Thalanga Copper Mines Pty Ltd

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20 June 2014

Dear Sir

Re: Transitional Environment Program (TEP) MAN17020

In accordance with the commitments made in the TEP please accept this report on site surface water flows at the Highway Reward mine. This report covers the period from 9 December 2013 until 9 June 2014. The TEP sites were sampled fortnightly during the notional wet season from 1 December until 30 March. This period was characterised by low rainfall on site with occasional short duration showers and storms and no real monsoonal influence recorded.

Table 1 Site Rainfall

Month	Rainfall mm
December	0.24
January	165.88
February	87.55
March	111.74
April	21.27
May	7.31
June (to 9 June)	2.58

At each sampling event, site pH was taken along with flow. The samples were analysed for acidity with the aim of developing an acidity flux for each site and then comparing the flux in terms of duration and strength with rainfall to provide an indication of the source (influent rainfall or waste rock dump seepage).

Investigative surface water sampling including flow measurements at specific locations has been instigated to provide data on the sources of contamination noted in the submitted draft TEP document and to inform the TEP reports. The sampling program is described in Appendix One. The TEP sample points are also shown in Figure 2 as green dots with black outlines and numbered in Figure 3.

SW6 FLOW PATH DRAIN

The flow path towards SW6 runs along the western side of the base of the Highway Waste rock dump. Flows along this path are measured at SF2 (TEP site 004) and downstream of that at TEP sample sites 003, 002 and 001. These sites are shown in Figure 3. Results are tabulated below from 004 through to 001.

Table 2 TEP Sample Site 004

Date	pH	Acidity mg/L	Flow L/s	Flux	
7-Dec-13					
09-Jan-14		160	0.15	24.30824	mg/s
22-Jan-14			0	0.00000	mg/s
28-Jan-14	4.63	195	0.3	58.50000	mg/s
11-Feb-14	4.52		0	0.00000	mg/s
24-Feb-14	4.48	116	0	0.00000	mg/s
11-Mar-14			0	0.00000	mg/s
25-Mar-14	4.33		0	0.00000	mg/s

In Table 2 it can be seen that surface flow was only recorded on two occasions, in January and again in February. Ponded water was sufficient to allow pH to be read on four occasions. Each pH was below 5 indicating an upstream acidity source. The acidity concentrations recorded ranged from 116 mg/L to 195 mg/L also indicating an upstream source of acidity.

Table 3 TEP Sample Site 003

Date	pH	Acidity mg/L	Flow	Converted L/s	Flux	
7-Dec-13			0			
09-Jan-14		349	44	0.01136364	3.96591	mg/s
22-Jan-14			0			
28-Jan-14			0			
11-Feb-14			0			
24-Feb-14			0			
11-Mar-14			0			
25-Mar-14	4.3		0			

TEP site 003 reflected the lack of rainfall and flow. The single acidity reading shows an increase from the weir upstream at 004. This indicates a potential source of acidity at or immediately upstream of 003. Additional sampling is required to confirm this.

Table 4 TEP Sample Site 002

Date	pH	Acidity mg/L	Flow secs	Converted L/s	Flux	
7-Dec-13			0			
09-Jan-14		213	106	0.004716981	1.005	mg/s
22-Jan-14			0			
28-Jan-14			0			
11-Feb-14			0			
24-Feb-14			0			
11-Mar-14			0			
25-Mar-14			0			

TEP site 002 follows the pattern of minimal surface flow established at 003. The reduced acidity (compared to 003) may indicate that no additional sources are present between 003 and 002 however additional sampling is required to confirm this.

Table 5 TEP Sample Site 001

Date	pH	Acidity mg/L	Flow	Converted L/s	Flux	
7-Dec-13			0			
09-Jan-14		165	62	0.008064516	1.33065	mg/s
22-Jan-14			0			
28-Jan-14			0			
11-Feb-14			0			
24-Feb-14			0			
11-Mar-14			0			
25-Mar-14			0			

The flow pattern at 001 replicated those at 002 and 003. The reduction in acidity (single sample) also followed the pattern shown at 002. The single flow event recorded and the lack of additional acidity generation may indicate that there is no seepage at this site with surface contamination upstream being the main source of acidity. However as with the other sites, additional sampling is required to confirm this.

