White Dam Gold Mine

Annual Mining and Rehabilitation Compliance Report 1 January 2019 to 31 December2019

Version 2.0

ML 6275 and 6395; MPL 95, 105, 106, 107 and 139

23 March 2020

Executive Summary

The following report addresses the mining and rehabilitation activities that have been carried out at the White Dam Project site for the 2019 calendar year. This Mining and Rehabilitation Compliance Report (MARCR) has been prepared to address the requirements of "*MG3 Guidelines for miners: preparation of a mining and rehabilitation compliance report in South Australia*"(Version 1.4), which is currently under revision, as well as the reporting requirements outlined in "*Ministerial Determination MD009: Reporting periods and minimum information required to be provided in a compliance report for a holder of a mineral lease and any associated miscellaneous purposes licence or associated extractive mineral lease*" (SA Government, January 2018), where appropriate.

Key operational matters and environmental outcomes reported for 2019 comprise the following.

Operations

Mining operations recommenced in February 2016 and continued until the end of mining on 17 May 2017 and end of crushing 21 July 2017. The mining operations included extension of mining in the Hannaford and Vertigo open pits and completion of the third lift on the heap leach pad (HLP). Irrigation of the HLP for gold recovery and process plant operations are continuing. The storage and encapsulation of waste rock in the open pits was completed at the end of mining.

There has been no change to the footprint of the project.

Monitoring, Rehabilitation and Closure Activities

Rehabilitation activities were carried out in the reporting period on the haul roads, abandonment bunds, old turkeys nest and magazine area. The ROM Pad was removed in preparation for rehabilitation. Monitoring was conducted in accordance with the current approved PEPR (MARP).

A revised PEPR was submitted to DPC (formerly DSD) in May 2016, incorporating changes to the project since the current approved PEPR resulting from recommencement of mining as well as the final Mine Completion Report (once approved by DPC). PEPR Review 3 was approved by DEM in November 2018.

PEPR Review 4, which was prepared to allow the use of a Sulphurisation, Acidification, Recycling and Thickening (SART) process within the existing cyanidation circuit at White Dam to remove cyanide, copper and gold from the heap leach operations, was approved by DEM on 16 September 2019 and by the SA EPA on 3 September 2019.

Incidents

No reportable incidents occurred in 2019.

Compliance

The project has complied with all conditions of approval, applicable compliance standards and required outcomes.

Complaints

No complaints were recorded during the reporting period.

Summary of White Dam Gold Mine Details	
Mine name	White Dam Gold Mine
Tenements	ML 6275 ML 6395 MPL 95 MPL 105 MPL 106 MPL 107 MPL 139
Mine owner	Exco Operations (SA) Pty Ltd and Polymetals (White Dam) Pty Ltd
Lease holder	Leases held jointly by Exco Operations (SA) Pty Ltd and Polymetals (White Dam) Pty Ltd
Mine operator	Polymetals (White Dam) Pty Ltd
Senior site representative (SSR)	Greg Poulter
Mine contractor	None
Reporting period	1 January 2019 to 31 December 2019
PEPR reference	PEPR Version 4, dated 10 July 2019. Approved on 16 September 2019.
Compliance report preparation date	23 March 2020
Site contact person	Mr Greg Poulter Telephone: (08) 8919 4455 Email: gpoulter@roundoakmin.com.au
Version control	Revision 2.00

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APPENDICES

1. Introduction

This Mining and Rehabilitation Compliance Report (MARCR) has been prepared for the reporting period January 2019 to December 2019 to meet the requirements of "*Minerals Regulatory Guidelines MG3 – Guidelines for miners: preparation of a mining and rehabilitation compliance report (MARCR) in Australia (Version 1.4 – March 2009)"* (Primary Industries and Resources South Australia, 2009), which is currently under review.

Draft (Provisional) MG3 Guidelines Version 0.5 were released in March 2015 but it is understood that these guidelines, while more comprehensive than Version 1.4, were yet to take effect at the time of preparation of this MARCR. Nevertheless, this document has addressed the Provisional March 2015 guidelines where appropriate, given the status of the project at the end of December 2019.

In addition, this MARCR also considers the requirements of "*Ministerial Determination MD009: Reporting periods and minimum information required to be provided in a compliance report for a holder of a mineral lease and any associated miscellaneous purposes licence or associated extractive mineral lease"*, as amended on 23 January 2018.

Following amendments to the *Mining Act 1971* which came into force on 1 July 2011, Mining and Rehabilitation Programs (MARPs) have been replaced by Programs for Environment Protection and Rehabilitation (PEPRs). Previously approved MARPs are deemed to be PEPRs. The currently approved PEPR referenced in this MARCR is the MARP December 2011 Rev 8 and the Minor Change Notification for the mine extension (December 2015). Mining operations at the site recommenced in February 2016 and followed the procedures described in the Minor Change Notice (MCN) report lodged with DSD in 2015 and the MCN for the Hannaford Cutback in 2016. These minor operations ceased in 2017.

PEPR Review 3, dated 21 August 2018, was approved by the Department of Energy and Mining (DEM) on 19 November 2018.

PEPR Review 4, dated 10 July 2019 and which was submitted to allow the use of a Sulphurisation, Acidification, Recycling and Thickening (SART) process within the existing cyanidation circuit at White Dam to remove cyanide, copper and gold from the heap leach operations, was approved by DEM on 16 September 2019 and by the SA EPA on 3 September 2019.

1.1. Project Location and Description

The WDGM Project area (**Figure 1**) is located to the north-east of Olary on the Barrier Highway, South Australia. Broken Hill, in New South Wales, is the nearest regional centre and is about 80 km east of the project area. The site is located on two pastoral leases, i.e. Bulloo Creek and Bindarrah.

The project has granted leases Mining Lease (ML) 6275 and 6395 and Miscellaneous Purposes Licences (MPL) 95, 105, 106, 107 and 139 (**Figure 2**).

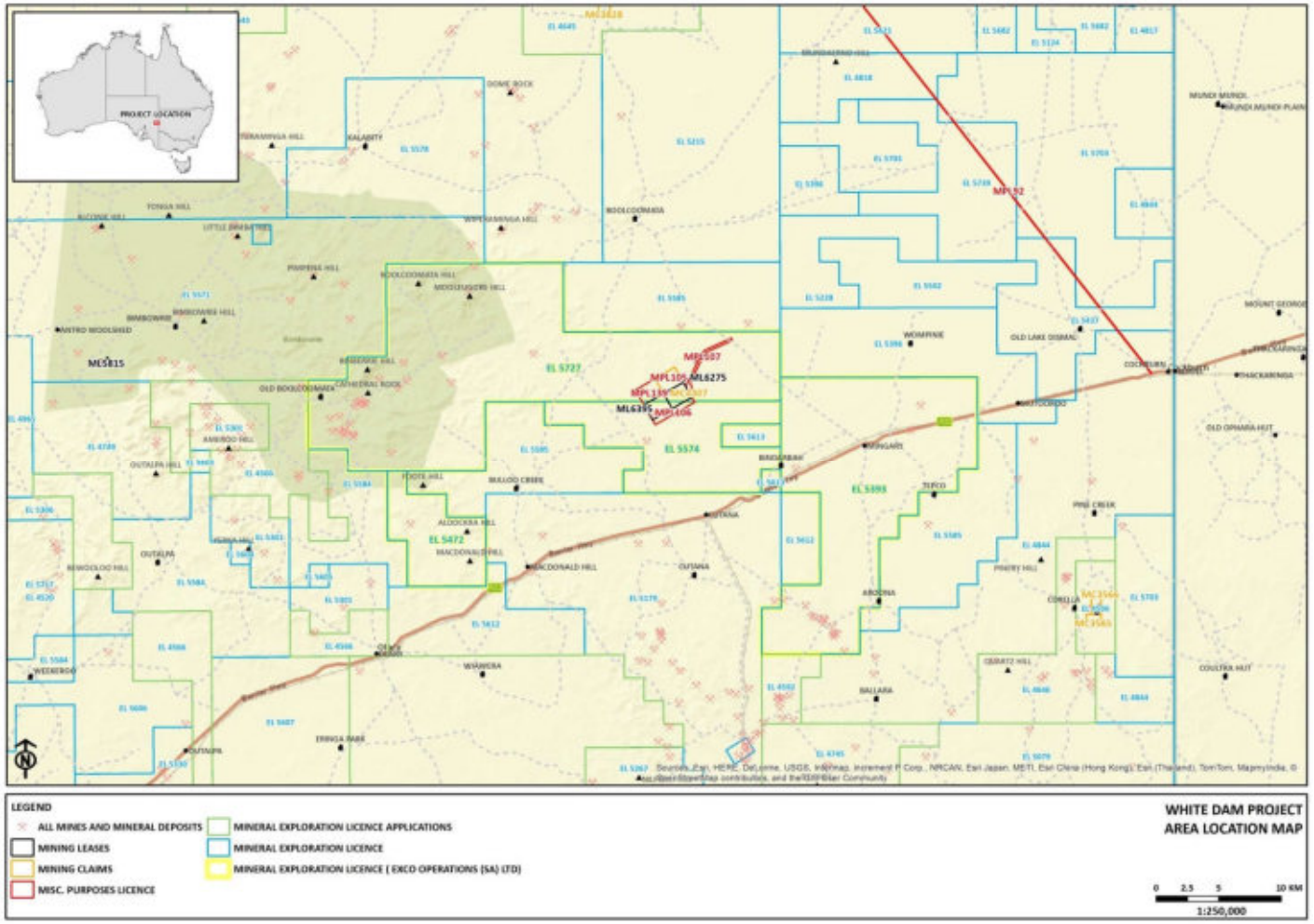

Figure 1: Project Location

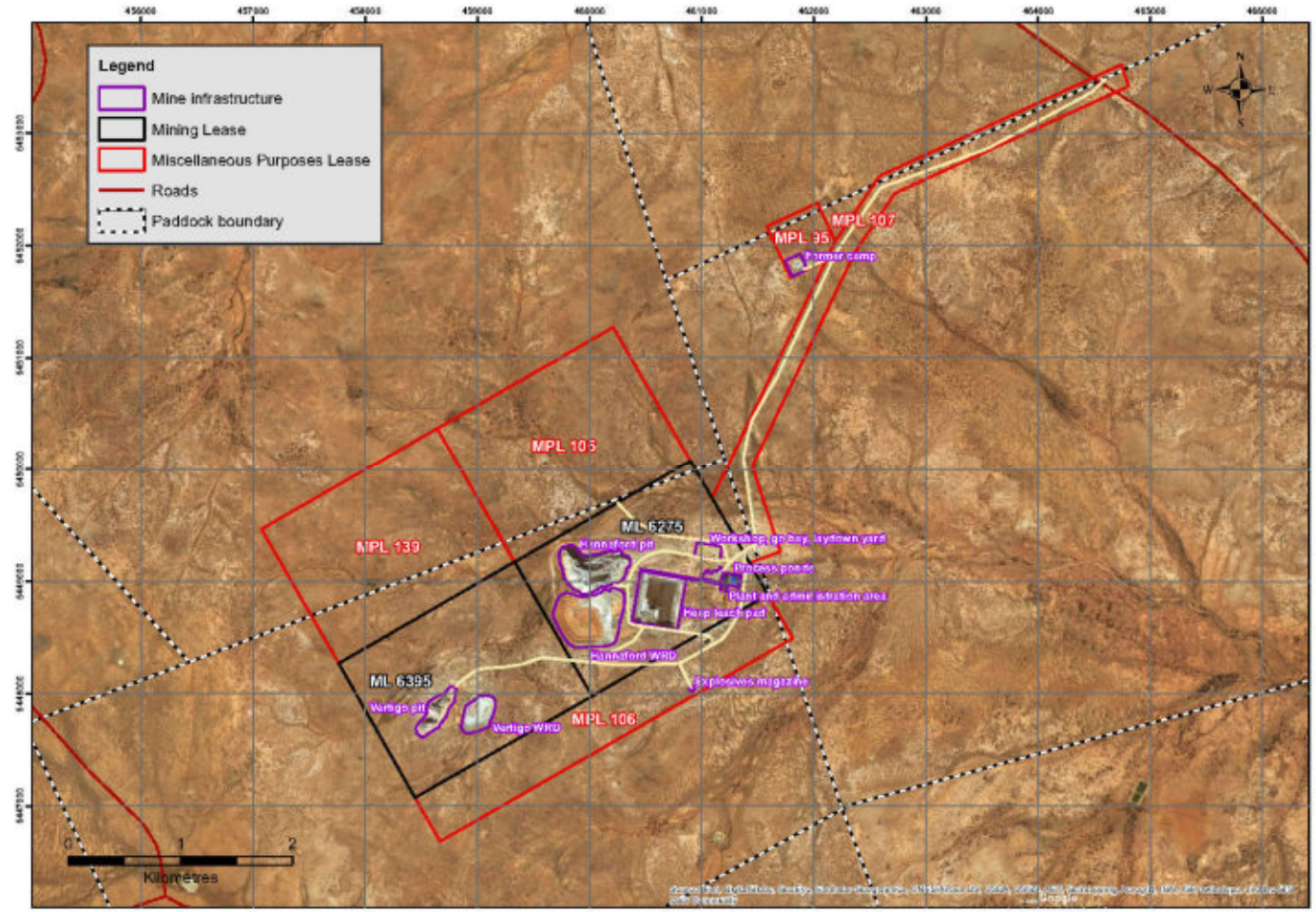

Figure 2: Project Tenements and Mine Layout

The site comprises mining of two open pits (Hannaford pit and Vertigo pit), in-pit storage of waste rock, heap leaching and gold recovery utilising a processing plant. Ore is mined by conventional drill and blast/load and haul techniques.

Ore is crushed using a mobile crusher prior to stacking on the heap leach where it is irrigated with a solution of sodium cyanide. Gold is recovered from the leachate by adsorption onto activated carbon before being refined to produce Doré bars.

The White Dam Gold Mine (the 'Mine') has involved the mechanical extraction and chemical processing of ore via a dump/heap leaching process using sodium cyanide. The operation has produced approximately 171k ounces of gold over an approximate eight-year operational mine life.

Construction of the mine project was completed in early 2010 with operations commencing in March 2010 and the first gold pour in April 2010. Mining ended in 2012 but processing gold continued intermittently. The Heap Leach Pad (HLP) was reworked in 2014.

Mining in the Hannaford and Vertigo open pits recommenced in February 2016, with associated disposal of waste rock in the open pits, creating a third lift on the HLP and ongoing irrigation of the HLP for gold recovery. These mining operations ceased in May 2017, with leaching operations currently ongoing. The processing plant was operational sporadically in Quarter 1 of 2019 and for 7 weeks in November-December 2019.

As part of planning for closure, the Joint Venturers plan to modify the existing processing circuit to include a Sulphidisation, Acidification, Recycling and Thickening ("SART") process to recover cyanide from the leach solutions. Implementation of the SART process will improve the quality of residual leach solutions, extend the economic recovery of gold from the heap leach and will result in the production of a Copper Sulphide precipitate which may be a saleable product capable of further enhancing the economics of the project in operation and closure.

In September 2019, DEM and the SA EPA approved PEPR Review 4 (PEPR No. 2019/20) (**Appendix A)**, which was submitted to allow the use of the SART process to remove cyanide, copper and gold from the heap leach operations. PEPR Review 4 also include a modified thickness in the capping design for the remaining heap leach, based upon column trials to validate the revised design.

1.2. Project Ownership and Operation

The White Dam Gold Mine (WDGM) was developed as an unincorporated joint venture between Exco Operations (SA) Pty Ltd (EXS) and Polymetals (White Dam) Pty Ltd (PWD). The joint venture is managed on behalf of the joint venturers by Polymetals Operations Pty Ltd (PMO). EXS, PWD and PMO are all wholly owned subsidiaries of Washington H. Soul Pattinson & Co Ltd (WHSP). Round Oak Minerals Pty Ltd (ROM) (formerly CopperChem Ltd) , a sibling entity of EXS and PWD, and also a wholly owned subsidiary of WHSP provides technical and commercial services to PMO.

1.3. Project Contact Information

The project contact is Mr Bruce McLarty.

Mr Bruce McLarty

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1.4. Executive Declaration

Table 1 presents the required executive declaration.

Table 1: Executive Declaration

Person responsible for preparation of the compliance report This document has been prepared to fulfil the requirement under Regulation 86 for the tenements listed herein. The information contained in this report is to the best of my knowledge a true and accurate record of the mining activities and compliance status for the reporting period.			
Name:	**Position or Agent:**	**Signature:**	**Date:**
Bruce McLarty	Commercial Manager White Dam Gold Mine		23 March 2020
Agency Agreement			

2. Tenements, Licences and Agreements

2.1. Tenements and Purpose

Table 2 presents details of the tenements at White Dam and the purpose for each in regard to the total project. **Figure 2** shows the location of these tenements and the activities that have been or continue to be associated with each lease.

Table 2: Tenement Leases Granted for White Dam Project

Tenement Type	Pastoral Block(s)	Name	Tenement No.	DSD Reference/ ML approval date	Purposes(s) and forward plan
ML	897 OH (Olary)	Bulloo Creek Station	ML6275	TO2435/ 26 Sept 2007	Mining operations may be carried out for the recovery of metallic mineral ores (gold) from the area of the lease. (Current White Dam operation - contains Hannaford Pit and associated waste dump.) **Work Plan**: No further mining. Construction of proposed SART plant is to commence in 2020, with processing to continue once SART plant is operational in 2020. .
ML	897 OH (Olary)	Bulloo Creek Station	ML6395	TO2553/ 8December 2011	Mining operations may be carried out for the recovery of metallic mineral ores (gold) from the area of the lease. (Contains Vertigo Pit and associated waste dump.) Formerly for a groundwater bore field and associated infrastructure for use in association with the mining operation and for the purposes of storing temporary topsoil stockpiles and addressing flood mitigation issues. **Work Plan:** No further mining or placement of mine waste planned.
MPL	656 OH	Bindarrah Station	MPL95	TO2642	For the purpose of constructing and operating an accommodation camp and associated infrastructure including communications (which may include a tower) specifically for use in association with the mining operation (used for White Dam Camp Site). **Work Plan**: The camp and associated infrastructure has been de-commissioned and removed. The camp area is being progressively rehabilitated.
MPL	897 OH (Olary)	Bulloo Creek Station	MPL105	TO2560	For the purpose of development and operation of a groundwater bore field and associated infrastructure for use in association with the mining operation and for the purposes of storing temporary topsoil stockpiles and addressing flood mitigation issues in relation to the Project. Note that this area is the subject of a Mining Lease Application for the proposed White Dam North Project. **Work Plan**: On-going use for bore field (abstraction for irrigating heap) and flood mitigation.

Tenement Type	Pastoral Block(s)	Name	Tenement No.	DSD Reference/ ML approval date	Purposes(s) and forward plan
MPL	897 OH (Olary)	Bulloo Creek Station	MPL106	TO2643	For the purpose of storing temporary topsoil stockpiles, location of an explosive magazine, waste dumps, ore stockpiles, crushing and screening, dump leach pad, bore field pipelines, process ponds and related infrastructure to be used for operations specifically associated with the mining operation. **Work Plan**: Continued use mainly for bore field (abstraction for irrigating heap leach pad) and stockpiles.
MPL	97 OH	Bulloo Creek Station	MPL107	TO2644	For the purpose of constructing and operating a mine access road and services, including water pipelines, for the accommodation camp and for a possible future water supply pipeline to transport water from a remote bore field specifically for use in association with the mining (this pipeline was not implemented). **Work Plan:** Used for on-going access and services corridor.
	656 OH	Bindarrah Station			
MPL	897 OH (Olary)	Bulloo Creek Station	MPL139	-	MPL for the purpose of development and operation of a groundwater bore field. **Work plan:** MPL for current production bore PB07.

2.2. Other Licences, Permits, Waivers, Native Title and Agreements

Other key licences and permits applicable to the operations are listed below in **Table 3**.

Table 3: Other Current Licences, Permits, Waivers, Native Title and Agreements

Type	Issuing Authority	Name	Description
Licence	EPA	EPA Licence 25543	Environmental licence to operate: Chemical works and Waste or recycling depot
Licence	EPA	EPA Works Approval 25422	Licence to construct 1(2)(a) Chemical Works: inorganic
Approval	SA Health	Application for wastewater systems and use	Approval to install and operate septic tank system- mine site
Licence	SA Health	Licence to Possess Section 22 Poisons (Cyanide) 2012-77676	Licence to use cyanide on site
Licence	SafeWork SA	Licence to Keep Dangerous Substances (Cyanide)	Licence to store cyanide on site
Licence	SafeWork SA	Blasting Licence	Licensed contractor to undertake activities
Permit	DWLBC	Permit to decommission water wells	Permit to decommission water wells
Approval	Native Vegetation Council	Native Vegetation clearance	Approval to clear 213.8ha of native vegetation

It is noted that the SA EPA approved PEPR Review 4, relating to the use of the SART process to remove copper and gold from the heap leach operation, in September 2019 with no requirements for changes to existing EPA Licence 25543. SA EPA approvals of the supporting *Application for change to process emission or waste* and the *Application for alternations to plant and equipment* under EPA Licence 25543 were obtained on 26 September 2019 (**Appendix A**).

2.2.1. Native Title

Exco has a Native Title Mining Agreement (NTMA) with the Ngadjuri, Adnyamathanha, Wilyakali Native Title Aboriginal Corporation (NAWNTAC), the Prescribed Body Corporate which acts as agents for the now determined holders of native title in the White Dam area. The NTMA covers the full site area encompassing all MLs and MPLs applicable to the White Dam project area. The long-standing project NTMA with Adnyamathanha was novated to NAWNTAC on 14 December 2018, as part of the Consent Determination of native title, made by orders of the Federal Court on that date. Minor amendments were made by virtue of the Consent Determination orders, to accommodate the determination in favour of the 3 overlapping groups, but the NTMA otherwise continues in accordance with its original terms.

