.00025	0.00025
	Surfacewater	18/12/2000	SW2	7.77	200	212	32	0.005	0.00800	0.080	0.005	0.12		0.005	0.070	0.00005	0.00025	0.00025
	Surfacewater	18/12/2000	SW3	7.92	783	480	50	0.005	0.00900	0.27	0.005	0.31		0.005	0.300	0.00005	0.00025	0.00025
	Surfacewater	18/12/2000	SW4	7.92	785	488	58	0.005	0.00500	0.25	0.005	0.27		0.005	0.290	0.00005	0.00025	0.00025
	Surfacewater	21/02/2001	SW2	7.4	209	232	58	0.005	0.00025	0.27	0.005	0.26		0.005	0.200	0.00005	0.025	0.00025
	Surfacewater	21/02/2001	SW3	7.47	772	556	143	0.005	0.01300	1.4	0.005	1.52		0.005	1.380	0.00005	0.13	0.00025
	Surfacewater	21/02/2001	SW4	7.67	999	688	200	0.005	0.00025	0.24	0.005	0.35		0.01	0.150	0.00005	0.04	0.00025
	Surfacewater	30/05/2001	SW6	7.15	908	520	60	0.005	0.00025	0.0050	0.005	1.07		0.005	0.010	0.00005	0.00025	0.00025
	Surfacewater	4/07/2001	SW6	7.2	800	420	30	0.005	0.00025	0.0050	0.005	0.80		0.005	0.010	0.00005	0.00025	0.00025
	Surfacewater	20/02/2002	SW2	6.24	679	412	190	0.005	0.00025	0.77	0.005	0.70		0.005	0.350	0.00005	0.00025	0.00025
	Surfacewater	20/02/2002	SW4															
	Surfacewater	29/05/2002	SW6	7.79	1,020	660	104	0.005	0.00025	0.0050	0.005	1.42		0.005	0.010	0.00005	0.005	0.00025
	Surfacewater	4/03/2003	SW2	6.98	299	148	11	0.005	0.00025	0.010	0.005	0.03	0.005		0.010	0.00005	0.0005	0.00050
	Surfacewater	4/03/2003	SW3	7.68	540	224	30	0.005	0.00025	0.0050	0.005	0.04	0.005		0.005	0.00005	0.0005	0.00050
	Surfacewater	4/03/2003	SW4	7.56	590	280	63	0.005	0.00025	0.18	0.005	0.04	0.0005		0.120	0.00005	0.0005	0.00050
	Surfacewater	16/12/2003	SW3	7.75		288	12	0.005	0.00500	0.0050	0.005	N/R	0.005	0.005	0.005	0.00005		0.00200