SW6 FLOW PATH WRD

The flows from the Highway WRD at SF2 weir can be seen in Figure 4 along with the rainfall recorded on site. Figure 4 indicates that the extremely dry conditions on site meant that runoff was virtually nonexistent until April at which time soil moisture was sufficient for run off to occur.

Flows from the WRD towards the weir at SF2 (TEP site 004) are measured at TEP sample sites 009, 008, 007, 006, and 005. These sites are shown in Figure 3. Results are tabulated below from 009 through to 005. The areas immediately downstream of TEP 008 and upstream of 007 were capped in the earthworks program of 2013 prior to the commencement of TEP sampling.

Table 6 TEP Sample Sites 009 and 008

Date	pH	Acidity mg/L	Flow
7-Dec-13		0	0
09-Jan-14		0	0
22-Jan-14		0	0
28-Jan-14		0	0
11-Feb-14		0	0
24-Feb-14		0	0
11-Mar-14		0	0
25-Mar-14		0	0

At these sites there was no flow and insufficient ponding to even obtain a pH sample. These sites will be moved for the next TEP sampling season.

Table 7 TEP Sample Site 007

Date	pH	Acidity mg/L	Flow
7-Dec-13		0	0
09-Jan-14		0	0
22-Jan-14		0	0
28-Jan-14		0	0
11-Feb-14		0	0
24-Feb-14		0	0
11-Mar-14		0	0
25-Mar-14		0	0

Again at this site there was no flow and insufficient ponding to even obtain a pH sample. This site will be moved for the next TEP sampling season.

Table 8 TEP Sample Site 006

Date	pH	Acidity mg/L	Flow
7-Dec-13			0
09-Jan-14		398	0
22-Jan-14			0
28-Jan-14	5.77	9	0
11-Feb-14			0
24-Feb-14	5.05	50	0
11-Mar-14			0
25-Mar-14	5.55		0

Table 9 TEP Sample Site 005

Date	pH	Acidity mg/L	Flow
7-Dec-13			0
09-Jan-14		747	0
22-Jan-14			0
28-Jan-14	5.98	20	0
11-Feb-14			0
24-Feb-14			0
11-Mar-14			0
25-Mar-14			0

Sample sites 005 and 006 are below and on northern side of the revetment mattress drain. The sites did not provide enough flow to obtain flow measurements and only provided ponded water on a few occasions. However the higher acidities (398mg/L at 006 and 747 mg/L at 005) indicate upstream sources of acidity. Site inspection upstream showed bare yellow patches of earth north of the revetment mattress, possibly jarrosite staining. This has been programmed for capping in the 2014 earthworks program.

SW5 FLOW PATH

Surface water flows towards SW5 are recorded at 011. TEP Samples Site 010 records the water flowing into the pit and away from the SW5 sample site (See Figure 3).

Table 10 TEP Sample Site 011

Date	pH	Acidity mg/L	Flow
07-Dec-13			0
09-Jan-14		2	0
22-Jan-14	6.67		0
28-Jan-14	7.22		0
11-Feb-14	5.5	6	0
24-Feb-14	6.76	5	0
11-Mar-14	6.14	2	0
25-Mar-14	5.64		0

Site 011 did not record flows from the site off lease towards SW5. The low acidities and pH approaching 7 recorded from localised ponded water reflects this and hopefully shows the benefits of site earthworks over the previous year's, capturing site water and diversion into the pit thus preventing off site pollution in this area. Further sampling hopefully will confirm this.