3. Description of 2019 Mining Activities

3.1. Changes to Mining and Operations since end-December 2018

The main changes/project variations to the operations since December 2018 (**Table 4**) are associated with or include the following:

- The site has been mainly in care and maintenance mode, with limited operations.
- Continued irrigation of the Heap Leach Pad.
- Intermittent use of the processing plant.
- Use of water from pit sumps

In 2019, Exco Resources/Polymetals Operations Pty Ltd submitted the following documents to the SA Government:

- PEPR Revision 4, dated 10 July 2019 and approved by the SA EPA on 3 September 2019 and by DEM on 16 September 2019.
- An *Application for change to process emission or waste*, dated 29 June 2019 and submitted under Section 54C of the *Environment Protection Act 1993*. The application was approved by the SA EPA on 26 September 2019.
- An *Application for alterations to plant and equipment*, dated 29 June 2019 and submitted under Section 54C of the *Environment Protection Act 1993*. The application was approved by the SA EPA on 26 September 2019.

Table 4: Summary of Mine and Operations Changes (Approved)

Mining Activities	Mining Proposal (2007)	Approved PEPR (Rev 8 Dec 2011)	Approved MCN for Mine Extension (8 Dec 2015)	December 2016	December 2018	December 2019
Hannaford Pit	4.5Mt ore at 1.27 Au g/t 9 Mt waste rock Pit area 14.4 ha Pit depth approx. 70m	5.2Mt ore at 0.98 g/t 6.6 Mt waste rock Pit area 15.3 ha Pit depth approx. 70m Potential to Backfill	6.3 Mt ore 7.2 Mt waste rock Pit depth approx. 100m Waste rock to be sorted as mined and encapsulated in pit as appropriate.	6.4 Mt ore; 9.6 Mt waste rock Pit depth approx. 100m Updated ramp and cutback of west and part south wall. Waste rock to be sorted as mined and stored and/or encapsulated in pit as appropriate.	6.8 Mt ore; 8.7 Mt waste rock Pit depth approx. 122m (86mRL) Waste rock sorted as mined and stored and/or encapsulated in pit as appropriate.	6.8 Mt ore; 8.7 Mt waste rock Pit depth approx. 122m (86mRL) Waste rock sorted as mined and stored and/or encapsulated in pit as appropriate.
Vertigo Pit	Not scoped	0.47 Mt ore at 0.83 g/t 1.5Mt waste rock Pit area 7.5 ha Pit depth approx. 60m Backfill	No change	No change to approved footprint. 0.62 Mt ore; 1.73 Mt waste rock Pit area 4 ha Pit depth approx. 50m Waste rock sorted as mined and encapsulated in pit as appropriate	No change to approved footprint. 0.7 Mt ore; 2.9 Mt waste rock Pit area 4 ha Pit depth approx. 50m (170mRL) Waste rock sorted as mined and encapsulated in pit as appropriate	No change to approved footprint. 0.7 Mt ore; 2.9 Mt waste rock Pit area 4 ha Pit depth approx. 50m (170mRL) Waste rock sorted as mined and encapsulated in pit as appropriate
Hannaford Waste Rock Dump	8 Mt (two lifts approx. 9 to 10m each) Characterise waste rock into types, use Type I in exposed situations and cap any waste rock with Type II rock (PAF)	Waste Rock sorted as mined and either used or encapsulated as appropriate	No change	No change All waste rock from extension project stored in pit	No change All waste rock from extension project stored in pit	No change
Vertigo Waste Rock Dump	Not scoped	Waste Rock sorted as mined and either used or encapsulated as appropriate	No change	No change All waste rock from extension project stored in pit	No change All waste rock from extension project stored in pit	No change

Mining Activities	Mining Proposal (2007)	Approved PEPR (Rev 8 Dec 2011)	Approved MCN for Mine Extension (8 Dec 2015)	December 2016	December 2018	December 2019
Heap Leach Pad	Crushing and screening 9 cells Single lift (10m)	Second lift (14m) Heap leach base of 19.5 ha	No change to heap leach base, three lifts, crushing and screening	Third lift (8m) No change to heap leach base. Crushing and screening	No change to heap leach base. Irrigation of HLP ongoing.	No change to heap leach base. Irrigation of HLP ongoing.
Processing Plant and Ponds	Up to 300ppm cyanide	No change	No change	No change	No change	No change
Groundwater Production Bores	1869kL/d	No change	No change	Production bore T4 (PB07 / MB02) in operation. Former geotechnical bore converted in production bore PB06	No change	No change

Activities within the mining and processing area in 2019 comprised:

- Mining and processing
  - Continued irrigation of HLP for gold recovery using production bore and make up water.
  - Intermittent process plant operation.
- Water supply to meet peak demand for WDGM operations
  - Water abstraction from Production Bore PB04, if possible.
  - Use of pit water in Hannaford Pit (sump and pump).
- Monitoring
  - Gathering of data for the purposes of compliance reporting and mine closure assessment (where applicable).
  - Ongoing pit stability monitoring (visual monitoring on quarterly basis), radar and prism monitoring and use of Trigger Action Response Plan ended 12 August 2017.
  - Monitoring of rehabilitation effectiveness on the WRDs and other rehabilitated areas with maintenance/ rectification as required
  - Regional and site monitoring and production bore sampling on a quarterly basis.
  - Ongoing environmental monitoring.
- Rehabilitation
  - Review and engineering design of flood protection/stream diversion bunds is ongoing. Work has not progressed due to continuation of the processing and the proposed SART processing. The current "*WDGM Rehabilitation and Closure Schedule*" is attached in **Appendix D.** The schedule will be updated in the next reporting period, to take into account the construction, operation and decommissioning of the SART processing plant. The delay does not impact the dates provided for the construction works for the stream diversion and flood bund.
  - Heap Leach column trials to determine cover thickness of NAF/topsoil finished.
  - Removal of infrastructure from contractor's workshop (Lucas), crusher and lay-down area finished.
- Stakeholder liaison and consultation, primarily with the landholders, DPC and EPA representatives regarding compliance and closure activities and regarding the proposed SART processing. More specifically:
  - Detailed information of the SART project provided to the owners of Bindarrah Station on 17 June 2019 and followed up discussions on site on 26 June 2019. Other informal briefings have been held with Bindarrah on several occasions.

- Detailed information on SART provided to Bulloo Creek owners on 17 June 2019 and an offer was made to meet on site, or at the Bulloo Creek owners' premises on 26 June 2019. After a telephone discussion on 26 June 2019 with Bulloo Creek landowner they confirmed they were comfortable with the information required and did not require a face to face meeting. Further informal telephone discussions have been held with the Bulloo Creek landowner since June and no issues have been raised.

- Discussions with Safework SA and SA EPA.

- 28 May 2019: DEM site inspection and discussions.

- 27 June 2019: DEM meeting in Adelaide.

3.2. 2019 Mining and Operations Activities

A summary of mining and processing operational parameters end-2019 is provided in **Table 5**. The mine plan is presented on **Figure 2.**

Table 5: Summary of Production and Mining at the end of December 2019

Component	Details
ML/MPL area (current approved):	906 ha
Project disturbance footprint	101.67 ha
Project disturbance footprint – ultimate approved	148.26ha (note that recommencement of operations in 2016 has not significantly changed this approved area figure)
Mining method	No mining in 2019
Mining inventory	Mining completed 17 May 2017
Open pit dimensions (ultimate final pit)	Hannaford pit @ 20.9ha includes slip in southwest wall) Vertigo pit @ 4.7ha
Mine operational life (based on current approval)	Mine extension: 3.5 years from commencement
Ore handling and processing	Heap leach extraction with cyanide
Surface waste rock dump area and volume	Hannaford: 26 ha (2.3 Mm^3); Vertigo: 6.7 ha
In-pit waste rock dump volumes	Hannaford: 2.3Mt, Vertigo: 0.68 Mt
Ore Mined in Reporting Period	None
Gold production (Total)	2,205.62 oz gold produced in 2019. Total of 171,308.46oz gold produced by end-2019.
Operating hours	24 hours per day, 7 days per week
Raw water source and daily consumption (average)	Production bore PB04 <1ML/d Pit water
Potable water source	Rainwater tanks and RO plant on-site. Tanker delivery only as required
Power requirement	265 kVA average load

Component	Details
Workforce numbers (WDJV)	Workforce is now 7 persons on site.
Operational commencement date	Operations: April 2010 Project Extension: February 2016
Accommodation	Workforce accommodated in Third Party Camp at Bindarrah Station

Details of previous and current mining for the Hannaford and Vertigo pits are presented in **Table 6**.

Table 6: Mined Resources in Hannaford and Vertigo pits

Item	Hannaford		Vertigo	
	End-2012	End-2019	End-2012	End-2019
Volume of pit (Mm^3)	4.91	6.26	0.56	0.97
Volume of overburden/ interburden (Mm^3)	2.14	3.04	0.42	0.70
Volume of ore comprising oxide ore (Mm^3)	2.13	2.58	0.14	0.28
Maximum pit depth (mbgl)	64	115	36	55
Gold cut-off grade (g/t)	0.15	0.25	0.15	0.32

Mining re-commenced in February 2016. Detailed description of the mining and operations activities that commenced in 2016 and ceased in May 2017 was provided in the September 2017 Progress MARCR Report and is summarised below.

3.2.1. Recommencement of Mining (2016)

Mining Process

Ore was mined by conventional drill and blast/load and haul techniques. The majority of ore was crushed and screened prior to stacking on the HLP. A mobile crusher was located on a Run-of-Mine (ROM) pad within the existing footprint of disturbance for the Hannaford Waste Rock Dump adjacent to the HLP. All waste rock not used for construction of the heap ramp, minor modifications and reinforcement of abandonment bunds and upgrades of lay down pads has been disposed in the open pits.

Vertigo Open Pit

Mining the Vertigo pit entailed a cut- back and deepening of mainly the eastern walls within the existing and approved pit area, deepening from 35m to 55m (170mRL). At the end of mining. the in-pit dump and PAF encapsulation was completed.

Hannaford Open Pit

Mining within Hannaford pit entailed a cut-back and deepening of the southwestern, south and north wall areas within the current footprint, deepening of the pit from 60 to 115m (93mRL).

At the end of mining the cut-back in the Hannaford Pit west and south walls deepened the pit to create slopes 122m high. During and post mining PSM conducted geotechnical inspections and an assessment of the final pits.

Ongoing instability of the west and south walls in the Hannaford pit has occurred from the initial stages of mining in 2010 until mine completion in 2017. The exact mode of failure remains somewhat uncertain but PSM have suggested a circular style failure along the west wall. The west wall movements are associated with the West Fault Zone with ongoing failure occurring as the pit was developed down to the base of oxidation (145mRL). Whilst the north and east walls in Hannaford have performed well.

PSM assessed the long-term pit crest position for locating the abandonment bunds using an approach that is more conservative than the WA guidelines. Instability in the south and west walls has affected the Hannaford Waste Rock Dump with a crack evident in the dump toe. Based on the long-term pit crest position or regression of the south wall pit slope crest, the toe of the Hannaford surface waste rock dump could be undermined in the long term. However, PSM confirmed that any change would be gradual (from 12 degrees rehabilitated dump face to a 20 degrees long term pit slope) and any undermining of the dump is unlikely to affect the global dump profile (PSM, 2017). As recommended by PSM the cracks have been graded over in the toe of the waste rock dump to reduce water infiltration and slow the deterioration process. During operations should the wall movement further affect the stability of the toe of the dump it will be re-profiled and revegetated. During any re- profiling works benign waste rock may be borrowed for rehabilitation on the heap leach

Further to this advice PSM conducted another site inspection in January 2018, validating the methodology used to determine the long-term pit crest position and review the post closure risk assessment of the Hannaford pit and waste rock dump. PSM considered, based on their engineering experience and observations of natural slope geometry, the use of lay-back angles to determine the final pit crest positions is appropriate for the rock mass conditions and past performance of the pit slopes at White Dam. PSM used a flatter angle (20 degrees instead of 25 degrees) than the WA guidelines through the west and south walls. PSM revised the long-term pit crest for the west wall at its northern end. However, this revision still indicated that the Hannaford Pit long-term pit crest position is within the proposed abandonment bund locations, as shown in **Figure 3**. The Vertigo Pit long term crest position is shown in **Figure 4**.

The abandonment bunds will be developed outside of this long-term pit crest for both Hannaford and Vertigo. Based on the final pit crest at Hannaford PSM's advice is that the Bulloo creek diversion in its current form will not be influenced by long term regression of the pit slope.

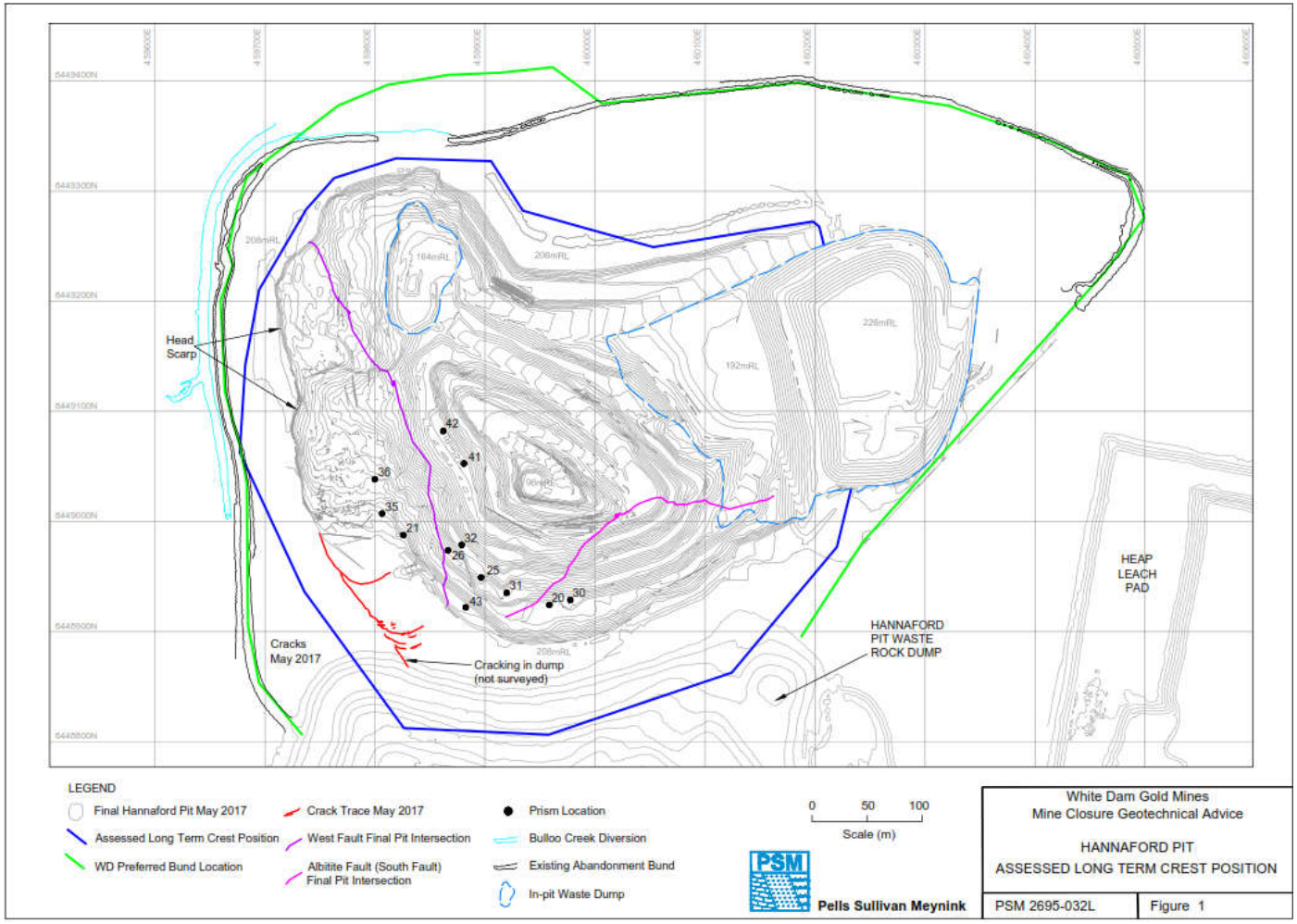

Figure 3: Hannaford Pit Long Term Crest Position

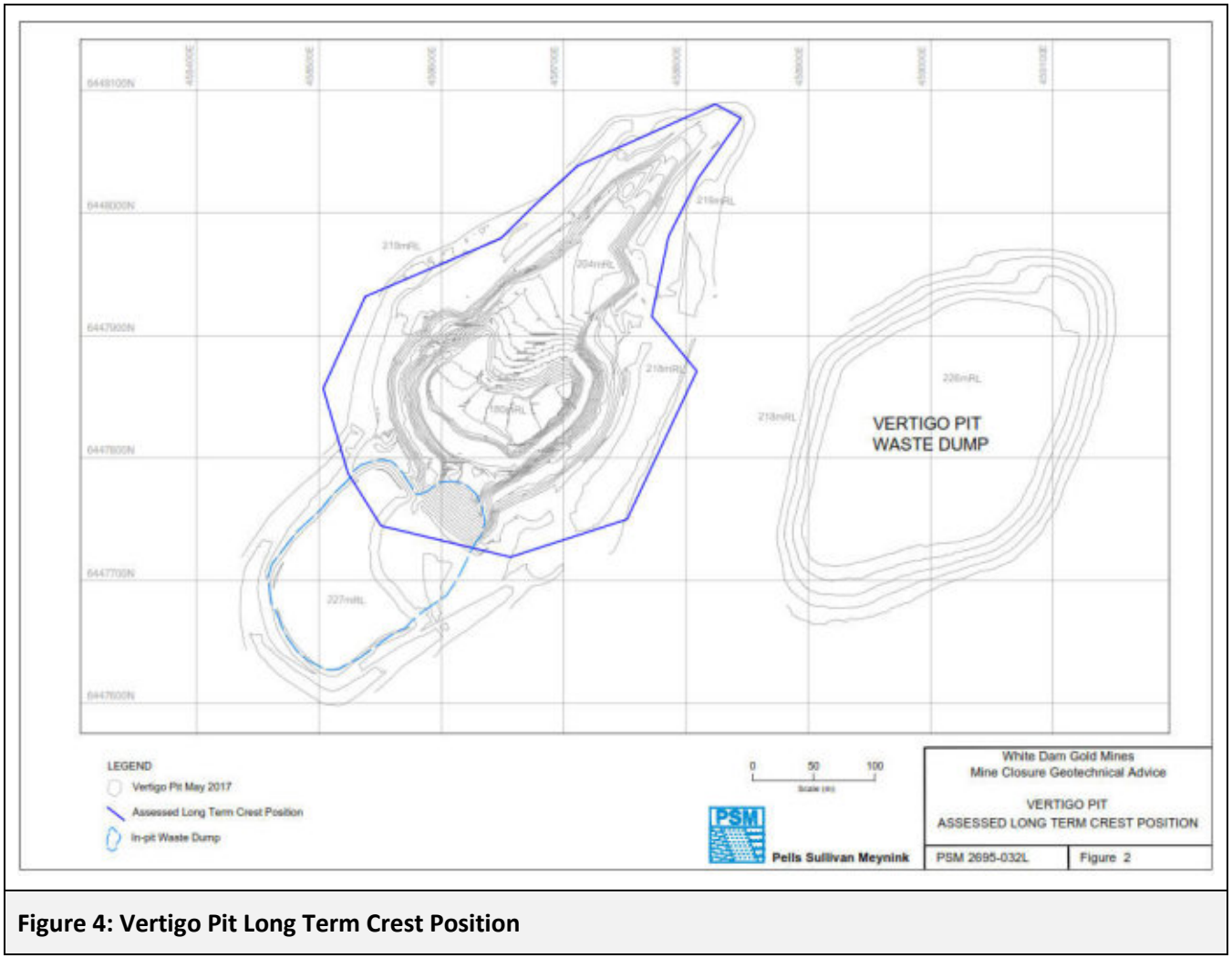

Figure 4: Vertigo Pit Long Term Crest Position

3.2.2. Heap Leach Pad (HLP)

Approval to stack ore on a third lift of the heap leach was granted by DSD in December 2015. Construction of a third lift did not extend the footprint of the HLP. Ore was crushed before stacking on the second or third lift. Stacking was completed 21 July 2017. There were no changes to the operation of the irrigation and processing circuits. All ore placed within the heap leach facility was dosed with hydrated lime. **Figure 5** shows the HLP at the end of 2019.

Figure 5: Photo of completed Heap Leach looking south - three lifts (end-2019)

The heap leach landform at completion will have the following distinguishing features:

- A 2 m high (thick) NAF waste rock bund (the bund) around the future toe of the heap leach pad batter slopes assuming that the batter slopes will be dozed down to 15 degrees to meet the bund.
- The base case cover design on the heap will consist of 0.2 m NAF rock overlain by 0.3 m topsoil.
- Once the cover is on, the whole surface of the heap will be close-spaced contour ripped to limit erosion and encourage vegetation establishment.
- The shaped landform will be surrounded by a containment drain to capture runoff before it reaches the receiving environment. The northwest portion of the heap runoff will be diverted to the Hannaford open pit as a contingency, the remaining surface runoff will be diverted to the ponds.