	Surfacewater	16/12/2003	SW4	6.89		308	57	0.005	0.00500	0.32	0.020	N/R	0.005	0.005	0.240	0.00005		0.01100
EB0500095002	Surfacewater	6/01/2005	SW2	6.93	163	216	6	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	*<0.004*
EB0500765004	Surfacewater	28/01/2005	SW6	7.59	312	197	30	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	*<0.004*
EB0500765003	Surfacewater	28/01/2005	SW5	4.91	2120	1670	928	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	*<0.004*
EB0500765002	Surfacewater	28/01/2005	SW4	7.97	299	185	23	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	*<0.004*
EB0500765001	Surfacewater	28/01/2005	SW3	7.8	312	203	27	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	N/R	*<0.004*
	Surfacewater	19/01/2006	SW2	6.38	N/R	2,200	35	0.012	0.00080	0.25	0.075	N/R	0.0020	0.01	0.095	0.00005	N/R	0.00200
	Surfacewater	19/01/2006	SW5	4.42	N/R	348	1,560	0.004	0.28200	66	0.013	N/R	0.0010	0.01	32.500	0.00005	N/R	0.00200
	Surfacewater	31/01/2006	SW3	6.82	N/R	122	3.0	0.001	0.00005	0.0080	0.002	N/R	0.0005	0.01	0.014	0.00005	N/R	0.00200
	Surfacewater	31/01/2006	SW5	4.27	N/R	866	431	0.001	0.07090	18	0.008	N/R	0.0005	0.01	8.320	0.00005	N/R	0.00200
	Surfacewater	1/02/2006	SW2	6.89	N/R	408	24	0.009	0.00040	0.12	0.030	N/R	0.0010	0.01	0.120	0.00005	N/R	0.00200
	Surfacewater	1/02/2006	SW4	6.61	N/R	160	11	0.002	0.00120	0.069	0.005	N/R	0.0005	0.01	0.016	0.00005	N/R	0.00200
	Surfacewater	4/04/2006	SW5		N/R	N/R	346	0.001	0.02570	2.2	0.004	N/R	0.0005	0.01	3.080	0.00005	N/R	0.00200
	Surfacewater	25/04/2006	SW5		N/R	N/R	136	0.015	0.00520	1.1	0.117	N/R	0.0020	0.01	0.685	0.00005	N/R	0.03200
	Surfacewater	25/04/2006	SW6		N/R	N/R	162	0.003	0.00100	0.074	0.021	N/R	0.0005	0.01	0.573	0.00005	N/R	
	Surfacewater	30/01/2008	SW2	6.34	N/R	732	18	0.001	0.00070	0.021	0.011	N/R	0.0005	0.01	0.003	0.00090	N/R	0.00200
	Surfacewater	13/02/2008	SW4	7.10	N/R	157	14	0.001	0.00020	0.013	0.001	N/R	0.0005	0.01	0.011	0.00005	N/R	0.00200
	Surfacewater	13/02/2008	SW5	5.06	N/R	1,370	580	0.001	0.07790	17	0.013	N/R	0.0005	0.01	5.540	0.00005	N/R	0.00200
	Surfacewater	22/07/2008	SW3	6.80	N/R	336	37	0.001	0.00060	0.16	0.001	N/R	0.0005	0.01	0.076	0.00005	N/R	0.00200
	Surfacewater	22/07/2008	SW5	4.36	N/R	510	236	0.001	0.02960	10	0.008	N/R	0.0005	0.01	4.790	0.00005	N/R	0.00200
	Surfacewater	22/07/2008	SW6	7.43	N/R	501	23	0.003	0.00040	0.086	0.005	N/R	0.0010	0.01	0.039	0.00005	N/R	0.00200
	Surfacewater	11/11/2008	SW3	6.66	N/R	290	37	0.001	0.03460	0.0005	0.001	N/R	0.0005	0.01	0.003	0.00005	N/R	0.00200
	Surfacewater	28/01/2009	SW2	7.09	N/R	192	10	0.003	0.00350	0.073	0.017	N/R	0.0005	0.01	0.044	0.00005	N/R	0.00200
	Surfacewater	28/01/2009	SW3	7.44	N/R	176	11	0.001	0.00080	0.0070	0.001	N/R	0.0005	0.01	0.012	0.00005	N/R	0.00200
	Surfacewater	28/01/2009	SW4	7.46	N/R	76	4.0	0.002	0.00100	0.025	0.010	N/R	0.0005	0.01	0.042	0.00005	N/R	0.00200
	Surfacewater	28/01/2009	SW5	5.34	N/R	772	415	0.025	0.03620	11	0.173	N/R	0.0010	0.01	5.360	0.00005	N/R	0.00200
	Surfacewater	28/01/2009	SW6	7.11	N/R	105	47	0.005	0.00360	0.31	0.021	N/R	0.0005	0.01	0.292	0.00005	N/R	0.00200
EB1023249002	Surfacewater	14/12/2010	SW2	7.24	93	N/R	8	0.001	0.00005	0.01	0.003	N/R	0.0005	0.01	0.008	0.00005	N/R	0.00200
EB1102283005	Surfacewater	9/02/2011	SW5	3.18	501	N/R	149	0.003	0.0028	3.25	0.004	N/R	*<0.001*	*<0.01*	0.511	*<0.0001*	N/R	*<0.004*
EB1102283004	Surfacewater	9/02/2011	SW4	7.99	768	N/R	41	*<0.001*	0.0002	0.005	*<0.001*	N/R	*<0.001*	*<0.01*	0.031	*<0.0001*	N/R	*<0.004*
EB1102283003	Surfacewater	9/02/2011	SW3	8.16	845	N/R	45	*<0.001*	0.0002	0.004	0.001	N/R	0.001	*<0.01*	0.012	*<0.0001*	N/R	*<0.004*
EB1102283002	Surfacewater	9/02/2011	SW2	7.47	130	N/R	10	0.002	0.0006	0.025	0.008	N/R	*<0.001*	*<0.01*	0.029	*<0.0001*	N/R	*<0.004*
EB1105579006	Surfacewater	22/03/2011	SW6	6.4	496	N/R	182	0.001	0.0162	0.72	0.001	N/R	0.0005	0.01	1.5	0.00005	N/R	0.00200
EB1105579005	Surfacewater	22/03/2011	SW5	5.88	299	N/R	106	0.002	0.0054	1	0.007	N/R	0.0005	0.01	0.657	0.00005	N/R	0.00200
EB1105579004	Surfacewater	22/03/2011	SW4	7.97	857	N/R	39	0.001	0.0004	0.008	0.001	N/R	0.0005	0.01	0.011	0.00005	N/R	0.00200
EB1105579003	Surfacewater	22/03/2011	SW3	7.86	861	N/R	38	0.001	0.0007	0.009	0.001	N/R	0.0005	0.01	0.022	0.00005	N/R	0.00200
EB1105579002	Surfacewater	22/03/2011	SW2	6.79	95	N/R	12	0.001	0.0004	0.014	0.004	N/R	0.0005	0.01	0.02	0.00005	N/R	0.00200
EB1126017006	Surfacewater	5/04/2011	SW6	7.46	177	N/R	15	0.003	0.0006	0.203	0.003	N/R	*<0.001*	*<0.01*	0.08	*<0.0001*	N/R	*<0.0001*
EB1126017005	Surfacewater	5/04/2011	SW5	3.19	603	N/R	199	0.003	0.0031	5.83	0.003	N/R	*<0.001*	*<0.01*	0.841	*<0.0001*	N/R	*<0.0001*
EB1126017004	Surfacewater	5/04/2011	SW4	7.88	1160	N/R	67	0.001	*<0.0001*	0.027	0.002	N/R	0.001	*<0.01*	0.013	*<0.0001*	N/R	*<0.0001*
EB1126017002	Surfacewater	5/04/2011	SW2	6.86	122	N/R	12	0.002	0.0002	0.168	0.01	N/R	*<0.001*	*<0.01*	0.046	*<0.0001*	N/R	*<0.0001*
EB1106698006	Surfacewater	5/04/2011	SW6	7.18	423	N/R	150	0.001	0.005	0.095	0.001	N/R	0.0005	0.01	0.394	0.00005	N/R	0.00200
EB1106698005	Surfacewater	5/04/2011	SW5	2.89	801	N/R	181	0.002	0.0028	4.22	0.008	N/R	0.0005	0.01	0.591	0.00005	N/R	0.00200
EB1106698004	Surfacewater	5/04/2011	SW4	8.29	834	N/R	39	0.001	0.00005	0.003	0.013	N/R	0.0005	0.01	0.003	0.00005	N/R	0.00200
EB1106698003	Surfacewater	5/04/2011	SW3	8.23	842	N/R	37	0.001	0.0002	0.003	0.002	N/R	0.0005	0.01	0.032	0.00005	N/R	0.00200
EB1106698002	Surfacewater	5/04/2011	SW2	7.39	94	N/R	9	0.001	0.00005	0.007	0.005	N/R	0.0005	0.01	0.018	0.00005	N/R	0.00200
EB1126017003	Surfacewater	5/12/2011	SW3	7.8	1410	N/R	87	*<0.001*	*<0.0001*	0.007	0.001	N/R	0.002	*<0.01*	0.012	*<0.0001*	N/R	*<0.0001*
EB1200146008	Surfacewater	29/12/2011	SW6	6.77	626	N/R	247	0.002	0.0171	0.987	0.007	N/R	*<0.001*	*<0.01*	1.68	*<0.0001*	N/R	N/R
EB1200146007	Surfacewater	29/12/2011	SW6	4.1	68	N/R	15	*<0.001*	0.0003	0.276	0.003	N/R	*<0.001*	*<0.01*	0.063	*<0.0001*	N/R	N/R
EB1200146005	Surfacewater	29/12/2011	SW5	4.32	386	N/R	144	*<0.001*	0.0079	1.77	0.006	N/R	*<0.001*	*<0.01*	1.16	*<0.0001*	N/R	N/R
EB1200146004	Surfacewater	29/12/2011	SW4	7.93	754	N/R	*<1*	*<0.001*	*<0.0001*	0.014	*<0.001*	N/R	0.001	*<0.01*	*<0.005*	*<0.0001*	N/R	N/R
EB1200146003	Surfacewater	29/12/2011	SW3	7.98	895	N/R	15	*<0.001*	0.0006	0.038	0.002	N/R	0.002	*<0.01*	0.065	*<0.0001*	N/R	N/R
EB1200146002	Surfacewater	29/12/2011	SW2	7.18	131	N/R	*<1*	0.001	*<0.0001*	0.03	0.004	N/R	*<0.001*	*<0.01*	0.012	*<0.0001*	N/R	N/R
EB1201163006	Surfacewater	16/01/2012	SW6	7	314	N/R	101	0.004	0.0074	0.712	0.035	N/R	*<0.001*	*<0.01*	0.819	*<0.0001*	N/R	N/R
EB1201163005	Surfacewater	16/01/2012	SW5	5.59	102	N/R	31	0.007	0.0023	1.41	0.11	N/R	*<0.001*	*<0.01*	0.33	*<0.0001*	N/R	N/R
EB1201163004	Surfacewater	16/01/2012	SW4	7.91	537	N/R	44	*<0.001*	0.0001	0.03	0.003	N/R	*<0.001*	*<0.01*	0.028	*<0.0001*	N/R	N/R
EB1201163003	Surfacewater	16/01/2012	SW3	7.87	564	N/R	21	0.001	0.0006	0.063	0.003	N/R	*<0.001*	*<0.01*	0.066	*<0.0001*	N/R	N/R
EB1201163002	Surfacewater	16/01/2012	SW2	6.97	83	N/R	*<1*	*<0.001*	0.0009	0.012	0.003	N/R	*<0.001*	*<0.01*	0.02	*<0.0001*	N/R	N/R
EB1101172006	Surfacewater	20/01/2012	SW6	7.47	360	N/R	127	0.001	0.128	0.3	0.003	N/R	*<0.001*	*<0.01*	0.627	*<0.0001*	N/R	*<0.004*
EB1101172005	Surfacewater	20/01/2012	SW5	6.23	210	N/R	76	0.002	0.0062	0.502	0.006	N/R	*<0.001*	*<0.01*	0.325	*<0.0001*	N/R	*<0.004*
EB1101172004	Surfacewater	20/01/2012	SW4	8.14	545	N/R	31	*<0.001*	0.0015	0.007	*<0.001*	N/R	*<0.001*	*<0.01*	0.023	*<0.0001*	N/R	*<0.004*
EB1101172003	Surfacewater	20/01/2012	SW3	8.22	626	N/R	35	*<0.001*	0.0005	0.009	*<0.001*	N/R	*<0.001*	*<0.01*	0.019	*<0.0001*	N/R	*<0.004*
EB1101172002	Surfacewater	20/01/2012	SW2	7.31	97	N/R	12	0.002	0.0005	0.076	0.012	N/R	*<0.001*	*<0.01*	0.048	*<0.0001*	N/R	*<0.004*
EB1202421006	Surfacewater	26/01/2012	SW6	7.28	355	N/R	56	0.001	0.0053	0.246	0.004	N/R	*<0.001*	*<0.01*	0.473	*<0.0001*	N/R	N/R
EB1202421005	Surfacewater	26/01/2012	SW5	5.51	72	N/R	19	0.008	0.0017	0.982	0.12	N/R	*<0.001*	*<0.01*	0.218	*<0.0001*	N/R	N/R