Figure 1 Flow Monitoring Locations Highway Reward

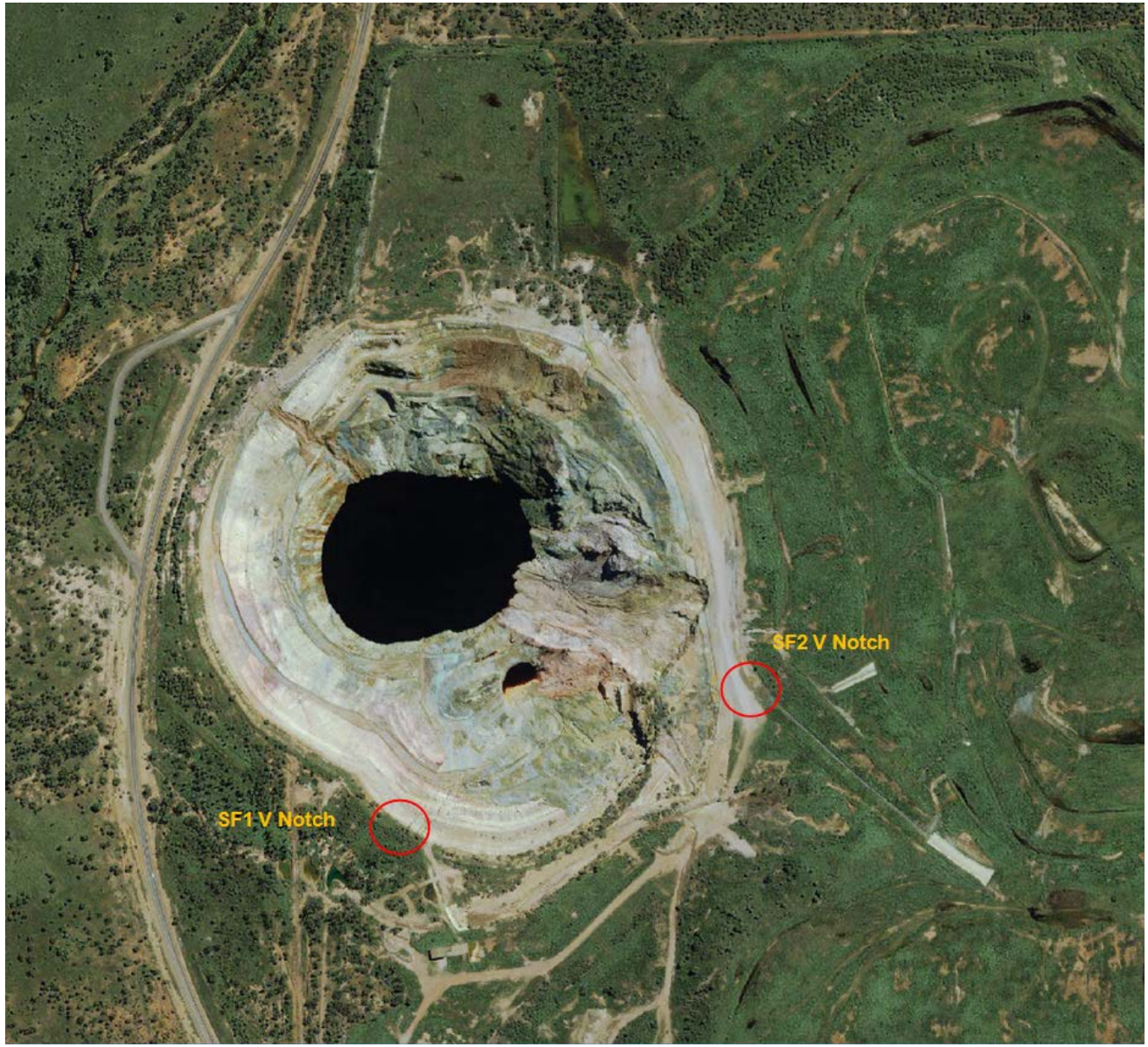