- NAF rock for rehabilitation of the heap leach as described above will be taken in the first instance from the top of the Hannaford in-pit waste rock dump before removing from the rehabilitated Hannaford surface waste rock dump.

3.2.3. Disposal of Waste Rock in Open Pits

Waste rock from the mine extension was used for either construction purposes (i.e. heap ramp, abandonment bunds, laydown pads etc) or placed in in-pit waste rock dumps. Rehandling waste and backfilling voids to surface was not economically feasible.

A *Waste Rock and Ore Management Plan* (EMM, 2015) was developed in December 2015 to implement site procedures regarding identification of PAF and NAF material, disposal options, construction of in-pit waste rock dumps, etc. Exco developed a 3D Sulphur Block Model, based on existing data and information and adopted the geochemical classification presented in **Table 7** to differentiate between the different types of NAF/PAF material.

Table 7: Geochemical Classification of Waste Rock

Waste rock type	Total S%	Indicative MPA[1]
Non Acid Forming (NAF)	<0.15	4.6
Potentially Acid Forming – Low Concern (PAF-LC)	>0.15 but <0.46	>4.6 but <14
Potentially Acid Forming (PAF)	>0.46	>14

Notes: 1.note that in most instances the NAPP will be lower i.e. ANC ranges from zero to 253 kg H_2SO_4/t

Field testing was completed following the drill and blast programs prior to the mining of each bench. Grade control drill cuttings were tested using handheld x-ray fluorescence (XRF) to identify Potentially Acid Forming (PAF), Potentially Acid Forming – Low Concern (PAF-LC) or Non Acid Forming (NAF) waste rock or ore. **Table 8** presents the total material moved for each type at the end of mining (June 2017).

Table 8: Total material movement at the end of mining 2017 (Tonnes)

Pit	NAF ore	NAF waste	PAF ore	PAF waste	PAF -LC waste
Vertigo	165,112	670,237	173,383	36,894	0
Hannaford	798,108	2,398,282	402,400	106,323	29,789

All waste rock was managed and disposed in accordance with the site's *Waste Rock and Ore Management Plan* with PAF material encapsulated within the in-pit waste rock dump and PAF –LC blended at a 1:1 ratio with NAF.

Waste Rock Disposal in Hannaford Open Pit

The as-built in-pit waste rock dump in the Hannaford Open pit at the end of mining is presented in **Figure 6.** The interim height on the NAF in-pit waste rock dump is approximately 226mRL. This material will be rehandled as cover material during the rehabilitation of the heap leach reducing the final height of the in-pit WRD to well below the approved final height of 220mRL at closure.

The floor of the PAF cell at its lowest point is 167mRL with return of groundwater creating a void lake anticipated at or below 165mRL. The final height of the NAF encapsulating the PAF cell is 193mRL.

PAF exposed on the pit floor and 115mRL switchback at the end of mining was covered over with NAF. The volume of waste material was both surveyed and recorded by truck count during mining. PAF waste encapsulated in the Hannaford in-pit dump was in the order of 55,000m³.

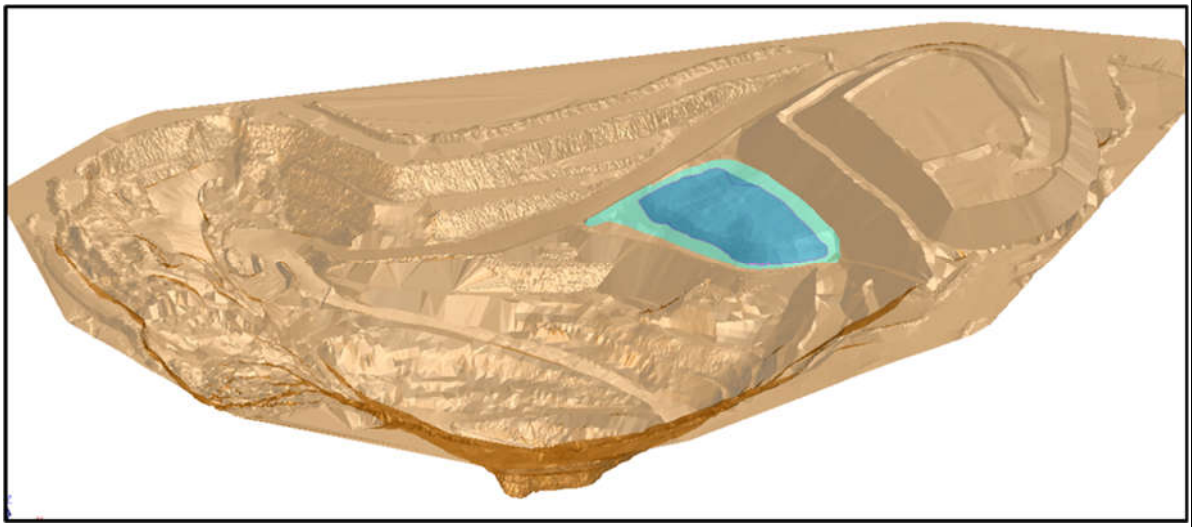

Figure 6: Hannaford Isometric view of Hannaford PAF encapsulation, blue is PAF waste, green is NAF encapsulation, brown is the Final Pit Void

Waste Rock Disposal in Vertigo Open Pit

Waste rock from mining at Vertigo was selectively handled and disposed into its designated cell (encapsulation area) using the same method as for Hannaford. The as-built Vertigo in-pit waste rock dump at the end of mining is presented in **Figure 7.**

The final height of the NAF in-pit waste rock dump within the southern void of Vertigo is 227mRL. The floor of the PAF Cell is 186mRL and final NAF covered height over the PAF cell of 201mRL**.** PAF exposed on the pit floor at the end of mining was covered over with NAF. The actual volume of waste material was both surveyed and recorded by truck count. PAF waste encapsulated in the Vertigo in-pit dump was in the order of 17,500m³.

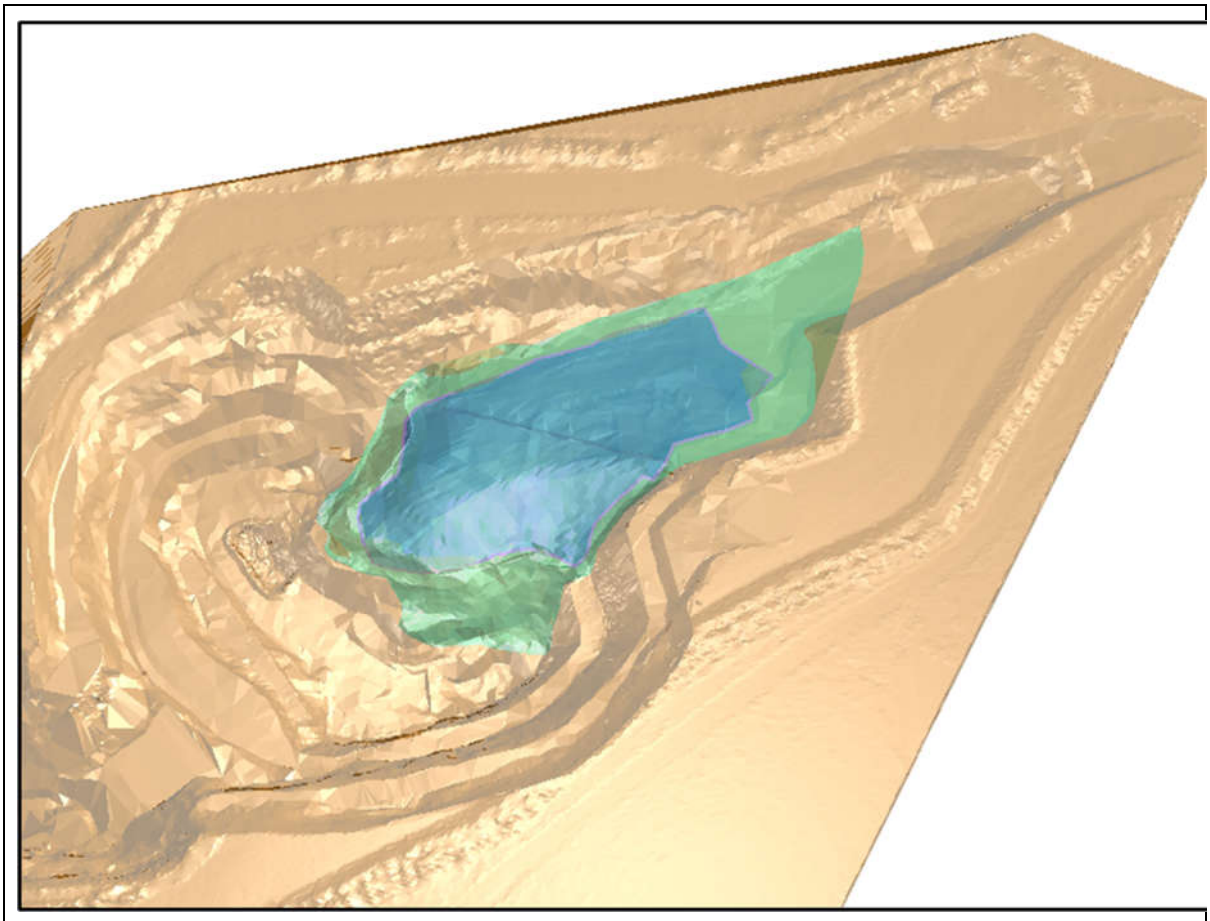

Figure 7: Vertigo in-pit PAF encapsulation, blue is PAF waste, green is NAF encapsulation, brown is the Final Pit Void

3.2.4. Production to Meet Peak Water Demand for Operations

The site has approval to abstract from seven production bores on site. Details for the bores are provided in **Table 9** and their location in **Figure 8**. Except for PB04, the production bores are no longer in active use. Due to the drought conditions at the site, pumping from PB04 has been minimal in 2019.

Table 9: Details of Production Bores

Bore ID	Previous ID	Easting	Northing	RL (mAHD)	Total depth (m)	Bore completion	Current status
PB01	WD75R	460,225	6,449,722	204.59	150	2008	Not active
PB02	TPW1	458,680	6,447,717	221.04	147	2007	Not active
PB03	T1	458,736	6,448,384	215.68	124	2008	Not active
PB04	Trial site WDWMP-A	460,115	6,448,241	216.72	150	2011	Active

Bore ID	Previous ID	Easting	Northing	RL (mAHD)	Total depth (m)	Bore completion	Current status
PB05	WDPIT-01	459,954	6,449,022	154.8	150	26-Nov-10	Lost during mining
PB06	NA (Geotech hole)	459808	6449408	207.55	140 reamed/ (TD will be 150)	18 Mar 2016	Not Active
PB07	MB02/T4	458706	6449669	216.36	150	Oct 2008	Not active

NA: Not applicable as hole not yet constructed and developed as bore

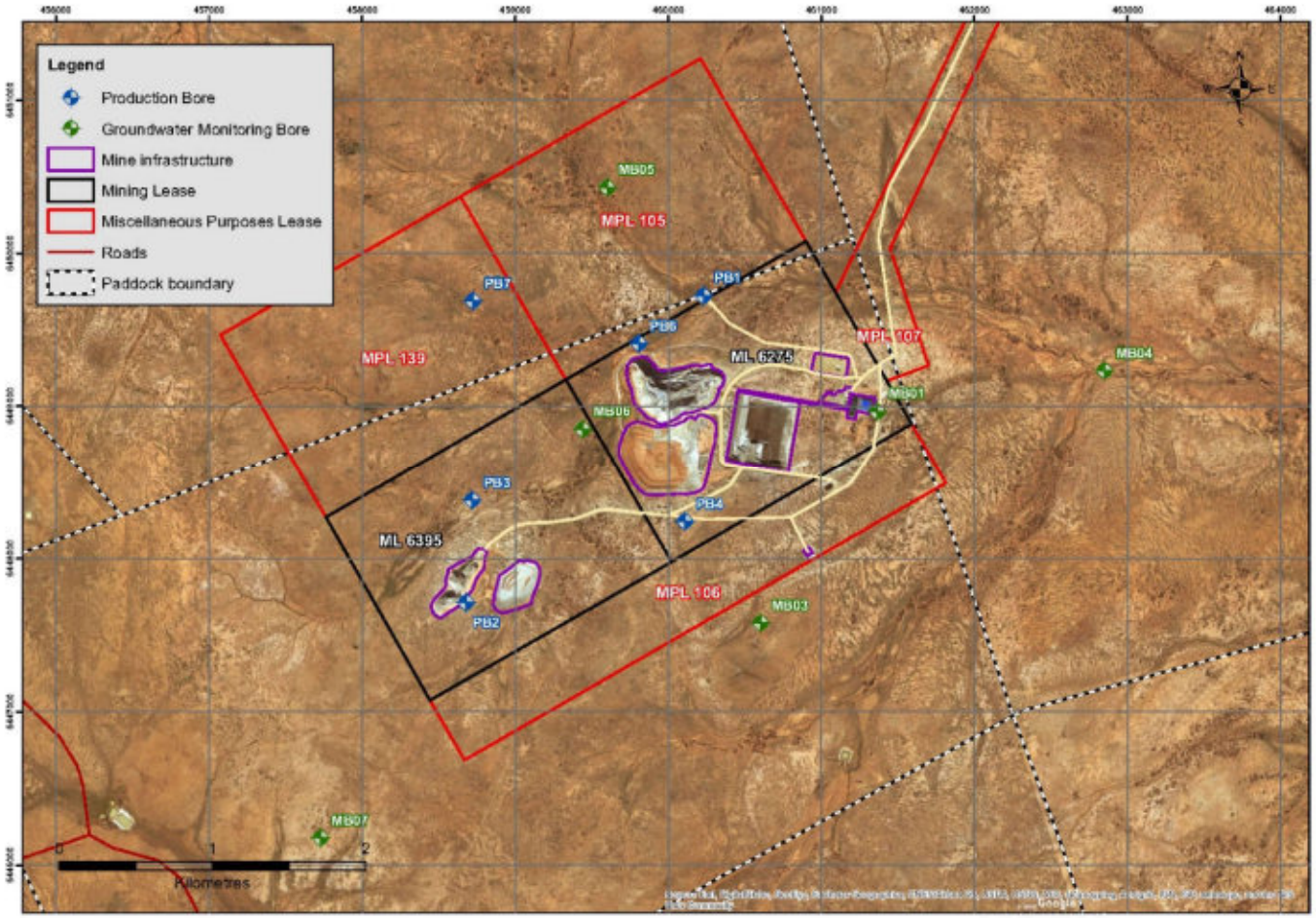

Figure 8: Location of Production Bores for Mine Extension

3.2.5. Continued Process Plant Operation

In 2019, the Adsorption Plant was operated intermittently in the first quarter of 2019 and for seven weeks in November-December. Cyanide dosing continues at a concentration of 230-400 ppm (mg/L). The pumps are not fully utilised as there is low water supply from production bores.

3.2.6. Other Mine Infrastructure

Other mine infrastructure (i.e. workshop, laydown pad, explosive storage, etc.) required for the mine extension were located in the same area/domains as the original mining operations, with the operations fully contained within the approved disturbance footprint of the current project.

The previously rehabilitated contractor lay-down area, Vertigo haul road and some minor site roads that were re-established have been decommissioned in preparation for rehabilitation. Some roads have already been rehabilitated. The Mine Site Layout is presented in **Figure 2**.

3.3. 2019 Mining Volumes

No mining was undertaken in 2019.

3.4. Proposed 2020 Mining Operations

Proposed operation for the 2020 reporting period includes:

- construction of the SART processing plant
- commencement of SART processing in addition to the existing cyanidation process
- on-going heap leaching and plant operations until approximately December 2021.
- rehabilitation of domains no longer required for mining and/or crushing (i.e. roads, ROM Pad, etc.).

3.4.1. SART Processing Plant

In 2020, a SART plant will be constructed adjacent to the heap leach and cyanidation plant (for gold recovery) on previously disturbed land (**Figure 9**).

The combined processes will result in a more effective gold recovery, the use of less cyanide and the production of a potential new source of by-product income from the sale of copper concentrate. SART processing infrastructure will be placed within the pre-existing processing plant disturbance area, resulting in no increase in disturbance footprint.

Figure 9: Location of SART Infrastructure

Except for sulphuric acid (H_2SO_4) and the sulphidisation reagent (sodium hydrosulphide (NaHS) and sodium sulphate (Na_2S)) all other reagents required for SART are already in use at WDGM. Glycine may also be trialled as a potential reagent for future use during the SART process. The use and management of the additional reagents is within the scope of the approved PEPR. They will not contravene the licence conditions, introduce new environmental impacts or require any modification to approved outcomes or measurement criteria

SART process infrastructure is not extensive (**Figure 10**) and will use leach solution from the w-drain before it is processed through the cyanidation process that comprises the following components:

- pipe reactor — used to mix feed solution with H2SO4 prior to entering the nucleation tank;
- nucleation tank — an agitated and baffled mixing tank to promote precipitation of Cu2S by the addition of sulphide (NaHS, Na2S or H2S);
- thickener tank — primary dewatering of precipitated Cu2S to produce a thickened concentrate;
- filtration — secondary dewatering of the thickened concentrate to produce a potentially saleable dry Cu2S byproduct;
- neutralisation tank — used to convert HCN to free CN which is recycled in the cyanidation process; and
- scrubber — used to capture volatile HCN from the nucleation and thickener tanks before diversion to the neutralisation tank to capture free CN.

In addition, a H2SO4 storage isotainer and NaHS mixing and storage tanks are required

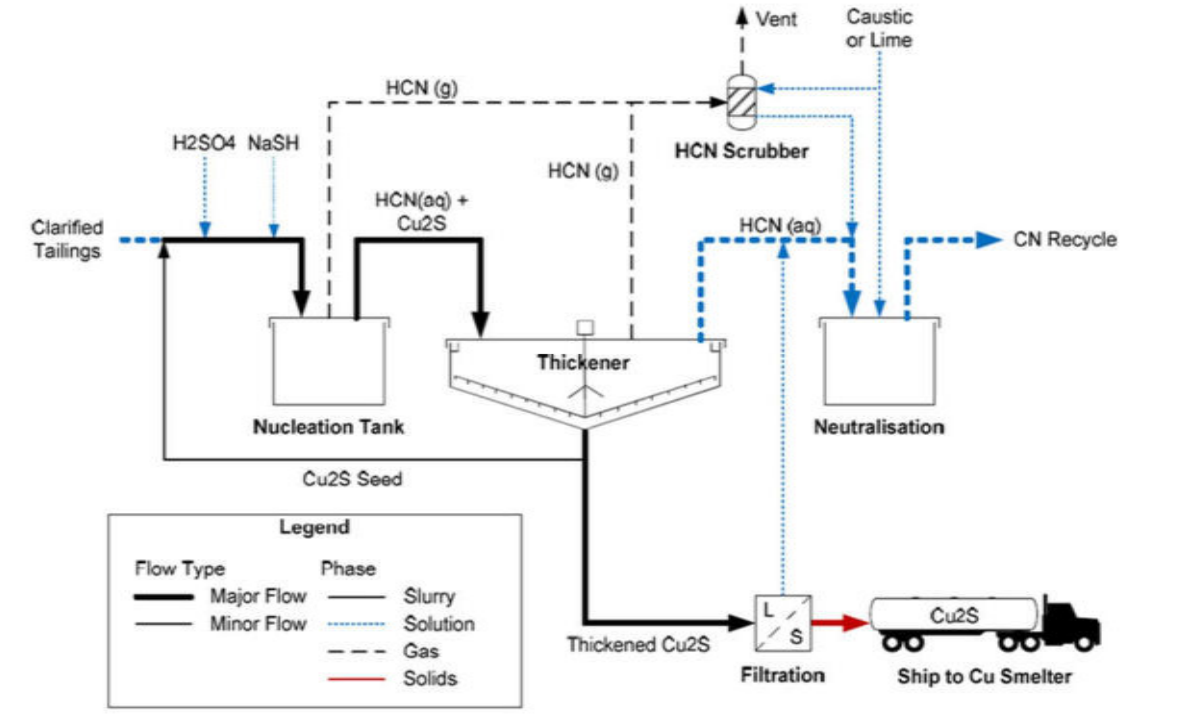

Figure 10: Typical SART Process Infrastructure

The SART process infrastructure will be installed in a concrete bunded area and any spillages will be captured and reused in the leaching circuit. The SART plant will be decommissioned and dismantled as part of the Processing plant. All above ground plant, equipment and infrastructure will be decommissioned and dismantled by:

- washing and cleaning the plant to remove any residual chemicals;
- dismantle plant and remove from mine;
- footings and pipes will be removed to a designated dump site (Hannaford pit);
- reinstate the original landform; and
- rip compacted areas and seed.

4. Ore Reserves and Mine Life

4.1. 2019 Delineation/Exploration Drilling Activities

No delineation or exploration drilling was undertaken during the reporting period across the subject MLs and MPLs to date.

4.2. Review of Ore Reserves

White Dam Resources are classified as Indicated and Inferred and distribution of each varies spatially depending on drilling density and confidence in the Resource.

The Hannaford resource is hosted within weathered to fresh folded biotite-feldspar gneiss. The resource covers an area of approximately 500 m EW and 250 m NS. Maximum depth extends to 120 m below surface. The shape of the mineralized zone in plan is arcuate and is terminated to the south by a steep north-dipping albitite contact and to the SW by a moderate NE-dipping fault.

The Vertigo resource comprises low grade, fine grained, disseminated gold mineralisation, hosted within folded, weathered to fresh biotite-feldspar gneisses and schists which have been metamorphosed to upper amphibolite grade. The mineralisation comprises mainly oxide mineralisation within a shallow south-east dipping undulating zone. The resource measures approximately 800m along strike, 250m wide at its widest point, and extends to a maximum depth of 100m below surface.