EB1202421004	Surfacewater	26/01/2012	SW4	8.11	801	N/R	34	*<0.001*	*<0.0001*	0.006	*<0.001*	N/R	0.001	*<0.01*	*<0.005*	*<0.0001*	N/R	N/R
EB1202421003	Surfacewater	26/01/2012	SW3	8	841	N/R	35	*<0.001*	*<0.0001*	0.005	*<0.001*	N/R	0.001	*<0.01*	0.006	*<0.0001*	N/R	N/R
EB1202421002	Surfacewater	26/01/2012	SW2	7.52	105	N/R	7	0.002	*<0.0001*	0.012	0.003	N/R	*<0.001*	*<0.01*	0.009	*<0.0001*	N/R	N/R
EB1203259006	Surfacewater	4/02/2012	SW6	7.32	268	N/R	83	0.004	0.0041	0.783	0.035	N/R	0.001	*<0.01*	0.452	*<0.0001*	N/R	*<0.004*
EB1203259005	Surfacewater	4/02/2012	SW5	6.95	266	N/R	93	0.002	0.0021	0.528	0.012	N/R	0.001	*<0.01*	0.29	*<0.0001*	N/R	*<0.004*
EB1203259004	Surfacewater	4/02/2012	SW4	7.81	257	N/R	14	*<0.001*	*<0.0001*	0.021	0.006	N/R	*<0.001*	*<0.01*	0.017	*<0.0001*	N/R	*<0.004*
EB1203259003	Surfacewater	4/02/2012	SW3	7.76	256	N/R	16	0.001	0.0002	0.04	0.006	N/R	*<0.001*	*<0.01*	0.033	*<0.0001*	N/R	*<0.004*
EB1203259002	Surfacewater	4/02/2012	SW2	7.22	69	N/R	6	*<0.001*	*<0.0001*	0.019	0.007	N/R	*<0.001*	*<0.01*	0.029	*<0.0001*	N/R	*<0.004*
EB1208629006	Surfacewater	27/03/2012	SW6	7.95	444	N/R	117	0.001	0.0009	0.075	0.064	N/R	*<0.001*	*<0.01*	0.067	*<0.0001*	N/R	N/R
EB1208629005	Surfacewater	27/03/2012	SW5	6.83	364	N/R	121	0.001	0.0023	0.439	0.163	N/R	*<0.001*	*<0.01*	0.31	*<0.0001*	N/R	N/R
EB1208629004	Surfacewater	27/03/2012	SW4	8.21	934	N/R	53	*<0.001*	*<0.0001*	0.002	0.019	N/R	0.001	*<0.01*	*<0.005*	*<0.0001*	N/R	N/R
EB1208629003	Surfacewater	27/03/2012	SW3	8.17	996	N/R	266	*<0.001*	*<0.0001*	0.002	0.002	N/R	0.001	*<0.01*	*<0.005*	*<0.0001*	N/R	N/R
EB1208629002	Surfacewater	27/03/2012	SW2	7.31	95	N/R	*<1*	0.001	*<0.0001*	0.008	0.021	N/R	*<0.001*	*<0.01*	0.018	*<0.0001*	N/R	N/R
ES1213314006	Surfacewater	26/05/2012	SW6	7.35	260	N/R	40	0.001	0.00090	0.1520	0.004	N/R	*<0.001*	*<0.01*	0.083	*<0.0001*	N/R	*<0.004*
ES1213314005	Surfacewater	26/05/2012	SW5	6.54	46	N/R	11	0.003	0.00070	0.7310	0.059	N/R	*<0.001*	*<0.01*	0.105	*<0.0001*	N/R	*<0.004*
ES1213314004	Surfacewater	26/05/2012	SW4	7.98	1,500	N/R	96	*<0.001*	*<0.0001*	0.0160	0.002	N/R	0.002	*<0.01*	*<0.005*	*<0.0001*	N/R	*<0.004*
ES1213314003	Surfacewater	26/05/2012	SW3	8.11	1,690	N/R	106	*<0.001*	*<0.0001*	0.0030	0.018	N/R	0.002	*<0.01*	*<0.005*	*<0.0001*	N/R	*<0.004*
ES1213314002	Surfacewater	26/05/2012	SW2	7.37	145	N/R	22	0.007	*<0.0001*	0.0850	0.032	N/R	*<0.001*	*<0.01*	0.072	*<0.0001*	N/R	*<0.004*
EB1218117006	Surfacewater	10/07/2012	SW6	7.84	166	N/R	*<1*	0.004	0.0004	0.097	0.005	N/R	0.001	*<0.01*	0.1	*<0.0001*	N/R	N/R
EB1218117005	Surfacewater	10/07/2012	SW5	5.17	66	N/R	21	0.008	0.0014	1.04	0.117	N/R	0.001	*<0.01*	0.208	*<0.0001*	N/R	N/R
EB1218117004	Surfacewater	10/07/2012	SW4	8.21	1880	N/R	129	*<0.001*	*<0.0001*	0.023	*<0.001*	N/R	0.002	*<0.01*	0.006	*<0.0001*	N/R	N/R
EB1218117003	Surfacewater	10/07/2012	SW3	8.17	1900	N/R	135	*<0.001*	0.0001	0.036	0.002	N/R	0.002	*<0.01*	0.014	*<0.0001*	N/R	N/R
EB1218117002	Surfacewater	10/07/2012	SW2	7.05	110	N/R	*<1*	*<0.001*	*<0.0001*	0.006	0.063	N/R	*<0.001*	*<0.01*	0.022	*<0.0001*	N/R	N/R
EB1218597001	Surfacewater	17/07/2012	SW5	7.33	115	N/R	28	*<0.001*	*<0.0001*	0.001	0.004	N/R	0.069	*<0.01*	0.026	*<0.0001*	N/R	N/R
ES1301849006	Surfacewater	24/01/2013	SW6	5.5	475	328	182	0.001	0.02330	3.4100	0.008	N/R	*<0.001*	*<0.01*	1.660	*<0.0001*	N/R	*<0.004*
ES1301849005	Surfacewater	24/01/2013	SW5	5.18	40	89	5	0.002	0.00040	0.3450	0.030	N/R	*<0.001*	*<0.01*	0.056	*<0.0001*	N/R	*<0.004*
ES1301849004	Surfacewater	24/01/2013	SW4	6.97	370	250	75	0.001	0.00740	0.9560	0.011	N/R	*<0.001*	*<0.01*	0.567	*<0.0001*	N/R	*<0.004*
ES1301849003	Surfacewater	24/01/2013	SW3	6.99	374	256	80	0.002	0.00730	0.9330	0.018	N/R	*<0.001*	*<0.01*	0.550	*<0.0001*	N/R	*<0.004*
ES1301849002	Surfacewater	24/01/2013	SW2	6.31	209	209	14	0.003	0.00030	0.1250	0.019	N/R	*<0.001*	*<0.01*	0.078	*<0.0001*	N/R	*<0.004*
ES1301849001	Surfacewater	24/01/2013	SW1	6.37	123.00	100.00	13.00	*<0.001*	*<0.0001*	0.00400	0.0020	N/R	0.003	*<0.01*	0.01	*<0.0001*	N/R	*<0.004*
ES1308860006	Surfacewater	12/04/2013	SW6	5.11	578	312	237	*<0.001*	0.0432	7.02	0.007	N/R	*<0.001*	*<0.01*	2.66	*<0.0001*	N/R	*<0.004*
ES1308860005	Surfacewater	12/04/2013	SW5	5.45	33	14	9	0.003	0.0004	0.359	0.047	N/R	*<0.001*	*<0.01*	0.052	*<0.0001*	N/R	*<0.004*