Figure 2 **Site Flow Lines and Sample Points**

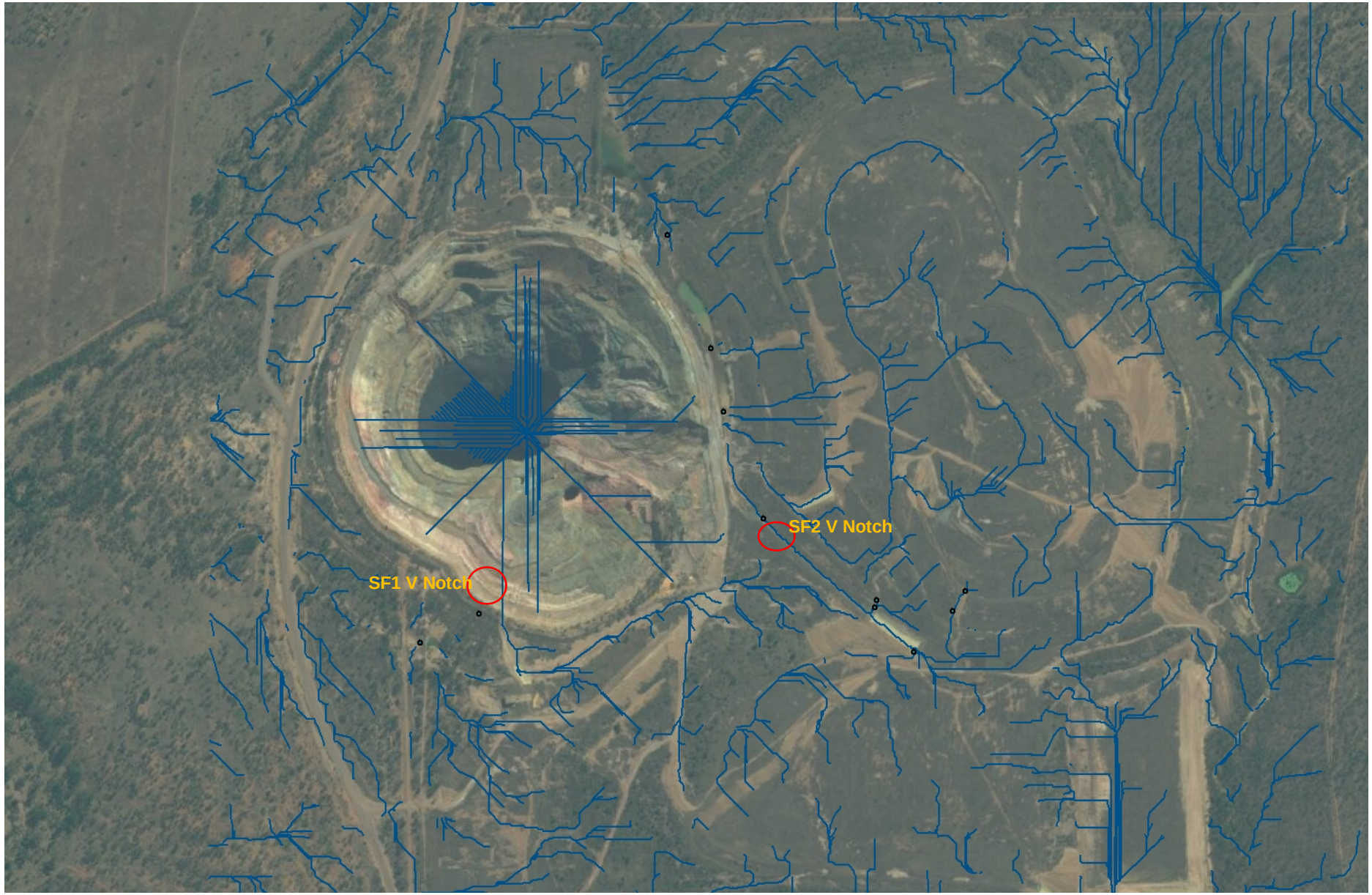
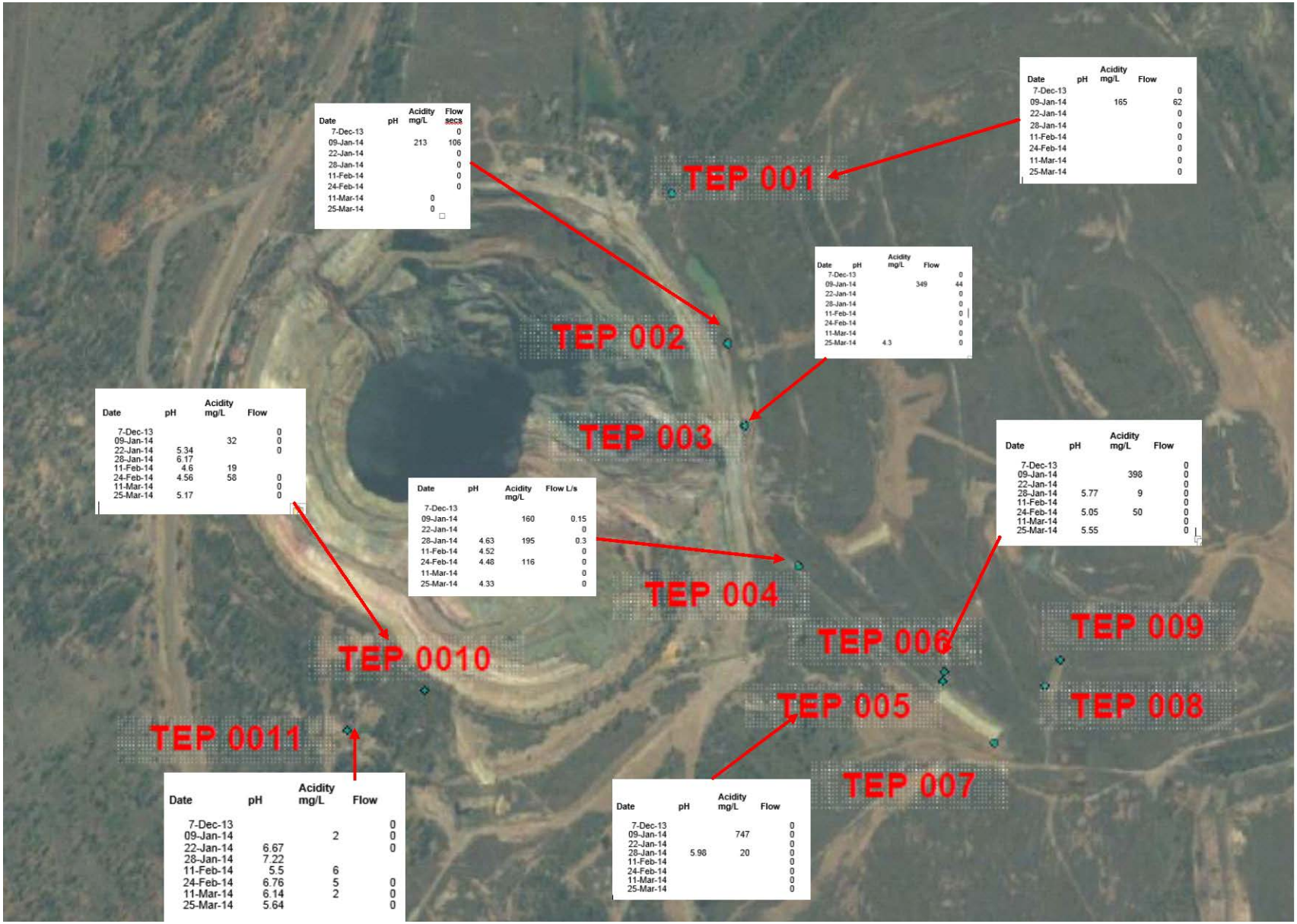