Confirmatory drilling was undertaken in both Hannaford and Vertigo pits in 2015 and the results utilised to revise the resource models.

The Hannaford Resource is not JORC (2012) compliant. However, drilling/assay data density at the deposit are reasonably straightforward and very robust mineralisation envelope provides high confidence in the updated mineral resource, especially proximal to the current Hannaford open pit.

An updated resource for the Vertigo (White Dam) gold deposit has been completed in 2016, utilising data from the drilling program conducted in 2015. The resource is not JORC (2012) compliant. However, it does provide appropriate confidence within the 'indicated' section of the resource. Lower confidence 'inferred' material occurs down-dip, in the smaller lenses, and some of this material is contained within the pit optimisation.

A revised resource estimate has been prepared and is shown in **Table 10**. The resource will not be considered sterilised at completion of mining.

Table 10: Mineral Resource Estimate (Non-JORC)

		Indicated			Inferred			Total		
Deposit	Cut-off grade	ktonnes	g/t Au	koz Au	ktonnes	g/t Au	koz Au	ktonnes	g/t Au	koz Au
Hannaford	0.2ppm	498	1.04	17	393	0.85	11	891	0.96	27
Vertigo	0.32ppm	385	1.06	13	756	1.12	27	1,141	1.10	40
Project Total		2,032	1.1	20	1,149	1.0	38	2,032	1.04	67

No review of ore reserves was undertaken in 2019.

4.3. Anticipated Mine Life

Based on the resource modelling undertaken in 2015, it was expected that the Hannaford and Vertigo pits will have an additional operational life of eight to nine months and four months, respectively, with mining of the two pits overlapping. Leaching from the heap leach pad and plant processing of the leachate was planned for approximately 18 months.

Mining recommenced in the existing Hannaford and Vertigo pits in February 2016. Mining was planned for a period of 9 months with leaching planned for approximately 18 months. However, delays in mining and an additional cutback in the Hannaford Pit extended mining until May 2017.

Leaching of the White Dam heap and operation of the SART processing plant will continue until no longer economically viable.

5. Rehabilitation and Environmental Management Activities

Rehabilitation and environmental management activities conducted for the reporting period have been a continuation of measures implemented previously and rehabilitation efforts and activities for those areas that can be rehabilitated, given the end of mining activity.

As part of the environmental management activities, ongoing environmental monitoring was undertaken to assess potential impacts of the past and current mining and operations activities on the surrounding environment. In 2019, this monitoring comprised:

- quarterly groundwater monitoring of groundwater bores (monitoring and regional).
- photo monitoring of Analogue, Rehabilitation and Erosion locations.
- regular checks of w-drain and ponds for fauna.
- weed control and pest monitoring and management (as required).

The operational monitoring program is based on monitoring at a number of locations within and in proximity to the mine operational area. These sites are shown on **Figure 11**.

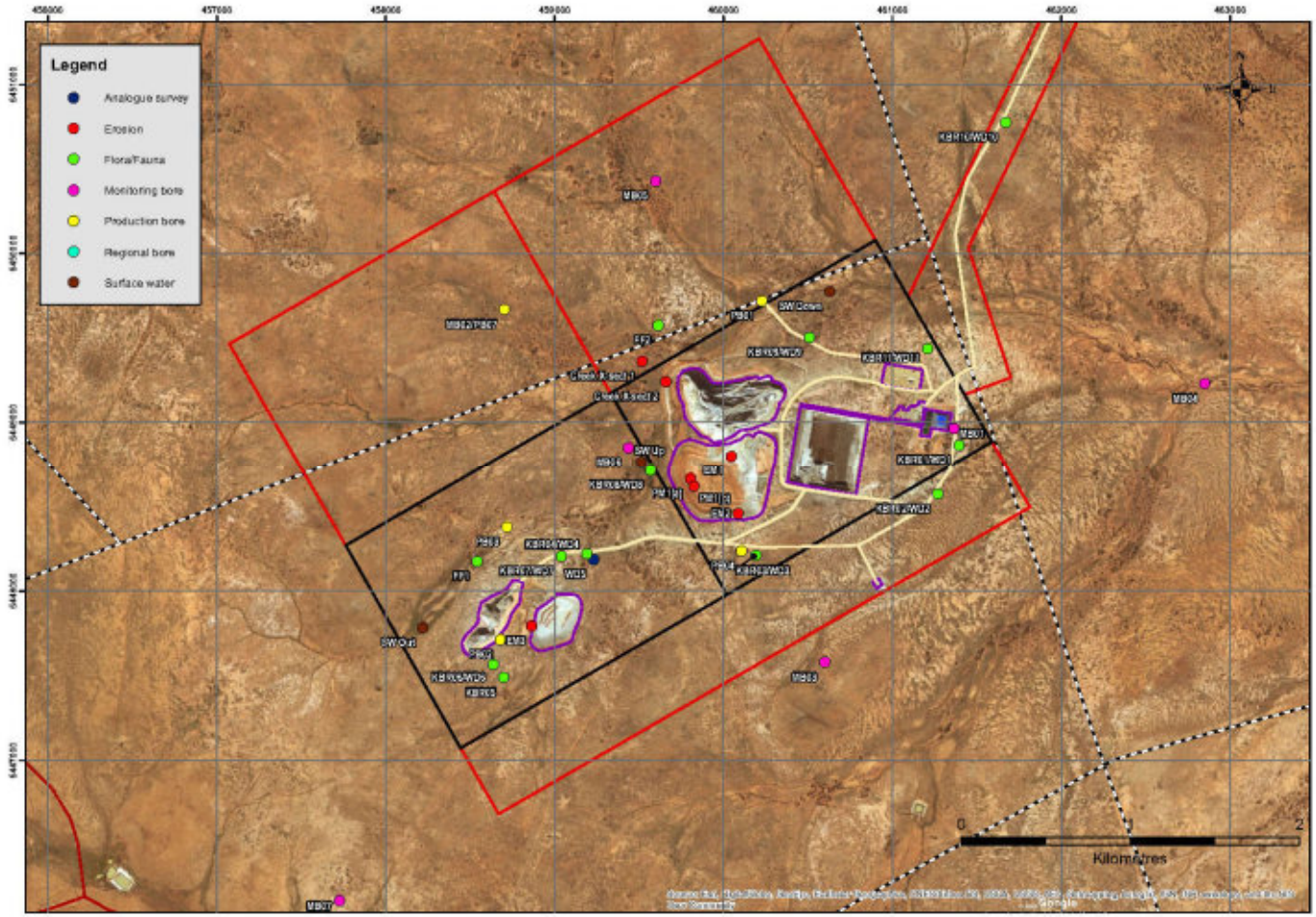

Figure 11: MARCR Monitoring Locations

Technical studies undertaken/reports prepared as part of WDGM's rehabilitation and environmental management activities are listed in **Table 11**.

Table 11: Technical Studies/Reports Relevant to Rehabilitation/Environmental Management Activities

Topic	Report Title	Report Date	Author
Surface Water	Diversion and Flood Protection Bund (extract)	18 July 2014	WRM Water
Geotechnical Stability	White Dam Gold Mine Geotechnical Studies to Support Mine Extension	21 January 2016	Pells Sullivan Meynink (PSM)
Soil	White Dam Gold Mine Leach Solution Spill. Remediation and Validation Report	8 March 2016	Ground Corp Pty Ltd
Groundwater	White Dam Gold Mine Groundwater Impact Assessment for Mine Closure	7 April 2016	WMV Environmental Pty Ltd
Review of PEPR document	PEPR Review	2 May 2016	Exco Resources (WDGM)
Waste rock	Waste Rock and Ore Management Plan	May 2016	EMM Pty ltd
Heap leach	Heap Leach Closure Plan	May 2016	EMM Pty ltd
Mining Progress Report	White Dam Gold Mine Progress Report 2016	1 December 2016	Exco Resources (WDGM)
Compliance	WDGM Annual Mining and Rehabilitation Compliance Report 2016	11 April 2017	Exco Resources (WDGM)
Geotechnical Assessment	White Dam Gold Mine: Mine Closure Geotechnical Advice	10 August 2017	Pells Sullivan Meynink (PSM)
Soil	White Dam Gold Mine Leach Solution Spill. Written Notification	8 September 2017	Exco Resources (WDGM)
Compliance (MARCR) Progress Report	WDGM Mining and Rehabilitation Compliance Progress Report 2017	October 2017	Exco Resources (WDGM)
Geotechnical Stability	Memorandum – Long Term Stability of Pit Slopes	9 February 2018	Pells Sullivan Meynink (PSM)
Review of PEPR document	PEPR Review 3	21 August 2018	Exco Resources (WDGM)
SART Processing	SART Process: Supporting Information for White Dam Gold Mine. Minor Change to PEPR – Level 4	25 July 2019	SGM environmental Pty Limited
Review of PEPR document	PEPR Review 4	10 July 2019	Exco Resources (WDGM)
Waste rock	Column trials. White Dam Gold Mine.	16 October 2019	SGM environmental Pty Ltd

The following sections describe the activities performed for each environmental element of the site during the reporting period. For each environmental element, the prescribed control and management measures of the MARP/PEPR are also referenced. Discussion on compliance is provided in **Section 7**.

5.1. Rehabilitation Activities

Matters described in this section address Sections 10.2 and 10.3 in the MG3 2015 provisional guidelines.

Table 12 compares the area disturbed in the preceding reporting period and the actual area disturbed up to the end of this reporting period.

Table 12 indicates there has been minimal change in the footprint since the previous reporting period, even with the recommencement of mining in February 2016. The table also indicates the area requiring rehabilitation for this reporting period. The areas required for the leach pad (based on ore volumes from the Hannaford and Vertigo pits, including the additional volume associated with the recommencement of mining) and the proposed SART processing plant are significantly lower than the current approved area. The actual process pond area is also substantially lower than the original planned area. Extensive rehabilitation activities across the site will continue in accordance with PEPR Review 4 and following the completion of mining and irrigating of the HLP.

Rehabilitation of the Hannaford surface waste rock dump commenced in mid-2011 and rehabilitation of the Vertigo surface waste rock dump commenced in July 2012. Rehabilitation comprised re-profiling of the batters along with topsoiling. A trial area on the Hannaford waste dump had been previously established to assess the likely rehabilitation outcomes and success for a number of treatment options. Such options included rehabilitation using natural volunteer colonisation for plant establishment, hand seeding using certain selected plant species within both topsoil and mine waste planting medium.

Both the Hannaford and Vertigo waste dump reshaping to final batter profiles plus topsoiling is essentially complete (with the exception of a minor area of the Hannaford WRD used for previous bioremediation activities plus access ramp and adjacent area). Plantings have been completed to supplement natural colonisation.

As the waste rock generated since the recommencement of mining in February 2016 is disposed in-pit, the rehabilitation activities of the existing WRDs have not been compromised nor nullified.

Rehabilitation activities requiring earthworks are planned during the closure of the heap leach pad, once no further gold can be economically recovered from the heap. The introduction of the SART process is anticipated to extend viable leaching until December 2021.

Photographs demonstrating the rehabilitation efforts and monitoring results are presented in **Appendix B**. Due to the severe drought, there was no improvement between 2019 Q1 and 2019 Q4. With respect to 2019, **Appendix B** only includes photos from Q4.

Table 12: Disturbance Areas and Rehabilitation Activities and Progress

Component/domain	Areas (ha)						Description of works (summary)	Forward work plan (reporting period)
	Last Reporting period		Current Reporting Period		Next Reporting Period			
	Planned Area of disturbance	Rehabilitated area @ December 2016	Actual Area of disturbance	Rehabilitated area @ December 2019	Actual Area of disturbance	Rehabilitated area planned for next period		
Process Plant area	0.1	0	0.1	0	0.1	0.1	None	Rehabilitation works planned for 2022, following completion of leaching and SART processing end-2022.
Workshop and laydown area (near Plant)	1	0	1	0	1	1	None	Rehabilitation works completed for 2019
Access roads, camp road and haul roads (actual disturbance in brackets)	27.0 (21.7)	7	14.7	7	14.7	0	All site roads not used for processing activities have been rehabilitated (approx. 7ha).	No further rehabilitation works planned for 2020.
Contractors hardstand and laydown area – (remote from main workshop) (actual area in brackets)	4.64 (4.0)	2	2.0	2.0 (see notes regarding re-clearing in 2016)	2	2	Part of the rehabilitated contractor's area was reused with the recommencement of mining in 2016. The contractor's workshop and equipment has been removed	Progressive rehabilitation works planned for 2023; once SART leaching process is completed. The contractor's workshop and equipment has been removed
Accommodation Village	0.4	0	0.4	0	0.4	0.4	Removal of facilities has been completed, with progressive rehabilitation completed in 2019.	Some minor earthworks and seeding to be done on the camp site. No further rehabilitation planned for 2020.
Heap leach pad (actual area in brackets)	48.9 (20.2)	0	20.2	0	20.2	0	None,	Rehabilitation works planned for 2022, following completion of leaching and SART processing end-2022.

Component/domain	Areas (ha)						Description of works (summary)	Forward work plan (reporting period)
	Last Reporting period		Current Reporting Period		Next Reporting Period			
	Planned Area of disturbance	Rehabilitated area @ December 2016	Actual Area of disturbance	Rehabilitated area @ December 2019	Actual Area of disturbance	Rehabilitated area planned for next period		
Process ponds (actual area in brackets)	6.85 (1.9)	0	1.9	0	1.9	0	None	No rehabilitation works planned for 2020.
Surface waste dumps	32.7	30.2 (mostly completed- vegetative rehabilitation to continue)	32.7	30.2 (mostly completed- vegetative rehabilitation to continue)	2.5	0	Active monitoring undertaken quarterly, grading of cracks at the toe of Hannaford WRD	No rehabilitation works planned for 2020.
Pit(s)	22.67	0	25.6	4.7 (Vertigo Pit) (refer MCN and approved PEPR Review 4 re geotechnical issues)	20.9 (Hannaford Pit)	0	Both Hannaford and Vertigo pits have been mined and waste rock disposed in them. PAF cells encapsulated and Vertigo abandonment bund completed	No rehabilitation works planned for 2020.
Creek diversion	2.5	1.6	2.5	1.6	0.9	0	Continue to monitor diversion. Review flood bund in consideration of final pit crest based on pit stability is complete.	No rehabilitation works planned for 2020.
Levee	1.5	1.5	1.5	1.0	0.5	0	As above	No rehabilitation works planned for 2020.
Airstrip (not to be undertaken)	(4.2)	0	0	0	0	0	n/a	n/a
TOTAL	**148.26 (104.47)**	**42.3**	**102.6**	**46.5**	**65.1**	**3.5**		

* The workshop and crushing equipment will stay within laydown areas until they are required to be mobilized to their next operation.

Summary details in relation to **Table 12** are provided below:

- **The amount of land disturbed**: no land was disturbed in this reporting period over and above that previously disturbed. No additional disturbance area associated with the mining project is proposed above that already disturbed and approved. At decommissioning battering of the side slopes to the required angle on the HLP will increase the current footprint within the approved disturbance area (refer approved PEPR Review 4).
- **Vegetation cleared**: no vegetation was disturbed/cleared in this reporting period over and above that previously disturbed/cleared.
- **Revegetation or rehabilitation earthworks conducted**: These works have comprised the final reshaping of the Hannaford and Vertigo WRDs (almost completed, minor area of Hannaford WRD remains to be reshaped), topsoiling (almost completed) and subsequent rehabilitation works (under monitoring). Rehabilitation activities in the reporting period have comprised the rehabilitation of the Vertigo haul road (light vehicle access remains), abandonment bunds and Vertigo pit apron as shown in **Figure 13** to **Figure 16**.
- **Evidence (by using closure and rehabilitation criteria in the current approved PEPR/MARP) of the effectiveness of rehabilitation**: This is being progressively undertaken. Photo points have been established and monitoring protocols developed and are presented in the approved PEPR Review 4. Closure and rehabilitation criteria are also addressed in the PEPR Review 4.
- **Any problems or potential improvements learned from previous rehabilitation**: There are some areas of gullying on the western face of the Hannaford Waste Rock Dump that will continue to be monitored. It is believed that these gullies have formed where topsoil has been spread too thick (> 300mm) and ripping has cut across contours. Improvement actions will be considered during future closure earthworks if warranted.

In regard to whether rehabilitation may or may not be achieved as planned, given the advanced status of the rehabilitation of both WRDs, there is a very low risk in this regard. Current rehabilitation requirements that have yet to be undertaken revolve mainly around the future closure of the HLP, its subsequent reshaping to the required design profiles and rehabilitation comprising cover and plant establishment. Exco is confident that this work can be successfully undertaken and with a very low risk of failure. Predicted risks have been presented in the approved PEPR Review 4 and an acceptable level of risk can be achieved in all cases for all domains.

Figure 12: Overview of Rehabilitated Areas at the end of mining (2019)

Figure 13: Haul Roads and laydown areas rehabilitated (ripped and seeded in green)

Figure 14: Vertigo Haul Road rehabilitated for light vehicle access only

Figure 15: Vertigo roads and pit apron ripped and seeded (green)

Figure 16: Haul road rehabilitation and abandonment bund restricting access to the Vertigo pit.

Figure 17: Vertigo pit apron inside abandonment bund: topsoil spread, ripped and seeded.

5.2. Assessment of Heap Leach Cover Thickness

As part of the rehabilitation studies, heap leach column trials to determine the appropriate cover thickness of NAF/topsoil on the heap leach pad were completed in 2019.

Three column trials were established above 1.3 metre (m) of heap leach ore in column trials (the cover trials) at White Dam Gold Mine in December 2018:

- 0.5 m soil cover, overlying spent ore.
- 0.2 m soil overlying 0.3 m non-acid forming (NAF) waste rock, overlying spent ore; and
- 0.3 m soil and 0.2 m NAF waste rock, overlying spent ore.

The cover trials were established at densities representative of as-built conditions and instrumented with volumetric water content sensors paired with matric suction sensors (the sensors) at 5 depths. Seepage from the cover trials was measured using a rain gauge tipping bucket under each column.

Over a six-month period since December 2018, 568 millimetres (mm) of simulated rainfall was applied over 14 simulated rainfall events to each cover option to slowly saturate the columns and develop a maximum water balance. The column trials did not show any signs of significant capillary rise.

The water balance of the column trials was measured by calibrated matric suction sensors and VWC sensors. Seepage from the base of the column trials was measured by rain gauge tipping buckets. All three column trials produced approximately the same amount of seepage (~1%).

Following the column trials, the maximum water balance was used to develop a semi-calibrated model in SVFlux. The model used SWCCs, saturated hydraulic conductivities and potential evaporation rates derived from the column trials. The semi-calibrated model showed a reasonable correlation to the observed results and it was accepted that the semi-calibrated model could be used to predict the long-term performance.

Finally, the covers' performance was simulated for a wet, average and dry year to predict the likely long-term performance of the covers had they been built on the heap leach pad. The long-term prediction showed that a cover made of either soil or a combination of soil and waste rock would limit rainfall infiltration. Further, the model agreed with the early findings that rainfall infiltration would not penetrate further then 1 m into the underlying heap leach ore. Seepage was predicted to be under 1% of annual rainfall in the longterm.

By comparison to Australian examples of covers that have been built on mine sites, a cover of 0.5 m cover of soil or soil in combination with waste rock, as proposed at WDGM, is expected to perform comparatively and below the 10% maximum desirable seepage range.

Therefore, the findings of these column trials, that a 0.5 m cover of soil or soil in combination with waste rock is likely required in the heap leach pad, based on cover column trial experiments and modelling, is supported by regional experience.

5.3. Environmental Management Activities – Fauna and Flora

5.3.1. General Outcomes

The White Dam site and general environs are significantly degraded due to previous, pre-mining land use activities (i.e. grazing). Management of flora and fauna issues has nevertheless been a component of environmental management at the site. Reference sites have been previously established in 2010 by Kellogg, Brown and Root (KBR) as per the (then) MARP requirements in regard to control sites that serve as a baseline upon which to judge the effects of mining activity. Other reference sites have also been indicated in the PEPR Review 4.

Recommendations in the MARP included the following with a response to each subsequently presented:

1. *The continuation of the weeds control program e.g. weed mapping and spraying across the mining lease*. A major weed control exercise was undertaken in 2015 and included spraying by a contractor within both the mining and exploration tenements held by Exco. Follow-up monitoring has indicated that the spraying was effective, and no follow-up spraying was required in 2016. Weeds have been actively controlled around operational areas in 2016, 2017 and 2018 (i.e. ponds and heap leach). Due to the severe drought at the site in 2019, weed control was not required. Weed control will continue on as needed basis.
2. *Implementation of weeds removal programs for all weeds, but especially African Boxthorn (which has been identified previously as a weed species of some concern), Noogoora burr and Bathurst burr.* Refer to comments above.
3. *The mapping and monitoring of weed species distributions at the site*: Refer to comments

above.

Pest fauna species recommendations/ requirements included:

- *The implementation of a dingo-dog monitoring program. Any observations of dingo-dogs, tracks presumed to be dingo-dog in appearance and evidence of its presence are documented and this information is passed on to the pastoralists immediately.* No dingo-dog sightings have occurred during this reporting period.
- *European red fox monitoring; fox numbers and evidence of fox presence is documented and this information passed on to the pastoralists:* Undertaken as above. No sightings during this reporting period.
- *The implementation of rabbit control measures and a warren removal program.* Significant controls were implemented in the past in this regard. There is limited evidence of rabbit presence and associated warrens in the ML areas.
- *Any occurrences of wild pigs (including evidence) should be documented and this information needs to be supplied to the pastoralists.* There has been no reported sighting of feral pigs on the lease.
- *The implementation of feral cat control program is required.* Due to concerns raised by a neighbouring pastoralist, a cat trapping program was implemented on the tenements in 2015 and has continued in 2016, 2017 and 2018. The program was not continued in 2019.