ES1308860004	Surfacewater	12/04/2013	SW4	7.92	327	145	34	0.002	0.0022	0.416	0.014	N/R	*<0.001*	*<0.01*	0.186	*<0.0001*	N/R	*<0.004*
ES1308860003	Surfacewater	12/04/2013	SW3	7.7	234	172	15	*<0.001*	0.0002	0.031	0.02	N/R	*<0.001*	*<0.01*	0.081	*<0.0001*	N/R	*<0.004*
ES1308860002	Surfacewater	12/04/2013	SW2	7.21	109	183	19	0.002	0.0003	0.196	0.013	N/R	*<0.001*	*<0.01*	0.091	*<0.0001*	N/R	*<0.004*
ES1309329010	Surfacewater	18/04/2013	SW6	6.68	564	450	270	*<0.001*	0.0281	0.739	0.044	N/R	*<0.001*	*<0.01*	1.56	*<0.0001*	N/R	*<0.004*
ES1309329006	Surfacewater	18/04/2013	SW6	4.89	624	494	307	*<0.001*	0.069	8.56	0.002	N/R	*<0.001*	*<0.01*	3.68	*<0.0001*	N/R	*<0.004*
ES1309329005	Surfacewater	18/04/2013	SW5	5.01	521	400	254	*<0.001*	0.0507	5.99	0.078	N/R	*<0.001*	*<0.01*	2.14	*<0.0001*	N/R	*<0.004*
ES1309329004	Surfacewater	18/04/2013	SW4	2.63	7400	7450	4420	0.022	0.505	165	0.348	N/R	0.008	0.11	66.3	*<0.0001*	N/R	*<0.004*
ES1309329003	Surfacewater	18/04/2013	SW3	8.17	4700	3320	1290	*<0.001*	0.0078	2.64	0.005	N/R	0.005	*<0.01*	0.694	*<0.0001*	N/R	*<0.004*
ES1309329002	Surfacewater	18/04/2013	SW2	4.52	3370	3710	2680	0.014	0.241	27	0.2	N/R	0.002	0.1	70.5	*<0.0001*	N/R	*<0.004*
ES1309329001	Surfacewater	18/04/2013	SW1	4.46	3650	4070	2900	0.014	0.252	29.1	0.079	N/R	0.002	0.08	55.5	*<0.0001*	N/R	*<0.004*
EB1401860006	Surfacewater	28/01/2014	SW6	4.16	664	492	269	0.001	0.054	9.57	0.008	N/R	*<0.001*	*<0.01*	3.24	*<0.0001*	N/R	*<0.004*
EB1401860005	Surfacewater	28/01/2014	SW5	5.08	60	47	15	0.005	0.0009	0.598	0.067	N/R	*<0.001*	*<0.01*	0.116	*<0.0001*	N/R	*<0.004*
EB1401860004	Surfacewater	28/01/2014	SW4	8.16	540	342	56	*<0.001*	0.0002	0.045	*<0.001*	N/R	*<0.001*	*<0.01*	0.021	*<0.0001*	N/R	*<0.004*
EB1401860003	Surfacewater	28/01/2014	SW3	8.27	751	479	77	*<0.001*	0.0014	0.212	0.002	N/R	0.001	*<0.01*	0.094	*<0.0001*	N/R	*<0.004*
EB1401860002	Surfacewater	28/01/2014	SW2	7.23	155	931	25	0.017	0.0004	0.368	0.073	N/R	*<0.001*	*<0.01*	0.187	*<0.0001*	N/R	*<0.004*
ES1403875006	Surfacewater	20/02/2014	SW6	4.7	751	496	312	0.001	0.0604	9.62	0.006	N/R	*<0.001*	*<0.01*	3.83	*<0.0001*	N/R	*<0.004*
ES1403875005	Surfacewater	20/02/2014	SW5	6.94	125	235	37	0.004	0.0006	0.232	0.045	N/R	*<0.001*	*<0.01*	0.101	*<0.0001*	N/R	*<0.004*
ES1403875004	Surfacewater	20/02/2014	SW4	7.81	380	230	31	*<0.001*	0.0007	0.167	0.01	N/R	*<0.001*	*<0.01*	0.054	*<0.0001*	N/R	*<0.004*
ES1403875003	Surfacewater	20/02/2014	SW3	7.5	243	196	18	*<0.001*	*<0.0001*	0.014	0.01	N/R	*<0.001*	*<0.01*	0.02	*<0.0001*	N/R	*<0.004*
ES1403875002	Surfacewater	20/02/2014	SW2	7.39	160	454	18	0.012	0.0002	0.114	0.034	N/R	*<0.001*	*<0.01*	0.063	*<0.0001*	N/R	*<0.004*
EB1407228006	Surfacewater	24/03/2014	SW6	5.04	837	709	370	0.001	0.0692	11.5	0.004	N/R	*<0.001*	*<0.01*	4.91	0.0002	N/R	*<0.004*
EB1407228005	Surfacewater	24/03/2014	SW5	7.1	158	239	47	0.001	0.0009	0.144	0.012	N/R	*<0.001*	*<0.01*	0.147	*<0.0001*	N/R	*<0.004*
EB1407228004	Surfacewater	24/03/2014	SW4	7.99	914	549	72	*<0.001*	*<0.0001*	*<0.001*	*<0.001*	N/R	*<0.001*	*<0.01*	*<0.005*	*<0.0001*	N/R	*<0.004*
EB1407228003	Surfacewater	24/03/2014	SW3	7.97	880	524	73	0.001	*<0.0001*	0.014	0.003	N/R	*<0.001*	*<0.01*	0.015	*<0.0001*	N/R	*<0.004*
EB1407228002	Surfacewater	24/03/2014	SW2	7.61	210	882	33	0.017	0.0004	0.346	0.064	N/R	*<0.001*	*<0.01*	0.156	*<0.0001*	N/R	*<0.004*
EB1511502006	Surfacewater	22/01/2015	SW6	7.24	114	205	16	0.002	0.0009	0.384	0.01	N/R	*<0.001*	*<0.01*	0.092	*<0.0001*	N/R	*<0.004*
EB1511502005	Surfacewater	22/01/2015	SW5	7.58	231	187	57	0.006	0.0016	0.413	0.036	N/R	*<0.001*	*<0.01*	0.173	*<0.0001*	N/R	*<0.004*
EB1511502004	Surfacewater	22/01/2015	SW4	7.75	158	220	4	0.001	0.0001	0.032	0.006	N/R	*<0.001*	*<0.01*	0.03	*<0.0001*	N/R	*<0.004*
EB1511502003	Surfacewater	22/01/2015	SW3	7.77	191	225	7	0.001	*<0.0001*	0.012	0.006	N/R	*<0.001*	*<0.01*	0.03	*<0.0001*	N/R	*<0.004*
EB1511502002	Surfacewater	22/01/2015	SW2	7.6	167	169	4	0.004	0.0001	0.034	0.006	N/R	*<0.001*	*<0.01*	0.053	*<0.0001*	N/R	*<0.004*
EB1511555006	Surfacewater	27/01/2015	SW6	5.1	948	663	451	0.001	0.0724	11.5	0.005	N/R	*<0.001*	*<0.01*	5.8	*<0.0001*	N/R	*<0.004*
EB1511555005	Surfacewater	27/01/2015	SW5	7.53	300	209	84	0.002	0.0024	0.195	0.034	N/R	*<0.001*	*<0.01*	0.219	*<0.0001*	N/R	*<0.004*
EB1511555004	Surfacewater	27/01/2015	SW4	8.26	342	212	25	*<0.001*	0.0001	0.032	0.054	N/R	*<0.001*	*<0.01*	0.031	*<0.0001*	N/R	*<0.004*