Figure 3 TEP Sample Points and Summary Results



PIT V-NOTCH

The pit v notch SF1 has provided similar flow regimes to SF2 and can be seen in Figure 4.

Figure 4 Flows and Rainfall

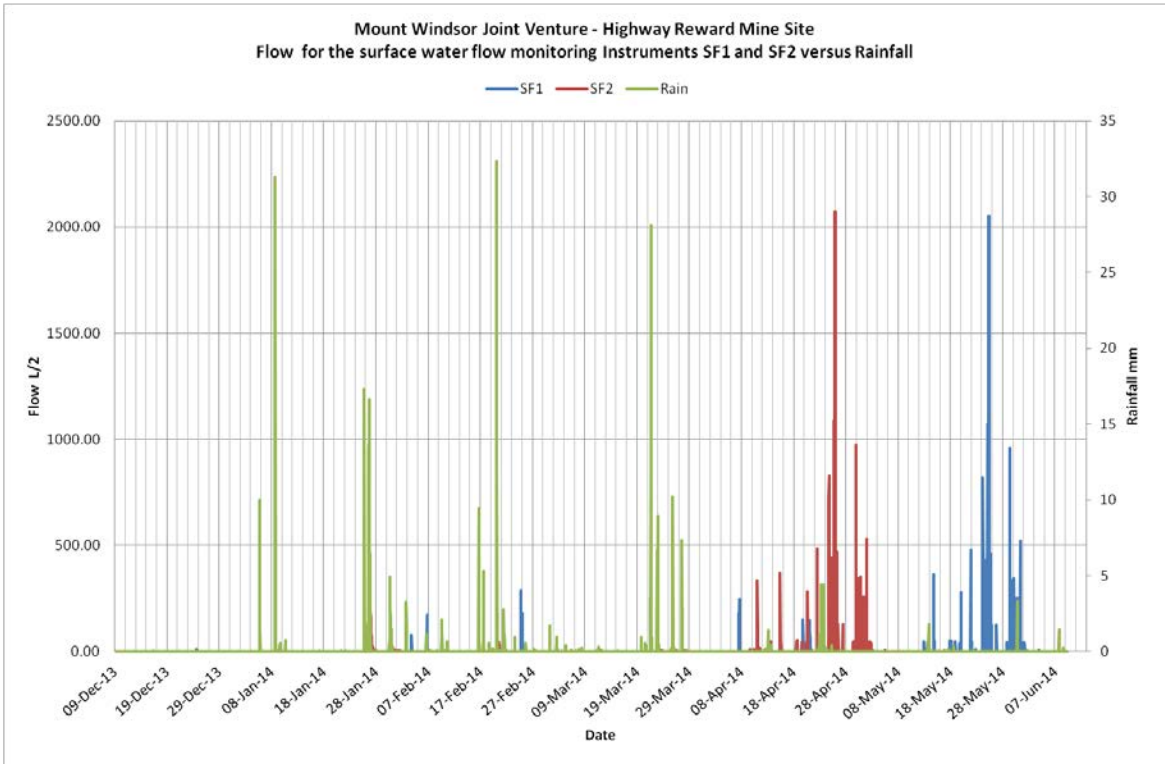


Table 11 TEP Sample Site 010

Date	pH	Acidity mg/L
7-Dec-13		
09-Jan-14		32
22-Jan-14	5.34	
28-Jan-14	6.17	
11-Feb-14	4.6	19
24-Feb-14	4.56	58
11-Mar-14		
25-Mar-14	5.17	

The low pH reflects the acidic drainage from upstream sources noted in the previous TEP for the site. The acidities are lower than expected.

SURVEY PIT WATER HEIGHT

Figure 5 shows the pit water height in September 2011 and Figure 6 shows the water level in February 2014. An estimated level increase of between 1 and 3 metres may have occurred over this 2.5 year period.

Figure 5 Pit Water Height September 11

Figure 6 Pit Water Height February 2014

SUMMARY

Initial rainfall and flow events indicate that the amount of infiltration, ponding and evaporation is higher than expected, reducing the runoff reporting to the weirs (and eventually off site) after each periodic rainfall event. As a consequence, total runoff volumes (and total concentration loads) will be lower than initially expected as what's happening in the drain is also happening for the creeks.