Other flora species management recommendations by KBR implemented at site included:

- *Seed collection*. There has been no seed collection during the reporting period. Seed stock collected previously has been used for the seeding of both of the reshaped WRDs. Further seed collection may be undertaken at the site in preparation for and prior to the final reshaping of the HLP and associated cover establishment; and
- The *Gilgai at WD11* remains a No-go Zone. There is no vehicular access permitted to this site in order to prevent any damage to this area.

5.3.2. Flora and Fauna Management and Outcomes/compliance

Table 13 details the current approved MARP(Version 8) /PEPR Version 4 flora and fauna control measures to be implemented and the outcomes for the reporting period.

5.3.3. Vegetation Clearing

No vegetation clearing has been undertaken during the reporting period and no further clearing is proposed. To comply with final rehabilitation batter slopes, some minor clearing will be required around the heap leach pad following cessation of leaching (estimated at approx. 7.3 additional hectares over and above the existing leach pad footprint. This will be undertaken during operations in preparation for closure (as defined in approved PEPR Review 4). Approval is in place for this future clearing requirement. It is noted that there is minimal native vegetation present in this area to be cleared. Topsoil will be stripped for future rehabilitation uses.

5.3.4. Incidents

Daily monitoring of the plant areas and ponds is ongoing with fauna capture and release when applicable. To date, losses are considered to be low and no species of conservation significance have been impacted to date. Losses have been attributed to light vehicle strike (kangaroos) and fauna found in ponds / drains (emus and kangaroos).

Table 13: Fauna/Flora Controls and Compliance

Flora & Fauna Control and Management Measures as per ML conditions	Actions and Outcomes For Reporting Period	Outcome measurement criteria	Compliance (or further work plan actions)
A permanent diversion drain and perimeter bund will be constructed to prevent surface runoff entering the operational areas from the existing natural watercourse. This will result in a permanent change to existing riparian vegetation, off-set by rehabilitation of the creek banks resulting in new riparian vegetation.	Diversion drain/bund and perimeter bund constructed previously. Due to the western wall geotechnical issues, the location and configuration of this bund (and any need for repositioning) has been the subject of assessment by geotechnical consultants as part of the finalisation of PEPR commitments. The end of mine geotechnical assessment indicates the final pit crest will not detrimentally impact the current diversion and flood protection bund. The diversion and bund will be monitored to evaluate erosion effects and vegetation.	Stability of existing diversion drain and associated bund. No evidence of significant erosion that may affect the stability of the drain/bund. No statistically significant difference in Biodiversity Index between 'control' sites upstream and downstream of creek diversion.	Subject to monitoring following significant rainfall and runoff events resulting in channel flow (photo evidence has been collected). This monitoring is to continue until demonstrated that structure is stable.
Annual survey of flora and fauna habitat biodiversity with Biodiversity Index calculated for upstream and downstream control areas.	A flora and fauna survey was undertaken by KBR in November 2011. This has provided the basis of the ongoing monitoring program and rehabilitation compliance. Future vegetation monitoring strategies in regard to completion criteria have been described in the PEPR Review 4.	Refer PEPR Review 4 regarding completion criteria	Refer PEPR Review 4. Vegetation photo monitoring has been conducted on a quarterly basis to provide evidence of stable vegetation conditions on closure (**Appendix B**). A Land Function Analysis Report is to be prepared at mine completion.
Clearance of vegetation to divert the creek is covered by the SEB agreement.	Original estimate (as presented in initial approved MARP) was that a total of approx 214 ha of vegetation would be cleared for the establishment and operation of the White Dam Gold Mine. Actual planned clearance area was estimated to be approx. 148.26ha due to revision to site plans. Under the Native Vegetation Act 1991 (NV Act), a Significant Environmental Benefit (SEB) is required where native vegetation is to be cleared as part of a mining development. The SEB strategies proposed in the NVMP to be implemented at the site and surrounds are as follows:	Area cleared as maximum	Area to be cleared significantly reduced (132.4ha)

Flora & Fauna Control and Management Measures as per ML conditions	Actions and Outcomes For Reporting Period	Outcome measurement criteria	Compliance (or further work plan actions)
	a) Exclusion of some of the grazing pressure from stock by erecting fences. Outcome: mine site has been fully fenced previously	Fencing of ML	Fencing compliant for operational phase. Fencing requirements for closure have been described in the PEPR Review 4.
	b) Control of pest plants and herbivores throughout the lease areas and grazing enclosures. Outcome: controls implemented (refer previous comments)	Refer previous comments	Controls compliant
	a) Financial and technical assistance for the management of pest species in the Bimbowrie Conservation Park. Outcome: Financial assistance has previously been provided in full. Report on use of these SEB funds has previously been received from park manager (Ian Falkenberg). Implementation of the approved SEB strategies has been carried out in accordance with the agreement.	Assistance to be provided in accordance with agreement	Compliant
Leach pad, launders and process ponds to be fenced to exclude stock.	The mining lease housing the leach pad, launders and process ponds is fully enclosed by a stock-proof fence, including a grid at the access point to the lease. Process ponds and drains from HLP have also been fenced. These remain in place.	Stock-proof fence around lease that contains facilities	Compliant
Leach pad, process ponds and launders to be rinsed following cessation of processing.	Implementation of this procedure has been described in the PEPR Review 4 and appendix HLP Closure Plan. Rinsing will not commence until there is no economical gold recovery from the HLP.	Compliance criteria described in PEPR Review 4.	Not applicable at this stage given the recommencement of cyanide application on the HLP and the proposed SART plant
All deaths of terrestrial fauna discovered in operational areas to be reported and investigated with corrective actions implemented to prevent recurrence.	No significant native species deaths occurred in the reporting period (refer below). Deaths of native fauna in operational areas are recorded and corrective actions implemented as appropriate.	All native fauna incidents to be reported and investigated	Compliant.

5.4. Environmental Management Activities – Groundwater

5.4.1. General Outcomes

Groundwater monitoring and sampling has been undertaken during the reporting term. New data is reported herein. The groundwater monitoring program included the monitoring and sampling of 7 monitoring wells and 5 regional, pastoral bores, if accessible and not dry.

Figure 18 presents the location of the monitoring, production and regional (pastoral) bores. With respect to the regional monitoring bores, monitoring/sampling was not always possible, due to inaccessibility (e.g. presence of pumps) or the bores being dry. All groundwater analytical reports for this reporting period are provided in **Appendix C**.

The main regional monitoring bore is Gum Bore – a pastoralist bore located on the Bindarrah pastoral lease. This is the nearest operating well to the Mine site (**Figure 18**). Maintaining and preserving the quality of water from Gum Bore and the prevailing water level is a specific environmental measurement outcome in the approved PEPR Review 4.

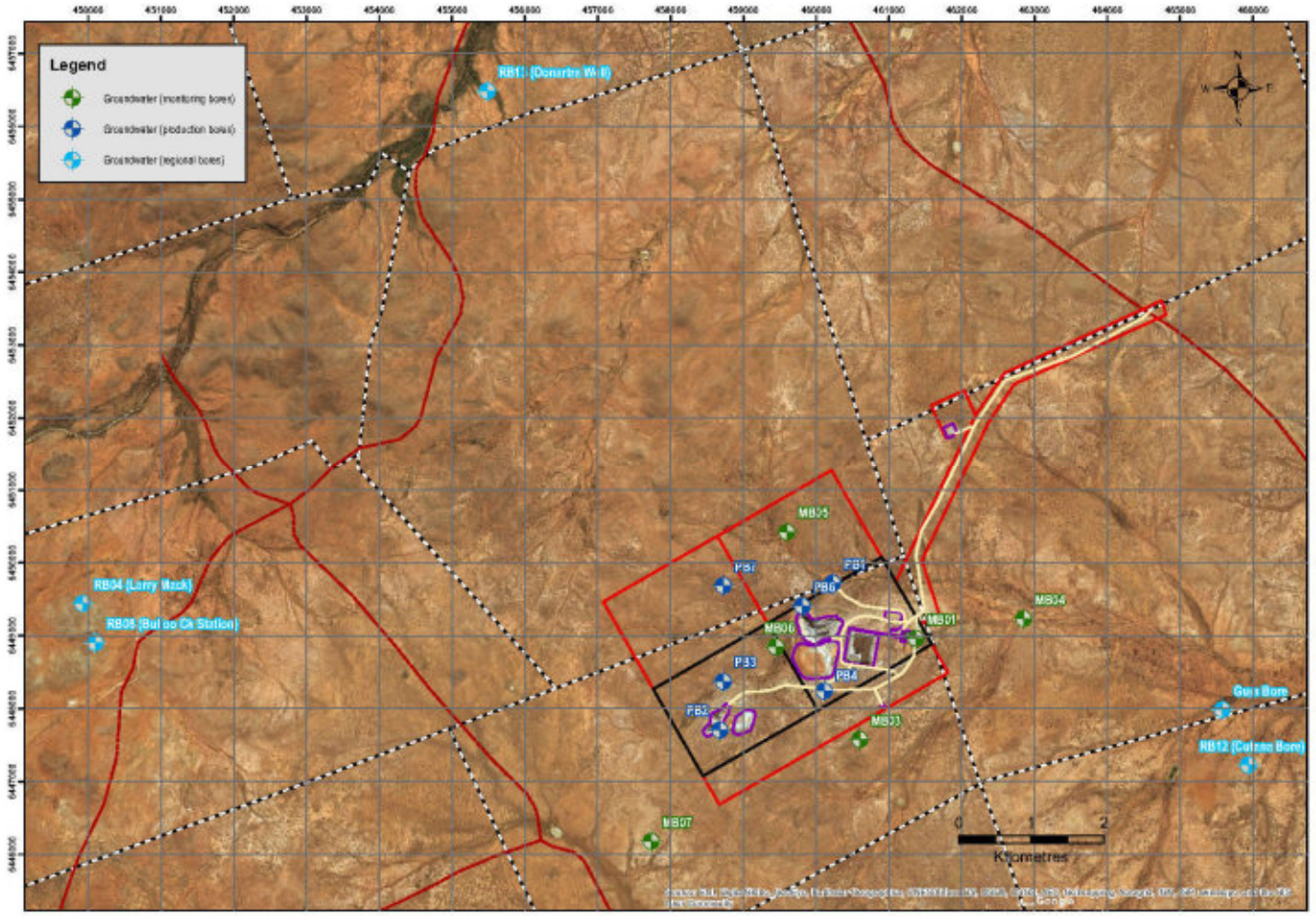

Figure 18: Groundwater Monitoring, Production and Regional (Pastoral) Bore Locations

Gum Bore produces low yields of low salinity waters. Both the past and recent groundwater assessments indicate that the aquifers at WDGM and at Gum Bore are not connected. This has been confirmed through monitoring during current and previous reporting periods. Monitoring results (**Figure 19**) indicate minimal change to water levels in Gum Bore during the reporting periods and there has also been little change relative to pre-mining levels. Similarly, salinity levels remain well below the 3000mg/L TDS compliance criterion.

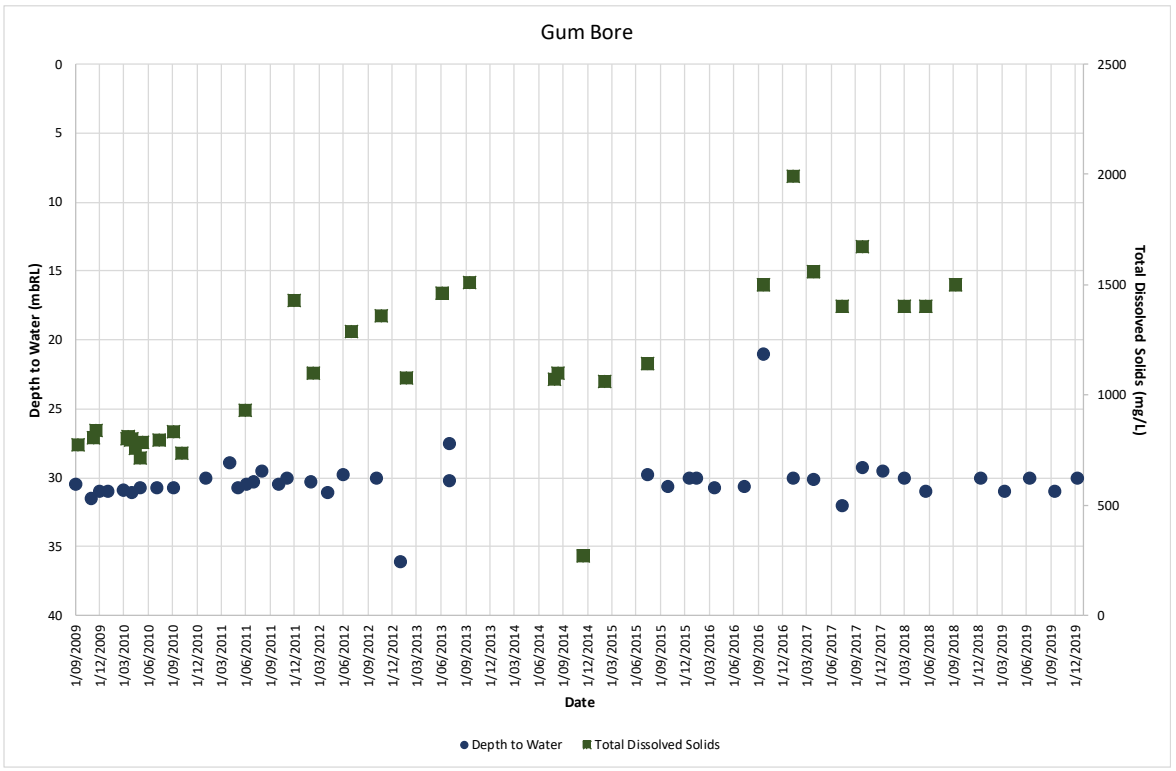

Figure 19: Gum Bore Water Levels and Salinity

5.4.2. Groundwater Monitoring Results

Table 14 and **Figure 20** present groundwater levels measured in the mine site monitoring bores located adjacent to the operations area. All levels are given in metres below top of casing. Levels were measured in December 2019.

Table 14: Monitoring Well Groundwater Level Summary

	MB01	MB02	MB03	MB04	MB05	MB06	MB07	Gum Bore
Pre-mining Depth to Water	50.08	34.12	52.56	44	49.92	30.48	41.65	30.98
Latest Depth to Water Level – Dec 2019	50	47	50	43	87	50	42	30
Change in Water Level	0.08	-12.88	2.56	1	-37.08	-19.52	-0.35	0.98

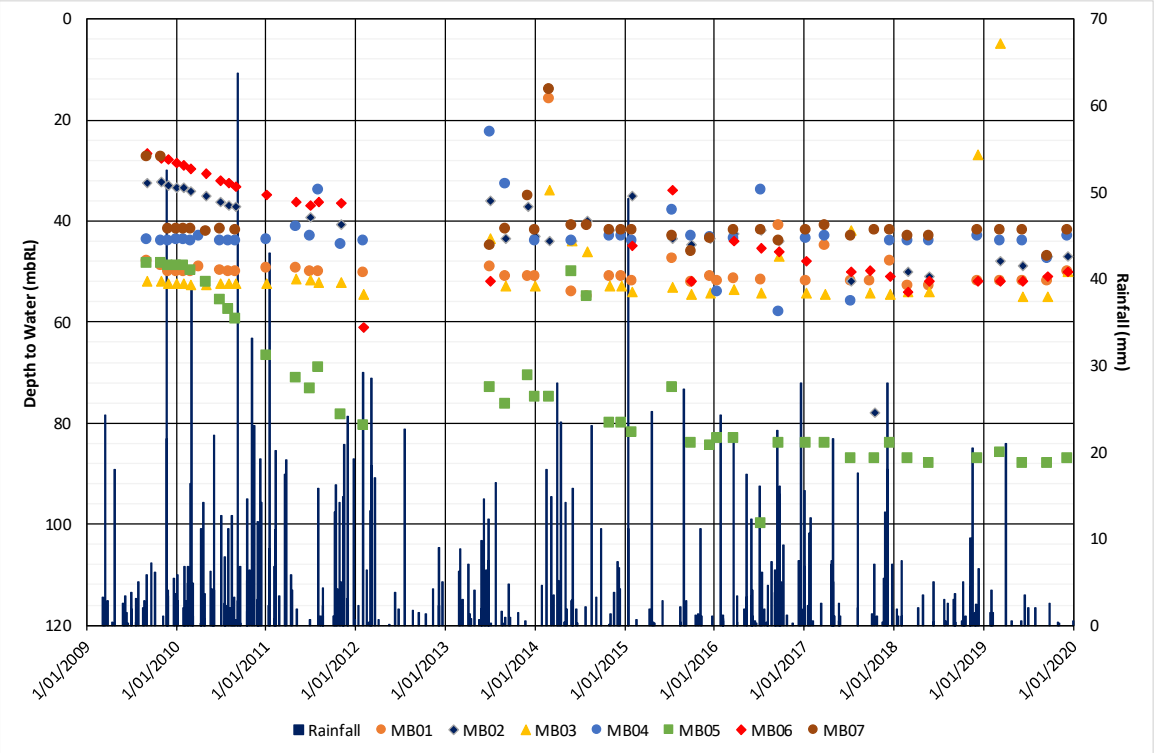

Figure 20: Groundwater Levels in Monitoring Wells (MB)

Monitoring bores MB02, MB04, MB05 and MB06 show declines in groundwater levels in excess of 7 metres, with a substantial decline in MB02 and MB05. However, MB02 was historically used during operations for abstraction of groundwater. The groundwater level plot (**Figure 20**) does show that groundwater levels in bores MB02 and MB05 decline very quickly between 2009 and 2011. This rapid decline is most likely associated with dewatering of water-bearing fractures during the early years of groundwater abstraction for mine water supply.

Figure 20 also shows that groundwater levels in these bores have remained relatively stable since early 2012, with a recovery of groundwater levels in MB02 since 2018. Fluctuations in groundwater levels most likely reflect variations in groundwater abstraction at the site and in rainfall recharge. These marked fluctuations are expected to continue until cessation whereupon the original baseline level is expected to recover rapidly. MB06 has a significant initial reduction but this is also expected to recover with cessation of groundwater extraction.

As is noted below, there has been no observable effect on regional bore water levels (**Figure 21**). **Figure 21** below indicates that there has been minimal change to bore water levels in most regional bores during this and previous reporting periods, with the exception of periodic rises during wet periods.

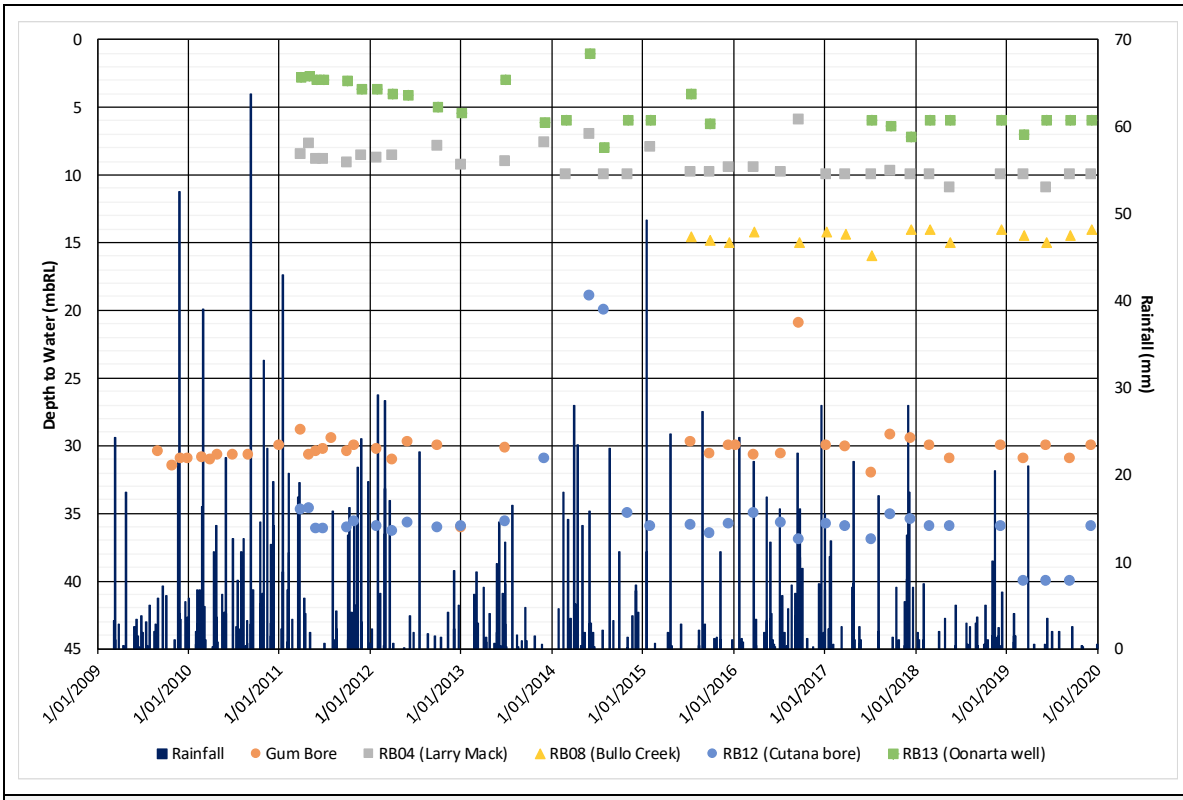

Figure 21: Groundwater Levels in Regional Pastoral Bores (RB)

Figure 22 presents salinity levels measured in the mine site monitoring bores located adjacent to the operations area, whilst **Figure 23** show salinity levels in the regional bores. This data continues to show minimal changes to salinity levels that are within expected natural fluctuations.