EB1511555003	Surfacewater	27/01/2015	SW3	8.35	383	224	24	***<0.001***	0.0002	0.021	0.002	N/R	***<0.001***	***<0.01***	0.016	***<0.0001***	N/R	***<0.004***
EB1511555002	Surfacewater	27/01/2015	SW2	7.42	119	131	10	0.002	***<0.0001***	0.054	0.029	N/R	***<0.001***	***<0.01***	0.022	***<0.0001***	N/R	***<0.004***
EB1611743002	Surfacewater	04/05/2016	SW2	**6.79**	**58**	**75**	<1	**0.002**	**0.0001**	**0.025**	**0.106**	N/R	<0.001	<0.01	**0.042**	<0.0001	N/R	<0.004
EB1611743003	Surfacewater	04/05/2016	SW3	**7.06**	**127**	**190**	**12**	**0.001**	<0.0001	**0.089**	**0.021**	N/R	<0.001	<0.01	**0.04**	<0.0001	N/R	<0.004
EB1611743004	Surfacewater	04/05/2016	SW5	**7.29**	**658**	**419**	**259**	**0.003**	**0.0013**	**0.192**	**0.02**	N/R	<0.001	<0.01	**0.078**	<0.0001	N/R	<0.004
EB1611743005	Surfacewater	04/05/2016	SW6	**6.41**	**220**	**160**	**72**	**0.00**	**0.00**	**1.09**	**0.01**	N/R	<0.001	<0.01	**0.248**	<0.0001	N/R	<0.004
EB1603352002	Surfacewater	06/02/2016	SW2	**7.2**	**81**	**102**	**8**	**0.00**	<0.0001	**0.041**	**0.018**	N/R	<0.001	<0.01	**0.038**	<0.0001	N/R	<0.004
EB1603352003	Surfacewater	06/02/2016	SW3	**7.54**	**98**	**223**	**28**	<0.001	**0.00**	**0.762**	**0.003**	N/R	<0.001	<0.01	**0.3**	<0.0001	N/R	<0.004
EB1603352004	Surfacewater	06/02/2016	SW4	**7.97**	**249**	**211**	**22**	<0.001	**0.00**	**0.232**	**0.002**	N/R	<0.001	<0.01	**0.058**	<0.0001	N/R	<0.004
EB1603352005	Surfacewater	06/02/2016	SW5	**7.39**	**346**	**219**	**111**	**0.01**	**0.00**	**0.348**	**0.045**	N/R	<0.001	<0.01	**0.224**	<0.0001	N/R	<0.004
EB1603352007	Surfacewater	06/02/2016	SW6	**4.83**	**980**	**1250**	**454**	**0.00**	**0.10**	**21.9**	**0.01**	N/R	<0.001	<0.01	**8.93**	<0.0001	N/R	<0.004
ES1605807002	Surfacewater	13/03/2016	SW2	**7.84**	**149**	**173**	**5**	**0.00**	<0.0001	**0.061**	**0.014**	N/R	<0.001	<0.01	**0.029**	<0.0001	N/R	<0.004
ES1605807003	Surfacewater	13/03/2016	SW3	**7.77**	**481**	**241**	**25**	<0.001	**0.00**	**0.04**	**0.004**	N/R	<0.001	<0.01	**0.011**	<0.0001	N/R	<0.004
ES1605807004	Surfacewater	13/03/2016	SW5	**6.95**	**595**	**454**	**134**	<0.001	**0.00**	**0.162**	**0.042**	N/R	<0.001	<0.01	**0.432**	<0.0001	N/R	<0.004
ET1600210001	Surfacewater	16/07/2016	SW1	**6.59**	**70**	**51**	**8**	<0.001	<0.0001	**0.008**	**0.069**	N/R	<0.001	<0.01	**0.017**	<0.0001	N/R	<0.004
ET1600210002	Surfacewater	16/07/2016	SW2	**6.92**	**87**	**75**	**14**	**0.00**	**0.00**	**0.077**	**0.011**	N/R	<0.001	<0.01	**0.037**	<0.0001	N/R	<0.004
ET1600210003	Surfacewater	16/07/2016	SW3	**7.17**	**290**	**210**	**65**	<0.001	**0.01**	**1.7**	**0.005**	N/R	<0.001	<0.01	**0.745**	<0.0001	N/R	<0.004
ET1600210004	Surfacewater	16/07/2016	SW5	**6.83**	**91**	**62**	**28**	**0.00**	**0.00**	**0.187**	**0.11**	N/R	<0.001	<0.01	**0.115**	<0.0001	N/R	<0.004
ET1600210005	Surfacewater	16/07/2016	SW6	**3.94**	**661**	**464**	**307**	<0.001	**0.04**	**9.88**	**0.004**	N/R	<0.001	<0.01	**4.41**	<0.0001	N/R	<0.004
ET1600210006	Surfacewater	16/07/2016	SW4	**7.09**	**245**	**169**	**55**	<0.001	**0.00**	**0.952**	**0.091**	N/R	<0.001	<0.01	**0.322**	<0.0001	N/R	<0.004