Mining one are contracted to monitor the flows and rainfall as variables to calibrate the runoff coefficient for the site. Once the drains SF1 and SF2 are known, we will be left with two components, direct rainfall on the catchment (which is also constrained by infiltration, ponding and evaporation and will be calculated with the runoff coefficient obtained from SF1 and SF2) and groundwater inflow. We will have 2 know variables to estimate the third one, the groundwater inflow.

Please feel free to call me if you have any questions.

Yours sincerely

Stephen Kent
For Thalanga Copper Mines JV
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APPENDIX ONE - HIGHWAY REWARD TEP SURFACE WATER SAMPLING

Additional surface water sampling is proposed for the TEP to:

- Investigate and find the source/s of high acidity and copper which are reporting to the sample site SW6, and
- Demonstrate that no surface water is flowing towards sample site SW5.

The location of each proposed sample site is shown in Figure 7 below. These are show in more detail later in the report along with sampling requirements. Sampling is proposed fortnightly during the wet season (1 November - 30 April) and monthly during the dry season each year. It is anticipated that the sample sites will be dry on many occasions. At these times, the results (dry) shall be recorded and no samples taken.

Figure 7 Sample Locations

TEP 001

TEP 001 is designed to sample the ARD leachate emanating from the NE corner of the base of the Highway waste rock dump (HWRD). This leachate has been shown to contain high concentrations of acidity and copper at times but is expected to only result in low flows. The contaminated leachate may be due to surface sulphide oxidation of influent rainfall from rocks containing visible sulphides (the yellow stained rocks in Figure 8) or it may be due to seepage of ARD from within the HWRD.

4177017 E
7748140 S

Figure 8 TEP001

A catch drain and sample sump has been constructed at this point to ensure that all seepage is captured and seepage flows can be measured. The seep collection drain only directs surface flows from either side of the NE point of the dump to a central location where the sump is situated. The approximated location is drawn in Figure 9. The length of the drain is approximately 10 m (5 m either side of the sump).

Figure 9 Seepage collection

Table 12 TEP 001 Sample parameters

TEP001	
Sample parameters	
Field	pH & EC & Flow
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

TEP 002

TEP 002 is the drain east of the HWRD and immediately north of the eroded drop structure where exposed sulphidic material can be seen oxidising

417092 E
7747948 S

Figure 10 TEP 002

Table 13 TEP 002 Sample Parameters

TEP002	
Sample parameters	
Field	pH & EC & Flow
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

For flow measurement, a small sump is envisaged in the drain as shown in Figure 10 with flow collection as per TEP 001.

TEP 003

TEP 003 is immediately north of sulphide oxidation staining coming from the road to the west of the drain. A small sump has been dug to facilitate flow measurement.

417114 E
7747841 S

Figure 11` TEP 003

Table 14 TEP 003 Sample Parameters

TEP003	
Sample parameters	
Field	pH & EC & Flow
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

TEP 004 - V Notch Weir

TEP 004 is the V notch weir. Flow is recorded automatically by the monitoring station.
417183 E
7747661 S

Figure 12 TEP 004

A sample can be collected from behind the v notch plate.

Table 15 TEP 004 Sample parameters

TEP004	
Sample parameters	
Field	pH & EC
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

TEP 005

TEP 005 is designed to sample the first obvious inputs to the gabion (and eventually revetment mattress) drain intersecting the HWRD and the Reward WRD (RWRD). The drain which flows into the main drain has two sources - above and to the immediate left of the drain (looking upwards TEP 006) coming down the left hand side of the drain TEP 005. A small sump has been dug in the yellow stained flow path for collection of samples and flow measurements.

417374 E
774511 S

Figure 13 TEP 005

Table 16 TEP 005 Sample parameters

TEP005	
Sample parameters	
Field	pH & EC & flow
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

TEP 006

TEP is to the immediate north of the gabion drain and collects surface flows which run alongside the revetment mattress and report into the gabion drain above TEP 005.