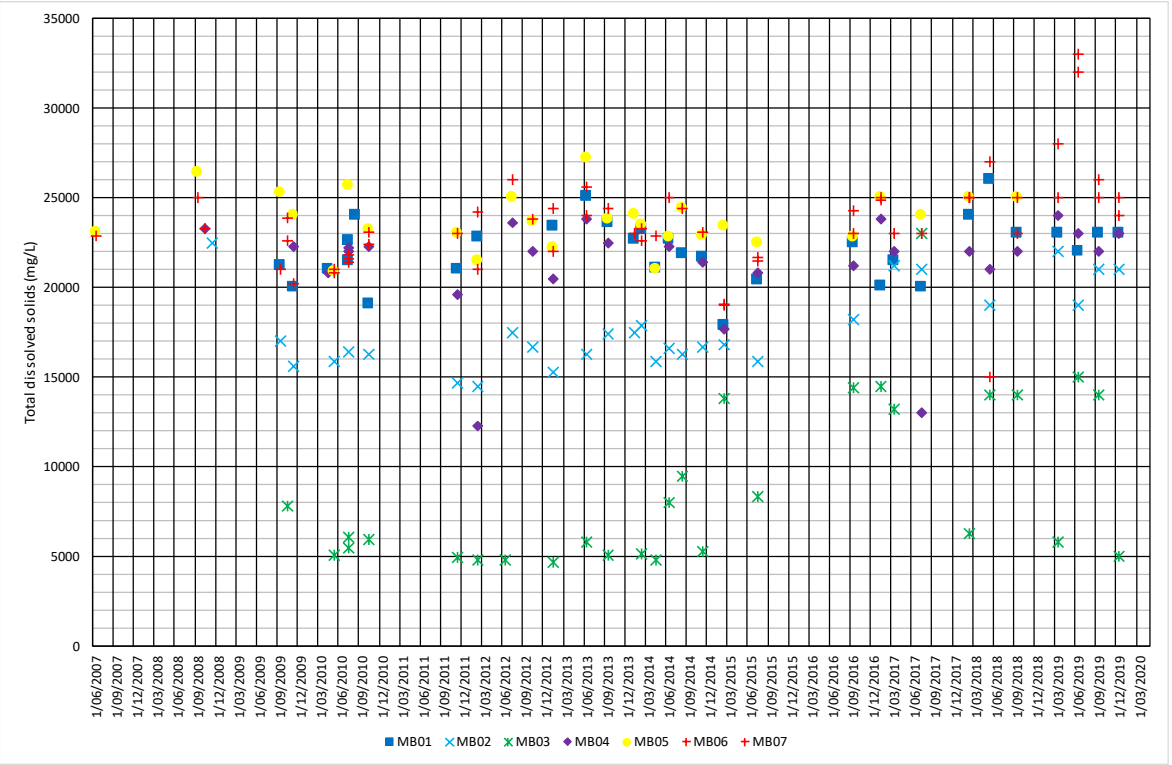

Figure 22: Groundwater Salinity Levels in Monitoring Wells

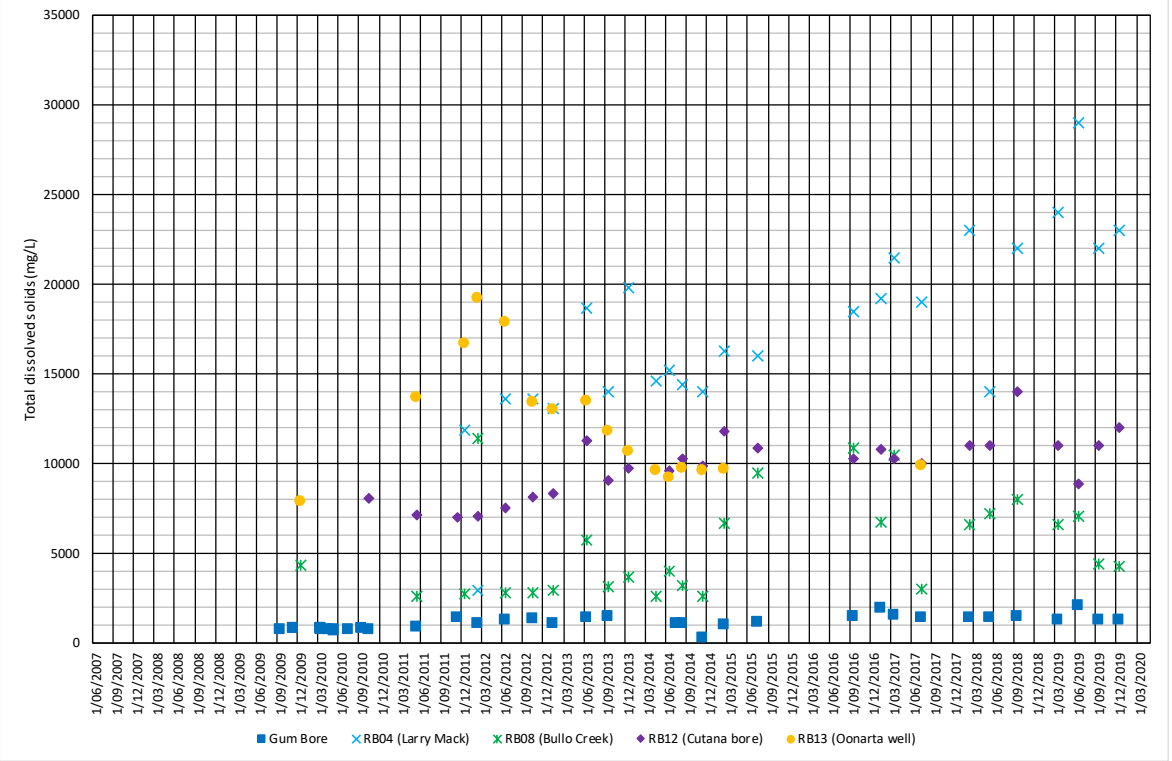

Figure 23: Groundwater Salinity Levels in Regional Pastoral Bores

5.4.3. Other Groundwater Quality Data

Laboratory documentation and analysis results of samples collected from the monitoring wells and regional bores during the reporting period are included in **Appendix C**. Groundwater sampling events relevant for this reporting period were undertaken in March, June, September and December 2019. In all cases, data is consistent with pre-development levels.

5.4.4. . Groundwater Management and Outcomes/Compliance

Table 15 indicates the outcome measurement criteria from the MARP/PEPR and compliance achieved during the reporting period.

5.4.5. Incidents

No actual groundwater-related incidents occurred during the reporting period.

Table 15: Groundwater Outcomes and Compliance

Groundwater ML Conditions and Outcome Measurement Criteria	Actions for reporting period	Outcomes and Compliance (or further work plan actions)
Leading Indicator: Drawdown at 2km from MPL to be no more than 5m (from pre- mining standing level) after 1 year of pumping and no more than 7m (from pre- mining standing level) after 2 years of pumping	Continued quarterly monitoring and sampling	Compliance achieved. Four of the eight bores shown in **Table 14** show drawdown levels greater than 7 metres (i.e. MB02, MB03, MB05 and MB06). It has been found that the bores which show a drawdown of >7m are within the 2km measurement zone so drawdown at 2km and beyond is considered likely to be within this compliance level (no effect has been observed at regional bores - see above regarding Gum Bore). MB06 has significant drawdown; however, water levels are expected to indicate recharge in the future due to cessation of mining and associated extraction. It has been continually demonstrated during the course of the mining and groundwater extraction operations that drawdown effects have been localised in scale. It is also noted the site received below average rainfall during this period.
The pastoralist has agreed that if the salinity of the water in Gum Bore reaches 3,000 TDS, his use of the water will be adversely affected. Thus, the trigger point (criterion) for remedial actions will be reached at 3,000 TDS.	Continued quarterly sampling	Compliance achieved. Salinity levels in Gum Bore remain overall stable, and well under the compliance level of 3,000 mg/L TDS
No incidence of cyanide detected in monitoring bores	Sampling conducted. CN sampling and analysis procedures have been addressed with protocol developed.	Compliance achieved. Cyanide levels in monitoring bores remain below 0.004mg/L (as per laboratory detection limit).

5.5. Environmental Management Activities – Surface Water / Sediment

5.5.1. General Outcomes

The MARP/PEPR requires that there be no statistical difference in water quality between upstream and downstream sites, with samples collected during opportunistic sampling of periodic surface flow events. During this reporting period, one surface water sampling event was undertaken on 25 March 2019 following a rainfall event that made the creeks flow.

5.5.2. Water Sampling Results

Photos of the upstream and downstream creek sampling location at the time of surface water sampling are presented on **Plate 1.**

	
Upstream Location	Downstream Location

Plate 1: Views of Upstream and Downstream Surface Water Location (2019 Q1)

Laboratory documentation and analysis results of surface water samples during the reporting period are included in **Appendix D**.

Cyanide concentrations were below the detection limit in the upstream and downstream surface water samples.

Analysis results indicate that there is no statistical difference between upstream and downstream surface water sample for physico-chemical parameters and nutrients. Alkalinity, anion and metal concentrations increased downstream. However, this is probably due to the leaching of these compounds from the soil during flow events. All levels were typical for the rural environment and were consistent with pre-development baseline sediment sampling.

5.5.3. Surface Water / Sediment Management and Outcomes/Compliance

Table 16 indicates the outcome measurement criteria from the MARP/PEPR and compliance achieved during the reporting period.

Table 16: Surface Water / Sediment Outcomes and Compliance

Outcome Measurement Criteria	Actions for reporting period	Outcomes and Compliance (or further workplan actions)
No statistically significant difference in water quality attributable to the operation measured between upstream and downstream samples collected during opportunistic sampling of periodic surface water flow events	Sampling conducted for surface water in March 2019.	Compliant. Sampling has indicated that all parameters measured were in compliance with relevant quality guidelines and consistent with baseline conditions.
Photographic record of flow paths during flow events to detect any flow restrictions	Photos taken during flow events (see **Plate 1**).	Compliant. No flow restrictions are evident on site.

5.5.4. Incidents

No surface water or sediment-related incidents occurred during the reporting period.

5.6. Environmental Management Activities – Air Quality

The current land usage of the site and surrounds is low intensity grazing and mineral exploration. Due to the distance from sensitive receivers to project infrastructure and the relatively small size of the mine there are minimal impacts from dust.

While dust sampling was in place for the duration of previous mining operations (2010-2012), there has been no dust issues with operations or community complaints. Dust emission levels have always been compliant with approval conditions; therefore, recommencement of regular dust monitoring was not considered necessary with the short recommencement of mining.

Any valid air quality complaint will be investigated and dust monitoring conducted where required.

5.7. Mine Completion Planning

All details of the proposed mine completion activities and associated compliance standards that will apply at closure have been documented as part of the mine completion planning process.

Mine completion planning has been undertaken by Exco for the last five years. Chronology of the planning is presented in **Table 17**.

Table 17: Chronology of Mine Completion Planning Activities

Date	Who	Description
3 April 2009	PIRSA	Approval of Mining and Rehabilitation Program (MARP) Rev. 5. Note: due to due to the continued development of the operational strategy, some amendments to the MARP have been necessary in 2009.
11 February 2011	PIRSA	Approval of MARP Rev.7.
1 July 2011	-	Amendments to the Mining Act 1971, replacing MARPs by Programs for Environment Protection and Rehabilitation (PEPRs). Previously approved MARPs are deemed to be PEPRs.
December 2011	Exco	Submission of PEPR, which is MARP Rev 8.
January 2012	DMITRE	Approval of PEPR, which is MARP Rev 8.
July 2012	Exco	Submission of revised MARP to DSD, formerly DMITRE.
7 September 2015	Exco	Submission of amended *Mine Completion Plan* (MCP) to DSD, seeking provisional approval with the MCP conditions.
23 December 2015	DSD	DSD response requesting a *revised Program for Environmental Protection and Rehabilitation* in light of the Minor Change Notification (MCN) to recommence open pit mining in 2016. DSD also advised that they would no longer accept the mine closure and completion plan as an addendum to the current approved PEPR. The revised PEPR is to incorporate the Mine Completion Plan, MCN matters and include a review of the Rehabilitation Liability for the site.
2 May 2016	Exco	Submission of reviewed PEPR to DSD. December 2016 provision of Heap Leach Closure Criteria and Cover Column Trial to DSD for comment.
22 September 2016	DSD/Exco	PEPR Review Workshop: measurement criteria for the closure of the Heap Leach Pad.
17 January 2017	Exco	Updated Measurement Criteria and Leading Indicator Criteria for the Heap Leach Pad for DSD review prior to resubmitting the PEPR Review.
30 August 2017	DSD	DSD feedback on Measurement Criteria for the PEPR review. DSD requested PEPR be resubmitted within 3 months (30 November)
November 2017	Exco	Planned submission of revised PEPR, addressing DSD comments
November 2018	Exco/DEM	Approved PEPR Review 3
September 2019	Exco/DEM	Approved PEPR Review 4

6. Operations Summary

6.1. Disturbance Areas

As discussed in the MCN lodgement, the recommencement of mining operations in 2016 did not significantly increase the approved disturbance footprint. Information about the areas on the mining tenements that have been disturbed by mining operations to the end of 2019 and the rehabilitation status of each area at that time is provided below in **Table 18**.

Table 18: Summary of Disturbance Areas at the End of 2019

Component	Original planned disturbance area (2007)	Revised total planned disturbance area	Actual disturbed area		
			@ Dec 2014	@ Dec 2016	@ Dec 2019
Domain 1: Infrastructure areas					
Process Plant area	0.1	0.1	0.1	0.1	0.1
Workshop and laydown area	1	1	1	1[1]	1[1]
Access roads, camp road and haul roads	13.95	21.67	14.7	14.7[2]	14.7[2]
Hardstand and laydown area (remote from main workshop incl. contractor)	1	4.0	4.0	4.0[3]	4.0[3]
Accommodation Village	0.4	0.4	0.4	0.4[4]	0.4[4]
Domain 2: Heap Leach Pad and Ponds					
Heap Leach Pad	48.9	27.5	20.2	20.2	20.2
Process Ponds	12.98	1.9	1.9	1.9	1.9
Domain 3: Waste Rock Dumps					
Waste Rock Dumps	35.7	32.7	32.7	32.7[6]	32.7[4]
Domain 4: Active Mine and Voids					
Pit(s)	15.3	22.67[6]	22.67[6]	25.57[7]	25.57[7]
Creek diversion	0.68	2.5	2.5	2.5[5]	2.5[5]
Levee	2.4	1.5	1.5	1.5	1.5
Total	**132.41**	**115.94**	**101.67**	**104.57**	**104.57**

[1] Partially rehabilitated (but not attained required final standard); area will now be reused for 2016/17 mining activities
[2] Estimate; access track to Vertigo had previously been partly rehabilitated
[3] Earthmoving contractors' area had been rehabilitated with all facilities removed –reused half for 2016/17 activities
[4] partially rehabilitated; area of reshaping and rehabilitation for WRDs; very minor additional area to be shaped
[5] Refer text regarding relocation of diversion bund
[6] Includes Vertigo and Hannaford Pits
[7] Includes Vertigo and Hannaford Pits (mine extension (southern wall slip) and cutback approved in MCN)

7. Compliance with Outcomes

7.1. Compliance with Operational Outcomes and Leading Indicator Criteria

Table 19 addresses the criteria presented in Table 7.3 in the current approved MARP/PEPR (i.e. operational matters mainly).

7.2. Compliance with Mine Closure Outcomes

Table 20 addresses the criteria presented in Table 8.1 in the current approved MARP/PEPR (i.e. mainly closure and rehabilitation matters).

7.3. Compliance with Non-Outcome Based Mine Lease Conditions

In accordance with the MG3 provisional (2015) guidelines, **Table 21** indicates compliance with non-outcome based lease conditions.

Table 19: Compliance with Operational Outcomes

Environmental risk	Aspect	Outcome and Measurement criteria	Works Performed/actions summary and evidence	Determination of Compliance
Groundwater and Surface Water	Flora protection Fauna disturbance	No statistically significant difference in Biodiversity Index between 'control' sites upstream and downstream of creek diversion.	To be subject to detailed assessment on the existing creek diversion.	**Compliant** (refer **Section 5.2**)
	Protection of surface water courses	No statistically significant difference in water quality attributable to the operation measured between upstream and downstream samples collected during opportunistic sampling of periodic surface water flow events.	Refer **Section 5.5**. No differences in sediment or surface water quality between upstream and downstream demonstrated.	**Compliant**. Water quality compliance for metals and CN indicated no evidence of adverse impact.
		Photographic record of flow paths during flow events to detect any flow restrictions.	Records maintained	
	Protection of stock water supply	Leading indicator: Drawdown at 2 km from MPL to be no more than 5 m (from pre-mining standing level) after 1 year of pumping and no more than 7m (from pre-mining standing level) after 2 years of pumping. The Pastoralist has agreed that if the salinity of the water in Gum Bore reaches 3,000 TDS, his use of the water will be adversely affected. Thus, the trigger point (criterion) for the actions listed in the previous column will be reached at 3,000 TDS.	Refer **Section 5.4**	**Compliant** No regional bores affected. Gum Bore indicators all acceptable with no evidence of adverse impact
Erosion	Protection of flora and habitat due to erosion	Annual change-map (GIS) to indicate progressive rehabilitation.	Change map to be maintained	**Partial Compliance** Change map to be provided in next annual report
		No statistically significant difference in water total suspended solids (TSS) attributable to the operation measured between upstream and downstream samples collected during opportunistic sampling of periodic surface water flow events.	Refer **Section 5.5.** To date, surface water samples have been analysed for TDS, not TSS. Samples when available will be analysed for TSS from 2020 onwards.	**Partial Compliant**
		No statistically significant difference in dust deposition between Mining Lease gauges and control gauges.	Refer **Section 5.6**	**Compliant**. Dust monitoring ceased due to completion of mining. Dust deposition minimal based on visual assessment.

Environmental risk	Aspect	Outcome and Measurement criteria	Works Performed/actions summary and evidence	Determination of Compliance
Cyanide	Injury to flora and fauna	No change in biodiversity index.	Refer **Section 5.2**	**Compliant** No fauna /flora incidents.
	Protection of soil and water	No incidence of cyanide detected in monitoring bores.	Refer **Section 5.4** regarding CN monitoring outcomes.	**Compliant**
	WRD stability and Acid generation	Formed waste dump final slope angle to be no greater than 15°.	WRDs established to have final slope angle no greater than 15°	**Compliant** Negligible potential for significant acid generation from either WRD due to absence of significant volumes of acid generating waste material (as reported in approved PEPR Review 4)
		Runoff water samples collected during opportunistic sampling of periodic surface water flow events, with pH to be greater than pH 5.	No runoff water samples able to be safely collected in period.	**Compliant**
Waste Dumps	Protection of topsoil	Topsoil material stockpile height no higher than 2m. Annual stockpile survey to indicate no significant decrease in volume, taking into account natural compaction.	Topsoil stockpiles comply. Substantial previous usage of piles for top soiling of the two WRDs. Updated stockpile survey undertaken Sept 2017. Main future requirement is for cover of HLP for which adequate cover supplies are available.	**Compliant**
Land use and soil quality	Protection of soil and water	All spillage incidents reported, investigated and corrective actions completed to prevent recurrence.	No reported incidents in 2019.	**Compliant**
		Post operation soil contamination survey and consequent remediation work to leave soil uncontaminated.	Previous bioremediation sampling reported in compliance report.	**Not applicable** No further sampling conducted apart from focused sampling associated with reported incident. Contamination matters to be addressed with final site remediation as described in approved PEPR Review 4.

Environmental risk	Aspect	Outcome and Measurement criteria	Works Performed/actions summary and evidence	Determination of Compliance
		Meeting minutes submitted to DSD.	Landholders have been engaged during each material change notification processes. Informal discussions held with pastoralists, agreements once reached to be finalised in writing regarding fencing and other final closure conditions.	**Not applicable.** Regular informal landholder meetings held with Michael Parker (Bindarrah) and Kim Riggs (Bulloo Creek)

Table 20: Compliance with Mine Closure and Rehabilitation Outcomes

Closure Objective/Outcome for domains	Outcome Measurement Criteria	Works performed/actions summary	Evidence - Determination of compliance to date	Forward work plan for compliance (next reporting period)
Mine Pits				
Render safe for stock post-mining	Test to demonstrate compaction that achieves a dry density ratio of at least 95% relative to Standard Compaction determined by AS 1289 5.1.1.	Compaction tests show that the bunding material compaction undertaken during previous diversion bank construction is not to specification. Additional bund consolidation work has occurred and will need to be assessed during future closure works.	**Not applicable** Suitable material compaction strategies to meet this compliance objective during future closure works. **Not applicable**. The results of associated compaction work will be reported to DPC once undertaken.	Applicable to closure phase of the project.
Render safe for humans	Fencing completed to a standard acceptable to the pastoral lease holder and PIRSA (now DPC).	Current fencing of lease areas is to be retained as per agreement with pastoral leaseholder.	-	Final fence condition to be confirmed with leaseholder and Pastoral Board following completion of mining. Confirming with pastoralist is to be arranged at that stage.
Leach pad, waste rock dumps				
Physical stability	Leach pad and waste dumps demonstrated to be stable after rehabilitation via annual photographic record. (Detailed compliance criteria are developed in the approved PEPR Review 4)	A monitoring program including photographic evidence has continued to be carried out for period (on quarterly basis and will be ongoing once reshaping of all landforms is completed and compliance criteria (as confirmed in final PEPR) are in place.	**Not applicable.** The current growth of vegetation is acceptable given the prevailing drought conditions. There is confidence that full rehabilitation is achievable (as is defined in approved PEPR Review 4).	Continued monitoring of vegetation cover on a quarterly basis, focusing on WRDs.