Appendix D

Response to EHP information request – 6 October 2016.

Northern Resource CONSULTANTS

DATE: 6 OCTOBER 2016
OUR REF: 16_115

JOHN RAINS
DEPARTMENT OF ENVIRONMENT AND HERITAGE PROTECTION
445 FLINDERS STREET
TOWNSVILLE CITY QLD 4810

RE: RESPONSE TO INFORMATION REQUEST - HIGHWAY REWARD - APPLICATION TO AMEND TEP MAN17020

Dear John,

Thank you for your email received 28 September 2016 regarding the application to amend the Highway Reward TEP. We acknowledge the Department of Environment and Heritage Protection (EHP) requests further information and clarification on items proposed within the revised TEP program, and as such Northern Resource Consultants (NRC) have prepared this letter on behalf of the Mount Windsor Joint Venture (MWJV) in response to the items raised.

1. Further justification on strategy

EHP requested further details on:

"The proposed strategy of treating any water flowing from the site towards SW6. Please detail the pre-treatment process and how the water quality limits will be achieved as a result of the treatment strategy".

As indicated in task 1 of the TEP, the MWJV are committed to installing an interim measure at the Highway reward site by 1 November 2016. The purpose of the interim measure is to minimise the risk of potential impacts at SW6 during the 2016/2017 wet season while further long-term methods are developed and implemented under the TEP.

The MWJV is proposing to treat runoff from the waste rock dump through installing lime rock armouring along the main drain and dosing water with lime to neutralise the pH which will result in a decrease in metal concentrations in solution.

The addition of lime to treat water is a widely used practice within the mining industry to neutralise pH and improve water quality for release and to decrease environmental impacts. When compared with neutral natural waters, acidic water can contain significantly higher concentration of a number of trace elements such as zinc, copper, arsenic and cadmium. Neutralising acidic waters results in precipitation of most of these trace elements including copper. Limestone ($CaCO_3$) is readily soluble and is found in the environment naturally. Its high solubility ensures that it quickly reacts with water upon contact and raises the pH value.

As part of the interim measure under the TEP, the drainage line towards SW6 will be bunded off. It is expected that through this works the water quality limits at SW6 will be achieved, as there should be no potentially contaminated water flowing to this EA monitoring location. Any water present at SW6 will be monitored in accordance with the EA. Given that there will be no drainage towards SW6 should any exceedances continue at this EA monitoring location the

MWJV will investigate potential causes. If required remediation can be undertaken through the removal of potentially contaminated sediments, which may have accumulated at the location from previous drainage from the site towards SW6.

2. Water treatment and catchment

EHP requested further details on:

"How mine affected/acidic water generated on site will be captured. Please provide details of the containment system with respect to a) adequate capacity to prevent overtopping, b) measures to prevent seepage affecting groundwater, c) catchment of the containment system and d) if applicable, consequence category of the containment system or any other requirements".

As part of the interim works, the drainage line which diverts water offsite towards SW6 will be bunded off and water will be directed to the old tailings storage area. This will act as a stilling/evaporative basin to ensure minimal water storage on site while also ensuring that there are no releases off site towards SW6. This bunding will be installed as a temporary measure until further works under the TEP can be carried out. It is expected that the transfer of water to this area will be undertaken for six months and will not exceed a maximum of 24 months.

The containment system will be installed by sealing the channel on the western side to a level of approximately 324.7m AHD (Figure 1). The wall on the eastern side will be breached, resulting in the formation of a large area available for pooling water (Figure 1). Conservative estimates using the 2010 site topography reveal that this will create a storage area of approximately 161.7ML to contain site water (Figure 2) with a maximum surface area of 6.5ha.

The upstream catchment area will also be temporarily diverted into the pit (refer to response below) to minimise the chances of release of mine affected water during construction activities. This will result in a catchment area of approximately 29.54ha to the temporary storage area compared to a 72.23ha catchment that would have drained without pit diversions.

A rainfall-runoff-evaporation model was developed for the temporary storage area using Goldsim software. The historical rainfall record from the area (compiled from SILO data) was run over 115 models with a two-year duration to examine the spill probability. The model shows the water balance of the temporary storage area with a 72.23ha catchment (pit diversions not in place) and a 29.54ha catchment (pit diversions in place). The results are shown in Figure 3 and Figure 4 respectively.

The median of all 115 years of historical data shows that without pit diversions, the volume stored in the temporary storage area should not increase above 40ML except in extreme circumstances (Figure 3). However, with the intended pit diversions in place the median shows that the volume stored will not exceed 20ML and the maximum volume is 125ML (Figure 4).