417377 E
7747524 S

Figure 14 TEP 006

Table 17 TEP 006 Sample parameters

TEP006	
Sample parameters	
Field	pH & EC & flow
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

TEP 007

TEP 007 is at the top of the revetment mattress where sulphide oxidation appears to be taking place. A small sump has been dug to facilitate sampling and flow measurement.
417441 E
7747435 S

Figure 15 TEP 007

Table 18 TEP 007 Sample parameters

TEP007	
Sample parameters	
Field	pH & EC & flow
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

TEP 008

TEP 008 is at the base of an eroding flow path immediately above the revetment mattress drain and flowing into it. TEP 009 is at the top of the structure / flow path.

417528 E
7747539 S

Figure 16 TEP 008

Figure 17 TEP 008 Close

Samples can be collected in flow paths along the rocks and drops and similarly flow measurement collected. (TEP 009 also)

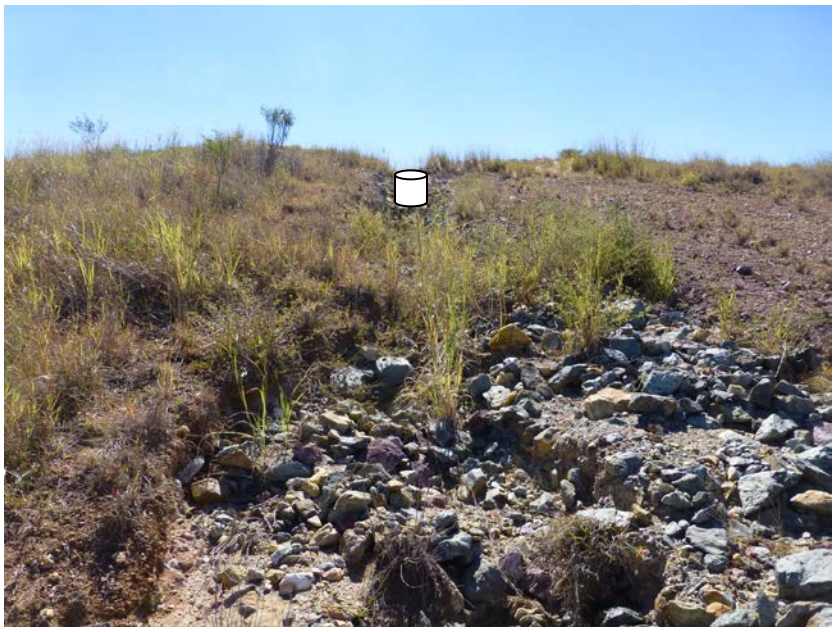
Table 19 TEP 008 Sample Parameters

TEP008	
Sample parameters	
Field	pH & EC & flow
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

TEP 009

TEP 009 is at the top of the flow path used for TEP 008.
417506 E
7747506 S

Figure 18 TEP 009



A sample sump / collection point near the top of the "structure is used - along a "natural" flow path.

Table 20 TEP 009 Sample parameters

TEP009	
Sample parameters	
Field	pH & EC & flow
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

TEP 010 and TEP 011

These sample locations relate to SW5 and are designed to demonstrate that no contaminated water flows from the site towards SW5.

TEP 010 is a sample at the v notch weir with flows automatically recorded at the weir.

Table 21 TEP 010 Sample parameters

TEP010	
Sample parameters	
Field	pH & EC
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)

TEP 011 is a sample point immediately to the west of the fenced lease boundary and along the flow path to the official SW5 point.

416598 E
7747447 S

Figure 19 TEP 011

It is envisaged that TEP 011 will be dry or will only contain localised flows (i.e. not specifically from the mine site). Hence the sampling in dry conditions will involve recording that no flow is present and taking a photographic record towards the site as per Figure 19. In the event that there is water at TEP 011, a sample shall be taken.

Table 22 TEP 011 Sample parameters

TEP011	
Sample parameters	
Field	pH & EC
Lab	Acidity, Total & Dissolved metals (Cd, Cu, Pb, Se, Mo, Zn)