Closure Objective/Outcome for domains	Outcome Measurement Criteria	Works performed/actions summary	Evidence - Determination of compliance to date	Forward work plan for compliance (next reporting period)
Non-polluting	Leach pad runoff weak acid-dissociable (WAD) cyanide level to be less than 0.2 mg/l.	Note the leach pad is not yet under rehabilitation – to be assessed once irrigating with CN solution is complete.	**Not applicable**. Compliance limits are the subject of further assessment. This has been reported in the approved PEPR Review 4.	Not applicable during this period. Works to commence in later period pending completion of mining and processing
	Leach pad runoff pH to be neutral before walk away.	Not applicable to current stage of project	**Not applicable**. Compliance and means to achieve same are the subject of assessment and reporting in the approved PEPR Review 4.	As above
	Survey to prove slope angle 15° or less.	A complete survey of WRDs batter slopes is to be completed	**Not applicable**. Some batters of WRDs may not comply with this requirement. Survey will be conducted once all batter slopes for all landforms (incl. HLP) have been completed.	As above.
Plant and equipment				
Remove plant for re-use elsewhere	Soil samples to be tested for cyanide residue. Cyanide concentration to be less than level of detection.	Baseline cyanide test work conducted and cyanide levels recorded for future reference on mine closure and plant removal. Not applicable at this stage.	**Not applicable** Will not be completed in the next reporting period.	Not applicable during this period. Works to commence in later period pending completion of processing activity and plant decommissioning.
Roads				

Closure Objective/Outcome for domains	Outcome Measurement Criteria	Works performed/actions summary	Evidence - Determination of compliance to date	Forward work plan for compliance (next reporting period)
Return to unimproved pastoral use.	Document all agreed actions with lessee and copy to PIRSA (DSD).	Discussions have been held with pastoralist and rehabilitation measures agreed - part of the access road to the camp area will be retained as the pastoralist has stock yards in this area. Agreements with pastoralist will be confirmed in final Mine Completion Plan.	**Not applicable** No rehabilitation of unused tracks in ML during reporting period. Road rehabilitation works to occur during operations only where roads are no longer required and not required by pastoralist.	No further road rehabilitation likely to be undertaken in next reporting period as roads in MLs and MPLs are used for bore field access or monitoring activities
	Measure biodiversity values on site and at a control site. Success is achieved when biodiversity value on site are no different to biodiversity values in control areas	Reference sites subject to active visual monitoring are described in the approved PEPR Review 4. Comparisons with rehabilitated landforms in terms of cover and biodiversity value not yet practical at this time.	**Compliant** Active surveillance monitoring undertaken. Detailed site evaluation of control sites planned once approved PEPR Review 4 compliance criteria have been confirmed.	Active monitoring of landforms that have been rehabilitated in past will continue. No significant rehabilitation works planned for next reporting period.
Remove surface water obstructions	Sample water upstream and downstream of site. No difference in TDS between samples taken upstream and downstream.	Sampling of the upstream and downstream surface water conducted once during the reporting period with outcomes presented in **Section 5.5**.	**Compliant** One significant rainfall event in this reporting period with monitoring conducted. Results of monitoring have demonstrated compliance.	Active monitoring to continue.
Buildings				
Return to unimproved pastoral use	Document all agreed actions with lessee and include in Annual mine and rehabilitation report to DSD	Camp has been decommissioned with lease accommodation now provided at Bindarrah Station.	**Compliant** Camp decommissioning will be undertaken upon completion of mining operations. Full rehabilitation of site will be undertaken following operational closure.	Not applicable to next reporting period.
Bore field				

Closure Objective/Outcome for domains	Outcome Measurement Criteria	Works performed/actions summary	Evidence - Determination of compliance to date	Forward work plan for compliance (next reporting period)
Return to unimproved pastoral use	Document all agreed actions with lessee and include in Annual mine and rehabilitation report to DSD	No further agreements were reached during the reporting period. All actions described in this report. Bore field now under active use with recommencement of mining.	**Not applicable**	Not applicable to next reporting period.
All disturbed areas except voids				
Return to unimproved pastoral use	Measure biodiversity values on site and at a control site. No difference between biodiversity values on site and at control sites. Monitor abundance and diversity of native species and non-native species. No difference between abundance and diversity values on site and at control sites	Monitoring or measurement of Biodiversity values were performed on the mine site previously. Surveillance monitoring of control sites continued. Final detailed compliance conditions have been presented in approved PEPR Review 4 submitted to DEM.	**Compliant**. Visual monitoring at control sites has been ongoing. Detailed surveys proposed once Closure compliance criteria (as presented in approved PEPR Review 4) have been confirmed and final profiling of rehabilitated landforms have been completed.	Monitoring to continue as a surveillance activity. Detailed surveys not planned for next reporting period.

Table 21: Compliance with Non-Outcome Based Lease Conditions

Lease Conditions ML 6275 and ML 6395	Compliance Status	Evidence	Forward Work Plan (if non-compliant or unable to demonstrate compliance)
Mining operations authorised by this Lease must only be for the recovery of gold in accordance with the mining lease proposal document dated 18 November 2010 and subsequent response documents dated 22 March 2011 and 16 May 2011	Compliant	Only gold recovery undertaken	n/a
The Lessee must not commence or undertake any mining operations on the land until a Mining and Rehabilitation Program (MARP) has been approved by the Minister and a bond has been paid in accordance with Section 62 of the Mining Act, 1971.	Compliant	MARP (now PEPR) prepared and addresses both tenements	n/a
The Lessee must prepare a MARP that complies with the requirements of guidelines approved by the Director of Mines and include criteria that are developed in consultation with relevant stakeholders.	Compliant	MARP (PEPR) approved with criteria suitably developed	n/a
The criteria included in the MARP must demonstrate clear and unambiguous achievement of the environmental and mine closure outcomes specified in the second Schedule by: • Including the specific parameters to be measured and monitored by the Lessee • Specifying the locations where the parameters will be measured, or how these locations will be determined • Clearly stating the acceptable values for demonstrating achievement of the outcome, with consideration of any inherent errors of measurement • Specifying the frequency of monitoring by the Lessee • Identifying what background or control data are to be used or specify how it will be acquired (if necessary).	Compliant	As above	n/a
The criteria must insofar as is reasonably practicable and appropriate be expressed in quantitative terms (rather than qualitative terms).	Compliant	As above	n/a
The Lessee must implement and comply with the approved MARP.	Compliant	Evidence presented in this Compliance Report	n/a

Lease Conditions ML 6275 and ML 6395	Compliance Status	Evidence	Forward Work Plan (if non-compliant or unable to demonstrate compliance)
The Lessee must review the MARP on request of the Director of Mines within a time specified in the request and submit the revised MARP for approval to the Director of Mines	Compliant	Reviews previously undertaken at request of DPC	n/a
The Lessee agrees to the approved MARP being made available for public inspection.	Compliant	Is available	n/a
The Lessee must provide information as requested by and to the satisfaction of the Director of Mines, on the Lessee's capability and competence to comply with the requirements of the Mining Act, 1971, the conditions of this lease, and the MARP in accordance with approved guidelines or as otherwise specified by the Director of Mines.	Compliant	Undertaken as requested	n/a
The Lessee must provide to the Director of Mines a Mining and Rehabilitation Compliance Report (MARCR) on operations carried out on the Lease and compliance with the approved MARP. The MARCR must be submitted every year, within 2 months after the anniversary of the date the Lease was granted, or at some other time agreed with the Director of Mines in accordance with guidelines approved by the Director of Mines. The Lessee agrees to the MARCR being made available for public inspection.	Compliant	Undertaken as required at intervals agreed to with DPC	n/a
The Lessee must, if requested by the Director of Mines, undertake an independent audit of achievement of the environmental outcomes in the MARP, by an independent expert approved by the Director of Mines and submit the audit to the Director of Mines. The Lessee agrees to the audit being made available for public inspection. The Lessee must meet all the charges and costs in undertaking the independent audit.	Compliant	Undertaken when it has been requested by DPC	n/a
At least 3 months prior to Lease relinquishment or expiry, the Lessee must provide to the Minister a Mine Completion Report prepared in consultation with the landowner and in accordance with guidelines approved by the Director of Mines, which demonstrates achievement of the closure criteria as specified in the current MARP.	Not applicable at this stage	PEPR Review 4 has been approved by DEM in September 2019. Lease relinquishment unlikely in 2020	n/a
The Lessee must, prior to commencing operations under this Lease and for the duration of the lease maintain public liability insurance to cover all operations under the Lease (including sudden and accidental pollution) in the name of the Lessee for a sum not less than $50 million or such greater	Compliant	Insurance and exploration and mining activities to the value of $ 50 MILLION	n/a

Lease Conditions ML 6275 and ML 6395	Compliance Status	Evidence	Forward Work Plan (if non-compliant or unable to demonstrate compliance)
sum as specified by the Director of Mines, and make such amendments to the terms and conditions of the insurance as the Director of Mines may require. A copy of the cover note of certificate of currency for the insurance must be provided to the Director of Mines upon request. If requested by the Director of Mines, the Lessee must engage an independent and reputable risk assessor to prepare a risk assessment report detailing the public liability risks arising out of the conduct of operations on the lease, and recommending the level of amount of public liability cover (in respect of any one occurrence) that should be effected and maintained by the Lessee. In preparing the risk assessment report, the assessor must consult with the landowner and the Director of Mines. In specifying the level of insurance required, the Director of Mines accepts no liability for the completeness, adequacy of the sum insured, the limit of liability, the scoped coverage, the conditions or exclusions of the insurance in respect of how the Lessee may or may not respond to any loss, damage or liability.		is currently covered by Public Liability insurance	
The Lessee must report any situation where the Lessee has failed to achieve an outcome specified in the MARP (as measured according to criteria adopted to measure that outcome) to the Director of Mines. A verbal notification must be provided within 1 business day after the Lessee becomes aware of the non-compliance. A written report must be provided within 3 months or such time period as approved by the Director of Mines.	Compliant	All incidents have been reported to DSD and EPA where required (addressed in all MARPs to date)	n/a
In requesting a review of the bond required under the Mining Act, 1971 the Minister may request that written quotes from an independent third party approved by the Minister are obtained by the Lessee for the cost of rehabilitating the site to the requirements specified in the approved MARP. The Lessee must meet all the charges and costs in obtaining and maintaining the Bond.	Not applicable	No request received	n/a

7.4. Rectification of Non-Compliances

There have been no non-compliances within the project area during the reporting period.

Rectification

No rectification measures are required.

Mitigation

No mitigation measures to correct any site non-compliances have been required.

Preventative action

No preventative actions have been required.

7.5. Third-Party Complaints

Table 22 presents the complaints registered as per MG3 reporting requirements.

Table 22: Third-Party Complaints Register 2019

Complaint Reference	Complaint Type	Was the compliant a result of a PEPR Non-compliance?	Resolution Date	Forward Work Plan
n/a	n/a	n/a	n/a	Exco to continue active liaison with key landholders (refer Section 14)

As indicated, no complaints were received during the period.

7.6. Compliance Summary

Table 23 presents a summary of non-compliances as per the requirements of the MG3 2015 guidelines. This table indicates that there were no non-compliances during the reporting period.

Table 23: Non-Compliance Summary

Licence/Permit/ Tenement	Type of non-compliance	Brief description	Status	Section of Report for Further Detail
MLs and MPLs	nil	nil	n/a	n/a

8. Reportable Incidents

Reportable incidents in accordance with Mining Regulations 2011 – REG 87(2)(b) for the reporting period are listed in **Table 24.**

Table 24: Summary of Reportable Environmental Incidents in 2019

Date	Incident Description	Contaminants Released	Area Affected	Corrective Action	Remaining Impact on Environment
N/A	N/A	N/A	N/A	N/A	None

9. Additional Matters

9.1. Topsoil Stockpiles

Topsoil stockpiles were surveyed once a month during previous mining operations (2010-2012). Topsoil removal involving stripping and placement on stockpiles at key locations for re-use for rehabilitation purposes to ensure a sufficient volume was available for the rehabilitation program planned for closure.

A new survey of existing stockpiles was undertaken in 2015 and then again in 2017 after recent rehabilitation activities to validate the volumes of stockpiled material suitable for rehabilitation uses. The location, areas and volumes of each of the main stockpiles within the ML area are presented in **Table 25** below and shown on **Figure 24**.

Table 25: Summary of Stockpile Volumes

Stockpile #	Volume (m^3)	Enclosed Area (ha)
1	5,300	0.32
2	1,688	0.35
3	52,000	1.22
5	11,000	1.25
6	1,350	0.38
7	7,250	0.51
8	3,400	0.53
9	274	0.05
10	7,400	0.55
TOTAL	**89,662**	**5.16**

Based on this survey, there is sufficient material stockpiled to enable completion of the site rehabilitation program. Almost 900,000 m³ of material is thus estimated to be available at present with an estimated additional volume of 39,800 m³ to be available with the stripping of topsoil around the extended base of the HLP prior to slope battering. To date, most stripped material has been used in the rehabilitation of the Hannaford and Vertigo surface WRDs. Coverage and seeding of both these WRDs is almost complete. The main future requirement for material suitable for vegetation establishment will be the placement on the final profile of the HLP. Approximately 90,000m3 of material is required to cover the final leach pad landform to an average depth of 300mm (based on a final area of 27.5ha) with additional lesser volumes for other rehabilitation uses such as the plant and processing ponds, haul roads and other infrastructure areas. The remaining material volumes are thus sufficient for these requirements.

There has been no topsoil recovery but some minor use of topsoil during the rehabilitation activities in this reporting period. As noted above, some stripping of topsoil will be required from the expanded footprint area of the HLP prior to establishment of the final landform profiles.

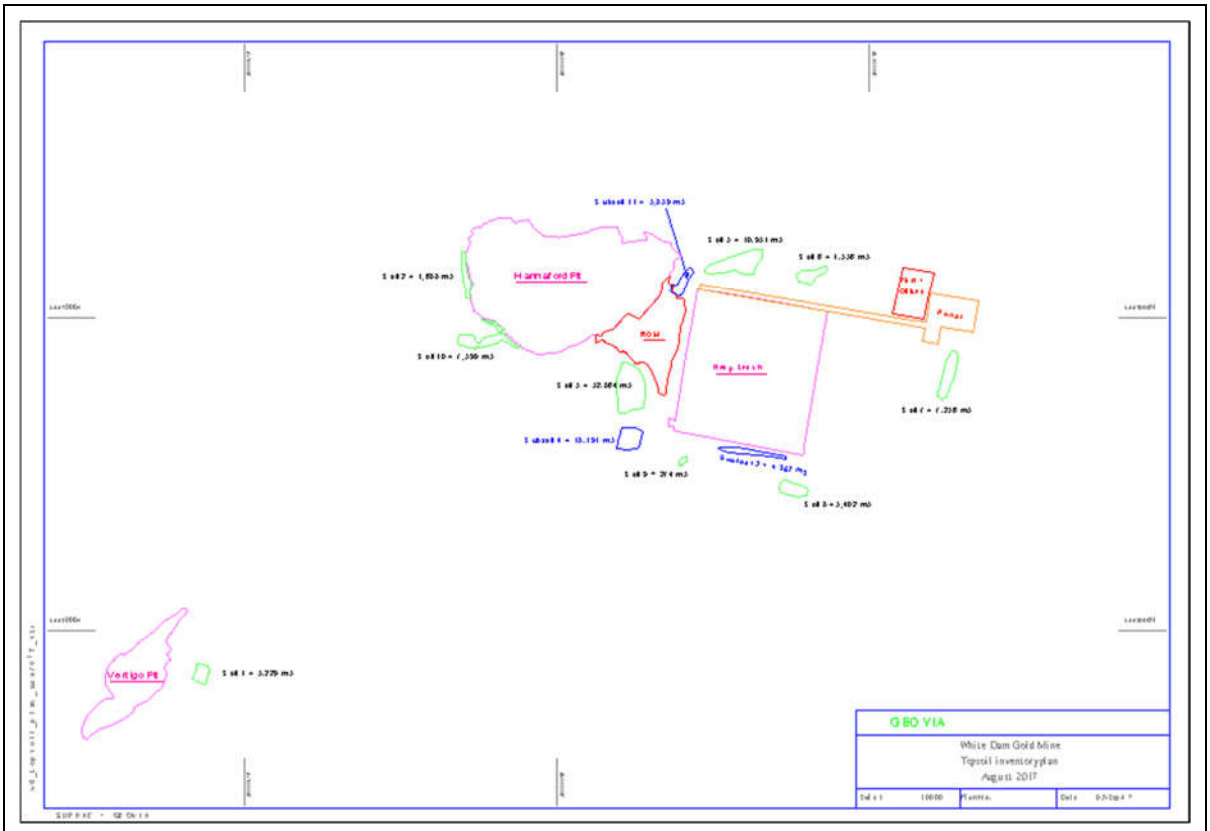

Figure 24: Stockpile inventory within White dam project site – 2019 (topsoil in green)

9.2. Significant Environmental Benefit Matters

An agreement in terms of an SEB offset strategy, between the mine proponents and the DEH (now DEWNR) was finalised following project approval. This agreement involves monetary staged payments to the department to support the *Bimbowrie Landscape Restoration Project*, involving the control of pest plant species (namely, African Boxthorn, Pepper Trees and Castor Oil Plant) and revegetation works within the conservation park.

The SEB offset strategy for the mine involves the following activities and has continued to be implemented during this reporting period (refer **Table 13**):

- exclusion of some grazing pressure from stock by fencing;
- control of pest plants and herbivores throughout the lease areas and grazing exclusions; and
- financial and technical assistance to the department for the management of pest species in the Bimbowrie Conservation Park.

Grazing exclusion and weed and feral animal control measures remain in place. All matters in regard to financial and technical assistance have previously been finalised.

10. Management System Reviews

Formal Management System Reviews or Audits were not been completed in the reporting period. Some safety systems and procedure reviews were undertaken for the purposes of preparing a Major Hazard Facility Licence application. However, this application is currently on hold. A further review of safety and other systems is currently being undertaken as part of the SART implementation.

An independent audit will be carried out in the reporting period that will follow completion of irrigation of the HLP with confirmation of results to DEM as per PEPR requirements. This audit will also include an assessment of rehabilitation works to date.

11. Review of Plant, Equipment and Infrastructure

A review of plant and equipment necessary for the SART processing plant was undertaken in 2019.

12. New Environmental Hazards

No new environmental hazards were identified during the current reporting period.

13. EPBC Act Reporting

The White Dam Gold Project is not subject to approval under the *Environment Protection and Biodiversity Conservation Act 1999* as it is not a controlled action.

14. Stakeholder Liaison

Tenure and ownership of the mine tenements are detailed in **Table 26**.

Table 26: Tenure and Tenement Ownership Details

Mining Lease 6275; Mining Lease 6395 Miscellaneous Purposes Licences MPL139, MPL105, MPL106 (part MPL107)		
Certificate of Land Title/Lease Number	Crown Lease	1299/38
Pastoral Number	Bulloo Creek	2363
Name of Leaseholder	G. and K. Riggs	
Activity	Stock (sheep) grazing	
Miscellaneous Purposes Licence MPL95 (part MPL107)		
Certificate of Land Title/Lease Number	Crown Lease	1276/20
Pastoral Number	Bindarrah	2200
Name of Leaseholder	G.S. & M.J. Parker	
Activity	Stock (sheep) grazing	

Informal liaison has continued with both of the two key pastoralists. Arrangements will be formalised in writing. With respect to the SART processing plant, a formal stakeholder consultation meeting was held with the Bindarrah Station landowner and a discussion was held via telephone with the Bulloo Creek landowner regarding the proposed change. The proposed change has also been discussed with Safework SA and the South Australian Environmental Protection Authority. Copies of V1-3 of this document were provided to the Bindarrah and Bullo Creek leaseholders and to Safework SA. At this time no concerns have been raised; however, WDGM will continue to maintain dialogue with all stakeholders. Preliminary discussion with the Department of Energy and Mines was held on site 28 May 2019 and in Adelaide on 27 June 2019.

15. Verification of uncertainties

The PEPR Review 4 present verification of any uncertainties associated with the proposed mining program for 2019 and mine closure activities respectively. This report indicates a high level of confidence associated with the outcomes of the future mining and rehabilitation/closure outcomes. There are considered to be no significant uncertainties in this regard.

16. Forward Work Plan

The forward work planning for the project has been described in PEPR Review 4 in terms of the proposed SART processing plant and in regard to rehabilitation and closure aspects. Leaching of the White Dam heap will continue into 2020.

Activities associated with mine closure will commence progressively once the heap leach is no longer economical, focussing on the reshaping and rehabilitation of the HLP and followed by decommissioning and rehabilitation of the processing area. The timing for these activities is described in the approved PEPR Review 4.