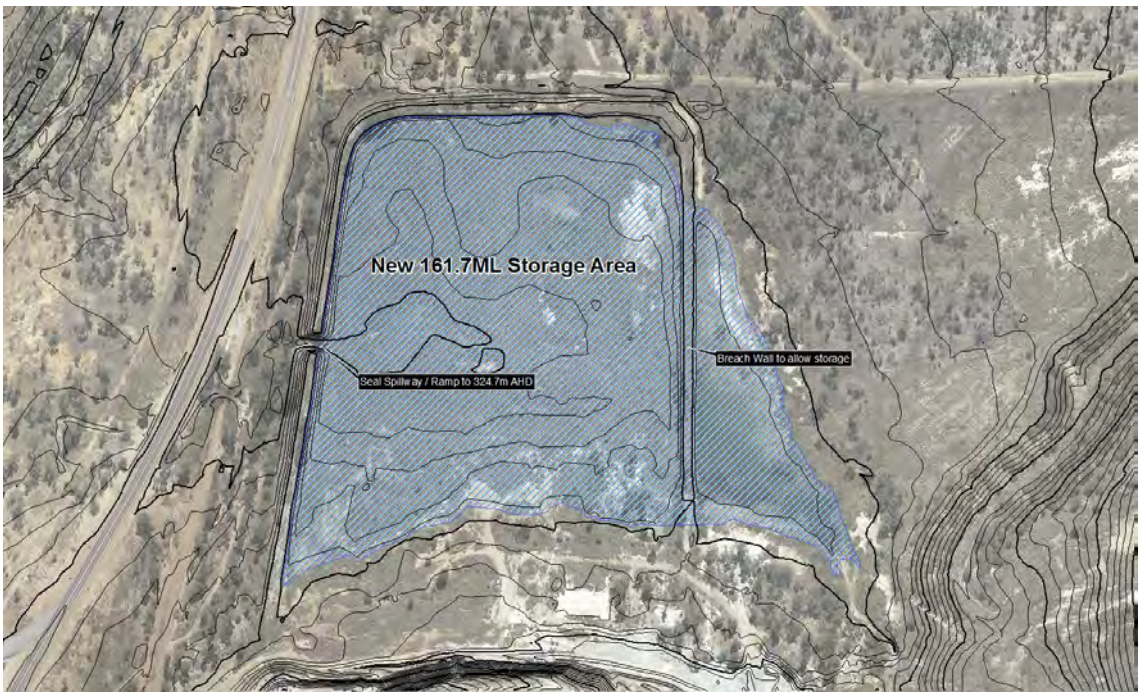


Figure 1: Schematic of proposed earthworks

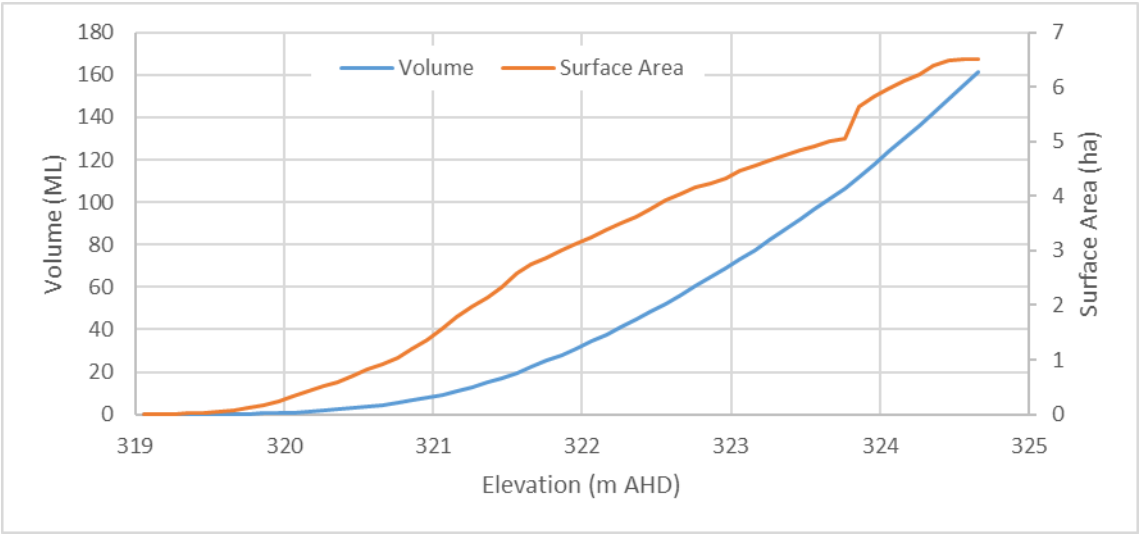


Figure 2: Stage-storage-surface area curve for the temporary water storage

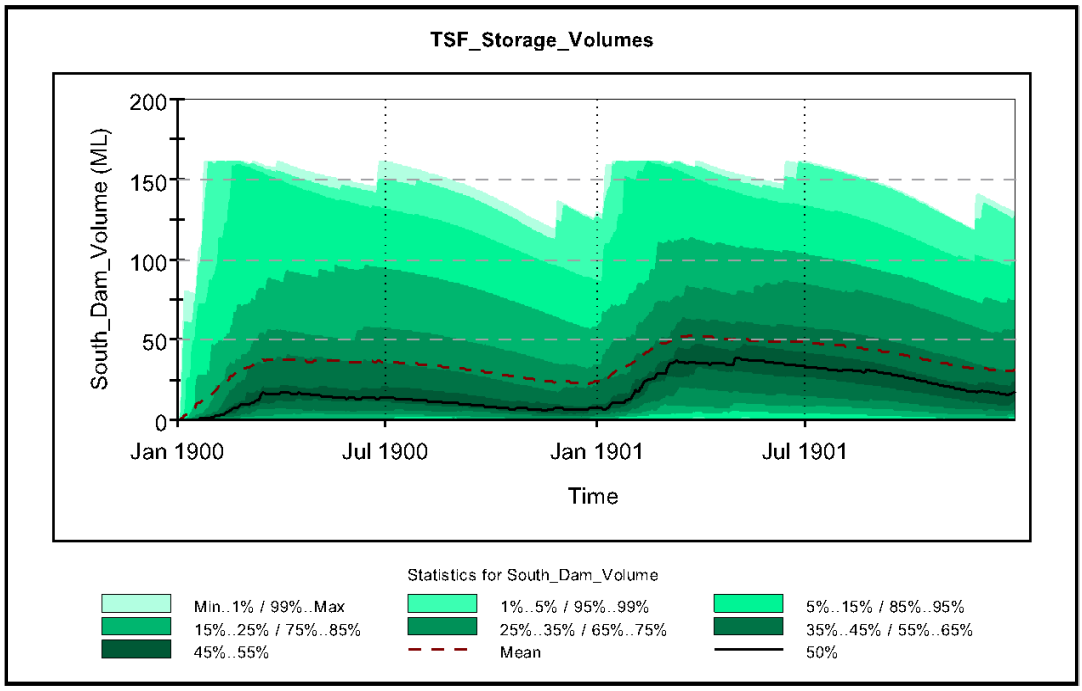


Figure 3: Volumes stored of the TSF temporary storage area with no diversions in place

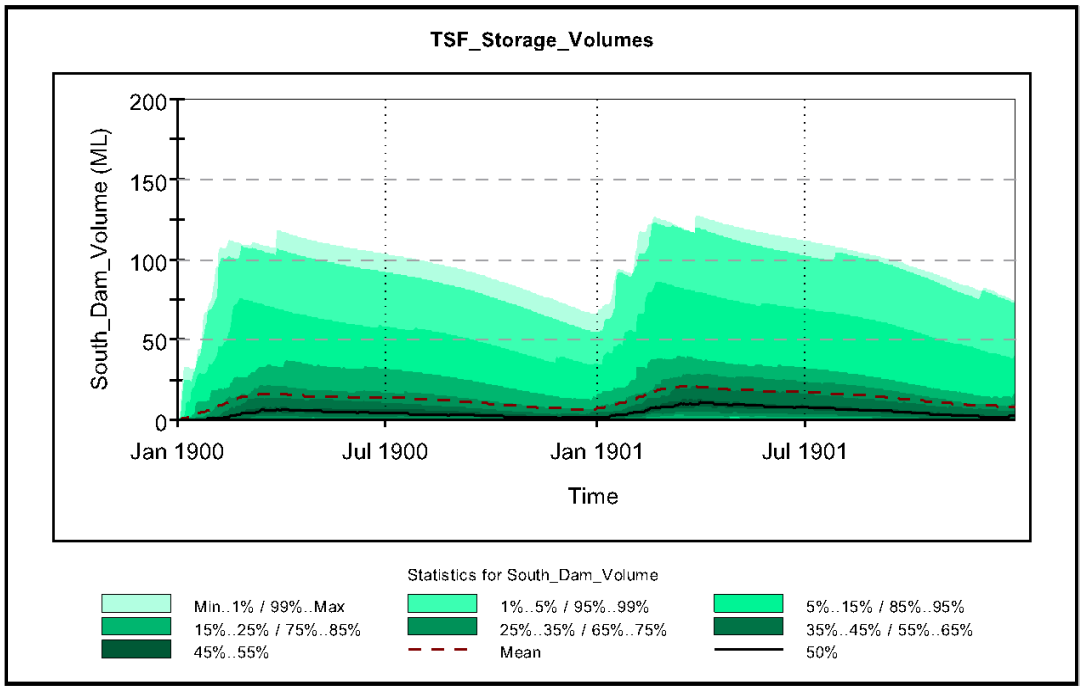


Figure 4: Volumes stored of the TSF temporary storage area with diversions in place

A map of the proposed works for the TEP interim measure is attached to this response. These works are subject to minor amendments during earthworks.

3. Drainage considerations

"Should the management strategy involve a temporary diversion to the pit. Please provide details on the adequate capacity of the diversion channel with respect to catchment size of the WRD and also taking into consideration approximate seepage inputs".

The catchment that reports to the TEL-011-SF2 V-Notch weir will be diverted into the pit via drainage works outlined in the attached map. This will ensure that runoff from approximately 42.7ha is prevented from leaving the site (as discussed in the response to the previous point). The design life of the temporary diversion is less than 24 months. In accordance with the *Best Practice Erosion & Sediment Control* manual published by the International Erosion Control Association (IECA) in 2008, temporary structures with a design life of less than 24 months are to be sized to convey a 1 in 5 year (20% AEP) event.

The temporary diversion drain that will collect waters from 42.7ha of the waste rock dump and route it to the pit will be designed to the 20% AEP (1:5) storm event to ensure that there is adequate capacity. XP-RAFTS was used to calculate the design hydrograph for the 20% AEP event. Various storm events with a different duration at the 20% AEP were modelled to determine which storm duration resulted in the highest flow rate. The 60min duration storm results in the highest peak flow rate through the diversion out of all duration storm events modelled (30min, 60min, 2hr, 3hr, 6hr). The design hydrograph for the drain as calculate by XP-RAFTS is provided in Figure 5. The peak flow rate is 5.7m^3/sec. Subsequently the drain will need to convey a peak discharge of 6m^3/sec.

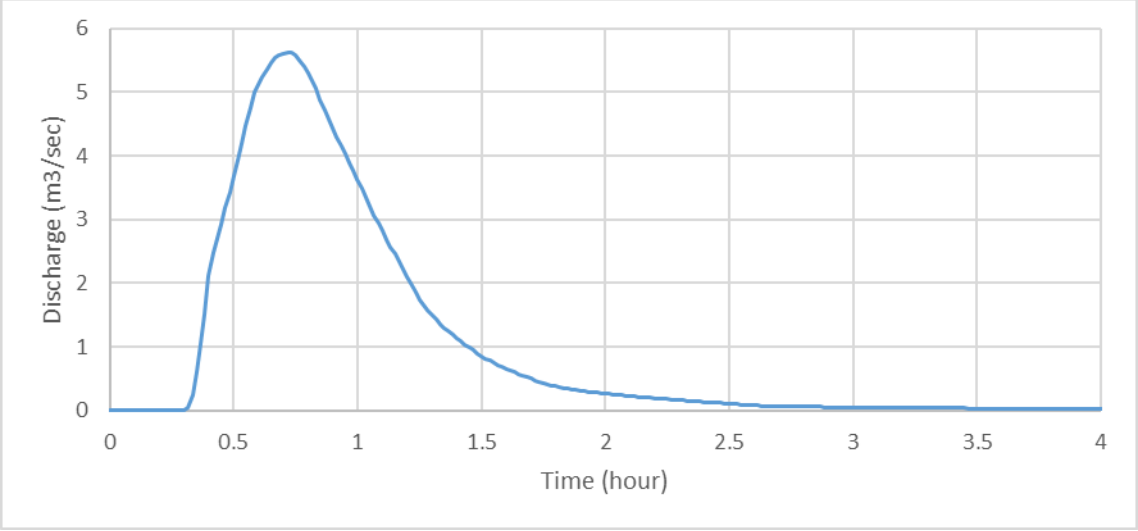


Figure 5: Design hydrograph for the 20% AEP 60min duration rainfall event

The drain will have a longitudinal gradient of approximately 1.5% in its steepest part. The drain was modelled in HEC-RAS to determine the optimum dimensions for a channel with a longitudinal gradient of 1.5%.

The dimensions of the existing drain were used to model the diversion channel in HEC-RAS. Notably this was a drain with a 15m wide base and batters with a gradient of 1V:3H, generally with a top width of 21m and a depth of approx. 1.0m. The hydrograph for the 5% AEP 60min duration storm (Figure 5) was routed through the drain unsteady flow analysis.

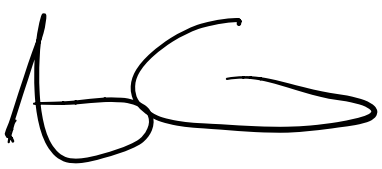
At the peak of the 20% AEP 60 min duration storm event there will be approximately 0.3m of water flowing at a velocity of 1.20m/sec at a stream power of 42N/m sec (Table 1). According to the *Best Practice Erosion & Sediment Control* manual (IECA, 2008) the drain should be lined with choir mesh, grass (with 70% cover occurring in the channel) or rock lining to convey these velocities without causing erosion. A mixture of rock lining and grass cover will be used to ensure that the drain can convey the 20% 60 min duration storm with minimal damage. Limestone sourced for other remediation works will be used to line the diversion channel and reaches of the existing channel leading into the pit in order to minimise the chance of erosion and to also promote water quality improvement.

Table 1: Results of HEC-RAS model of diversion channel

MEASURE	UNITS	VALUE AT PEAK FLOW
Flow	**m3/s**	5.53
Area	**m2**	4.6
W.P.	**m**	16.83
Percent	**Conv**	100
Hydraulic Depth	**(m)**	0.27
Velocity	**m/s**	1.20
Shear Stress	**N/m2**	34.9
Power	**N/m s**	41.92

Please do not hesitate to contact us if you have any queries on this correspondence.

Sincerely,



Marty Costello
Principal Environmental Scientist
For and on behalf of the Mount Windsor Joint Venture