17. Ministerial Determination Checklist

Section	Included? Or N/A
Executive summary	✓
1. Introduction	✓
Tenement number(s)	✓
Name of the mine operation	✓
General location details	✓
Name(s) of the mine owner and mine operator(s)	✓
Site Contact	✓
Registered Mine Manager, *Mines Works Inspection Act, 1920*	✓
Reference and approved date of relevant PEPR being reported against	✓
Person accepting responsibility for the report	✓
Dates of the reporting period for the report	✓
Date of preparation of the report.	✓
2. Executive Declaration	✓
3. Tenements	✓
Summary table of all tenements including ML, MPL, EML etc.	✓
4. Other Licences, Permits, Waivers, Native Title and Agreements	
Summary table of all licences, permits, waivers, native title and other agreements relevant to the PEPR.	✓
Where applicable, provide a statement that all waivers for exempt land required for the current operation are in place in accordance with the Mining Act	n/a
5. Mining Operations	✓
Ore reserves and mine life	✓
new delineation or exploration drilling activities on or off the lease (if required)	✓
review of reserves (if required)	✓
Other potential sources of ore (e.g. from nearby mines) (if required)	n/a
Overburden, Ore and Concentrate	✓
Overburden	✓
Ore	✓
Concentrate	✓
6. Voluntary information (not mandatory, but strongly recommended)	✓
7. Project Variation Summary	✓
Summary table of any changes/project variations submitted to DEM	✓
8. Complaints	✓
Summary table of complaints made by members of the public during the reporting period	✓
Indicate how concerns or complaints by third parties were addressed.	n/a

Appendix A

2019 Regulatory Approvals

Government of South Australia
Department for Energy and Mining

Ref: MO 7033.003
Doc No: 2019D058366

16 September 2019

Bruce McLarty
Commercial Manager
Exco Resources (SA) Ltd
GPO Box 778
BRISBANE QLD 4000

Dear Bruce

***Mining Act 1971* – Notification of approved Program for Environment Protection and Rehabilitation (PEPR) for Mineral Leases (MLs) 6275 and 6395 and Miscellaneous Purposes Licences (MPLs) 95, 105, 106, 107 and 139- White Dam Gold Mine**

The program for MLs 6275 and 6395, and MPLs 95, 105, 106, 107 and 139, as submitted on 21 August 2018, has been approved as **PEPR No. 2019/020** in accordance with Section 70C(5) of the *Mining Act 1971*.

You are reminded that in accordance with Section 70D(3), you must at all times implement and comply with this approved PEPR. Any significant proposed changes to mining or closure operations stated in this PEPR will require a review of the PEPR in accordance with the *Mining Act 1971*.

This approval does not constitute endorsement of the systems that you have in place to manage the mining and closure operations in compliance with the *Mining Act 1971*. Whilst the PEPR you have provided and your capability to undertake this activity have been considered in making the approval under the *Mining Act 1971,* the responsibility for compliance with the *Mining Act 1971*, *Mining Regulations 2011* and lease/licence conditions, remains at all times with the tenement holder.

The *Mines and Works Inspection Regulations 2013* (the Regulations) require that mining operations (including closure) must not interfere with a water course. Under Regulation 18 of the Regulations you are exempted from Regulation 12(4) and 14 of the Regulations. The Chief Inspector of Mines is satisfied that compliance with Regulations 12(4) and 14 is impractical in this case.

1. COMPLIANCE REPORTING REQUIREMENTS

In accordance with Regulation 86 of the *Mining Regulations 2011,* and Ministerial Determination 009, you are required to provide the Department with an annual Compliance Report. The Report must be submitted within a date as agreed by the Department. If the proposed submission date is not suitable, please contact Ross Stevens, Senior Mining Regulator, so that a mutually agreed date can be determined.

The schedule of closure and rehabilitation works must be provided in annual Compliance Monitoring Reports.

2. WORK HEALTH AND SAFETY REQUIREMENTS

SafeWork SA, in accordance with Chapter 10 of the *Work Health and Safety Regulations 2012* (SA) has introduced requirements for mine operators in South Australia which include a notification for mining operations and the establishment of a Safety Management System and the identification of Principal Mining Hazards and development of a Principal Mining Hazard management Plan. Further information on your responsibilities, including a guide to Chapter 10, and the Mine Operator Notification Form, is available on SafeWork SA's website www.safework.sa.gov.au.

Should you require any further assistance or would like to set up a meeting, please contact Ross Stevens, Senior Mining Regulator on telephone: (08) 8429 2517, mobile 0458 181 534 or email: Ross.Stevens@sa.gov.au.

Yours sincerely

Greg Marshall
DIRECTOR MINING REGULATION
DELEGATE OF THE DIRECTOR OF MINES
CHIEF INSPECTOR OF MINES

Cc: Gemma Connolly, Senior Environmental Advisor
Copperchem Ltd/Exco Resources Ltd
Level 32, 10 Eagle Street
BRISBANE QLD 4000

Application for change to process emission or waste
Section 54C *Environment Protection Act 1993*

This application is to be used in accordance with the criteria of the condition of your Authorisation. Prior to completing this Application, contact your EPA coordinator (whose name appears at the bottom of the EPA Authorisation) to discuss the proposed changes to Process/Waste emissions and determine relevant details/documentation to be included.

(Use **BLOCK LETTERS** throughout and all section must be completed)

Send completed application to:
Licensing & Regulatory Services Branch
Environment Protection Authority
email: epalicensing@sa.gov.au **or tel: 8204 2058**

Postal: GPO Box 2607 Adelaide SA 5001

ABN: 85 393 411 003

OWNERSHIP/PROPERTY DETAILS

Current EPA Authorisation Number	25543
Name of EPA Authorisation Holder *(as it appears on Authorisation)*	Polymetals Operations Pty Ltd
Location of premises to which application relates *(as it appears on Authorisation)*	Sects 96 & 292 OH Olary & Blocks 656 & 898 OH Curnamona and Block 897 OH Olary SA Post Code Title Reference/s
Postal Address of Authorisation Holder	PO Box 778 Brisbane Post Code 4000 Telphone 07 3835 6200 Email gemma.connolly@roundoakmin.com.au
Details of Contact Person – *Authorised to act on behalf of Authorisation Holder*	Name Gemma Connolly Telephone 07 3835 6200 Mobile Phone 0419598288 E-mail gemma.connolly@roundoakmin.com.au

PROCESS/WASTE CHANGE DETAILS

Nature of Process and/or Waste change *(include details of projected emission increases, changes to waste emissions or relocation of emission points, etc – attach extra details if necessary)*

Site propose to install a Sulphurisation, Acidfication, Recycling and Thickening Process plant. SART will break down weak acid dissociable cyanide complexes in the existing leach solutions to yield free cyanide and chalcocite precipitate. The SART will introduce the use, storage and handling of sulphuric acid, sodium hydrosulphide and sodium sulphate within a closed circuit.

Refer to the attached supporting information.

Application for alterations to plant and equipment

Section 54C *Environment Protection Act 1993*

This application is to be used in accordance with the criteria of the condition of your Authorisation. Prior to completing this Application, contact your EPA coordinator (whose name appears at the bottom of the EPA Authorisation) to discuss the proposed changes to Process/Waste emissions and determine relevant details/documentation to be included.

(Use **BLOCK LETTERS** throughout and all section must be completed)

Postal: GPO Box 2607 Adelaide SA 5001

ABN: 85 393 411 003

Send completed application to:
Licensing & Regulatory Services Branch
Environment Protection Authority
email: epalicensing@sa.gov.au or tel: (08) 8204 2058

OWNERSHIP/PROPERTY DETAILS

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Location of premises to which application relates *(as it appears on Authorisation)*	Sects 96 & 292 OH Olary & Blocks 656 & 898 OH Curnamona and Block 897 OH Olary SA Post Code Title Reference/s
Postal Address of Authorisation Holder	PO Box 778 Brisbane Post Code 4000 Telphone 078 3835 6200 Email
Details of Contact Person – *Authorised to act on behalf of Authorisation Holder*	Name Gemma Connolly Telephone 07 3835 6200 Mobile Phone 0419 598 288 E-mail gemma.connolly@roundoakmin.com.au

PLANT & EQUIPMENT DETAILS

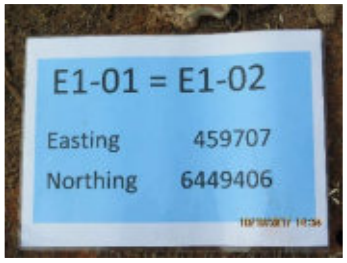
Details and purpose of Plant & Equipment alterations *(include site location of installation and construction works – attach extra details if necessary)*

Refer to the attached supporting information.

Appendix B

Rehabilitation Progress Photographs

E1-01 = E1-02: 2017 Q3







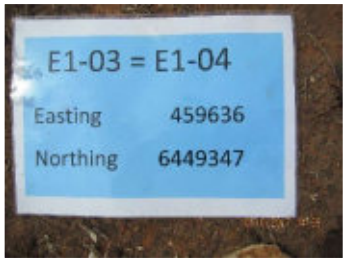


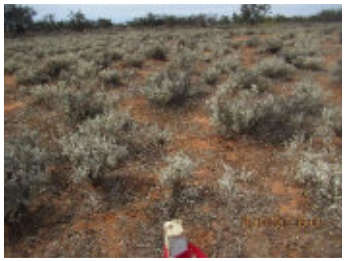

E1-01 = E1-02: 2018 Q3

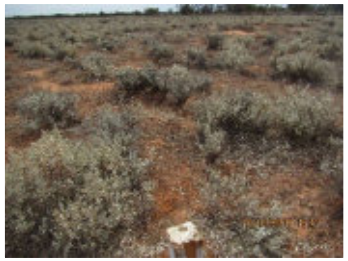


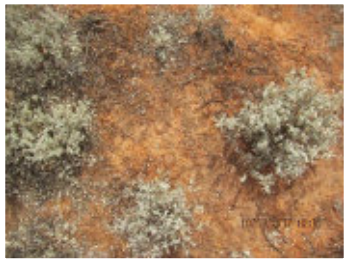



E1-03 = E1-04: 2017 Q3

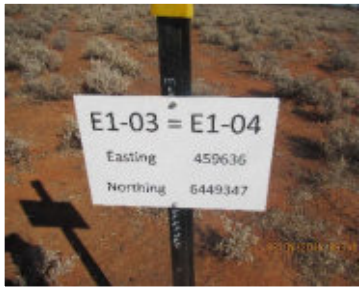




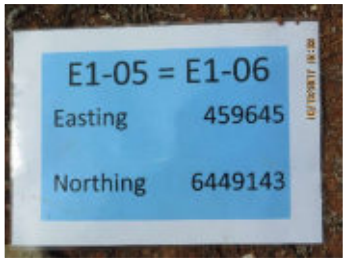



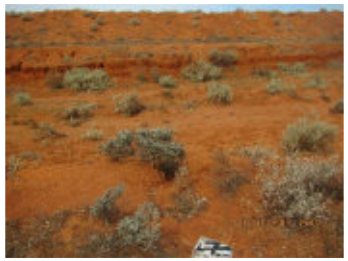
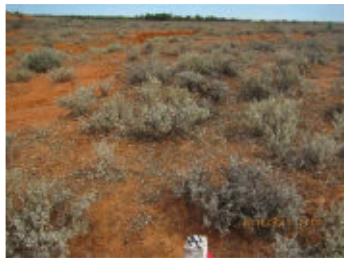
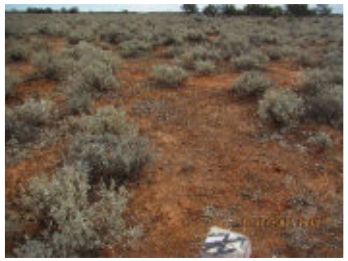

E1-03 = E1-04: 2018 Q3





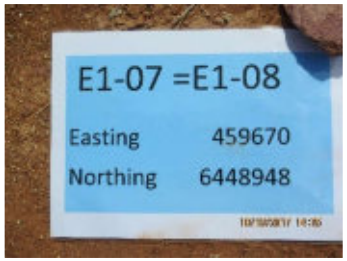

E1-05 = E1-06: 2017 Q3

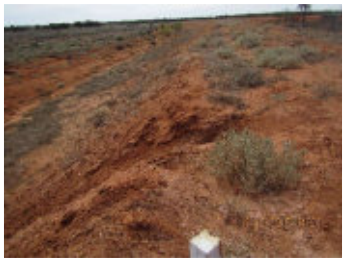
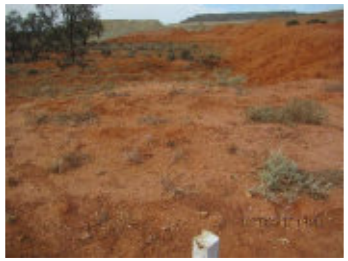


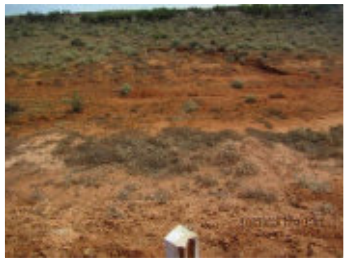







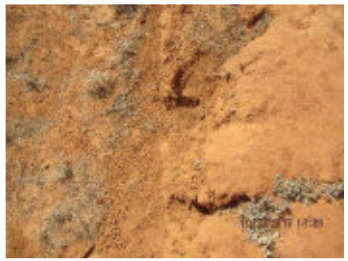
E1-07 = E1-08: 2017 Q3



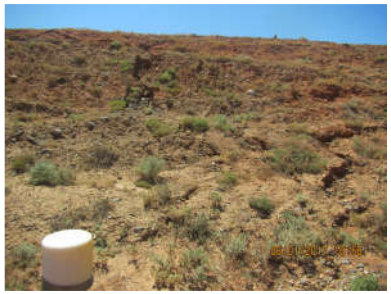









E3-01: 2016 Q4



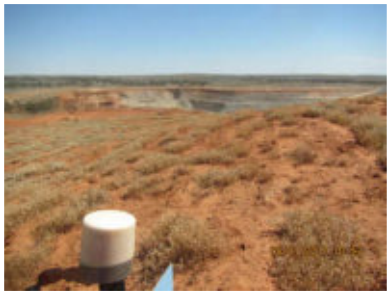

E3-01: 2017 Q3








E3-02: 2016 Q4

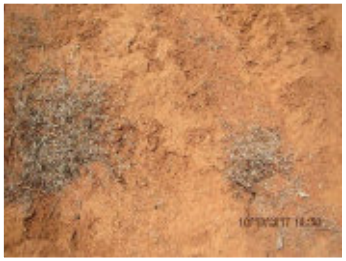



E3-02: 2017 Q3










E3-03: 2016 Q4

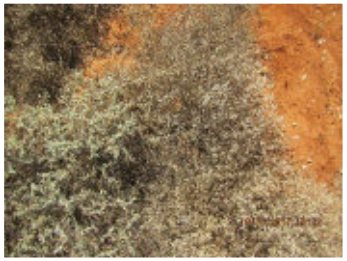



E3-03: 2017 Q3







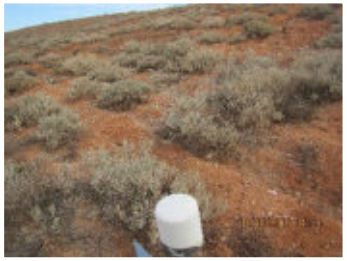
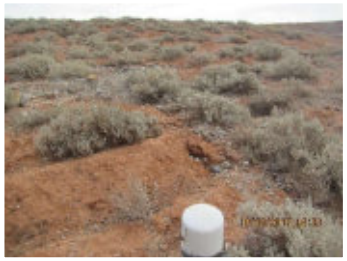



E3-04: 2016 Q4

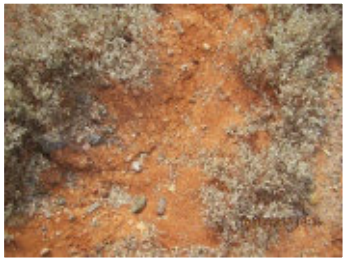



E3-04: 2017 Q3





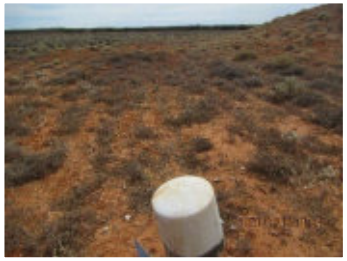


E3-05: 2016 Q4




E3-05: 2017 Q3



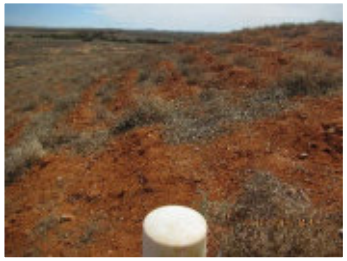


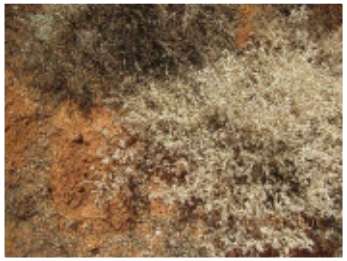
E3-06: 2016 Q4




E3-06: 2017 Q3



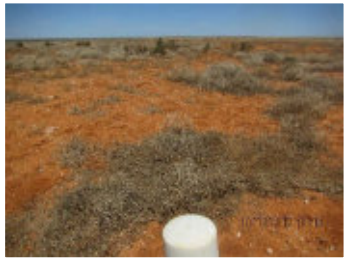


E3-07: 2016 Q4




E3-07: 2017 Q3








E3-09: 2016 Q4




E3-09: 2017 Q3





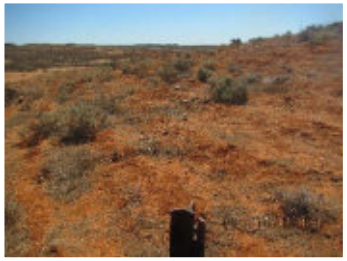



E3-10: 2016 Q4



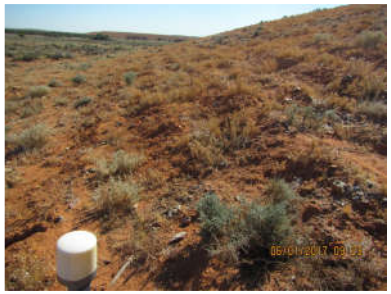

E3-10: 2017 Q3



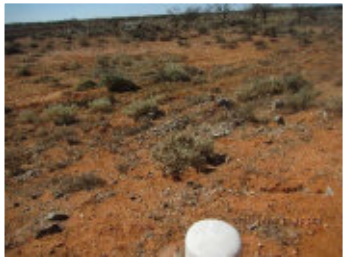



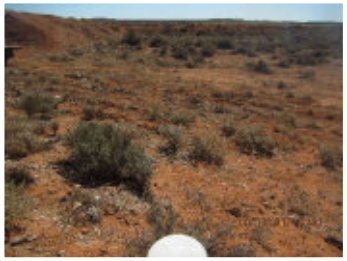


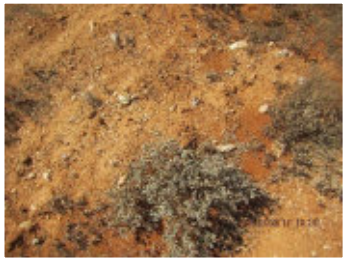
E3-11: 2016 Q4



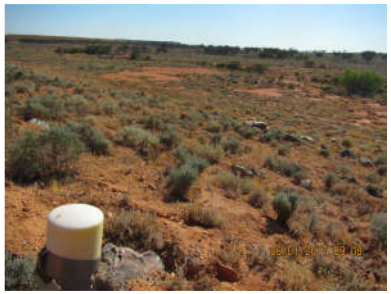

E3-11: 2017 Q3



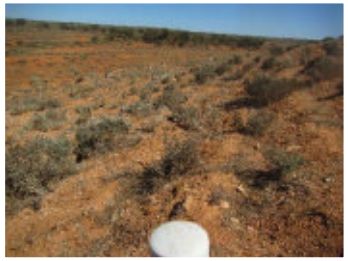


E3-12: 2016 Q4

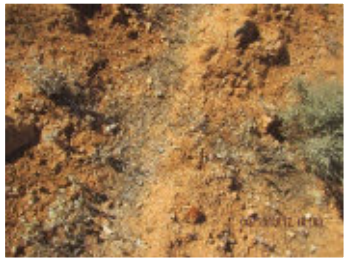



E3-12: 2017 Q3



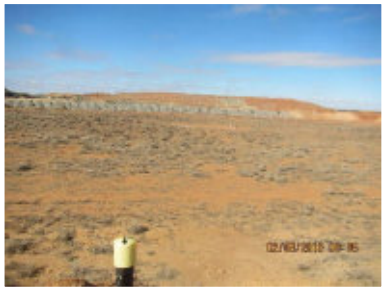




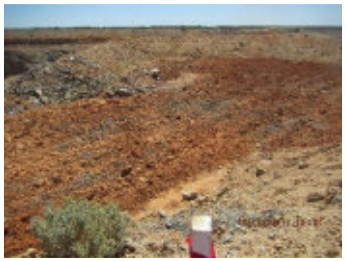
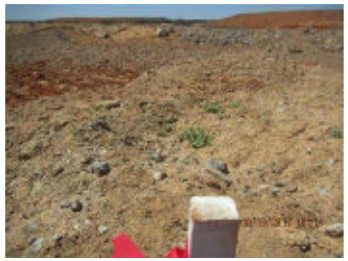
RV1-01: 2018 Q3

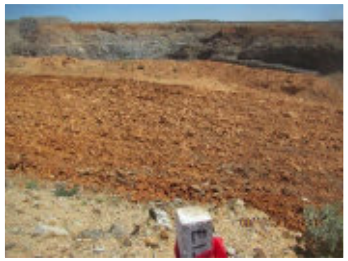




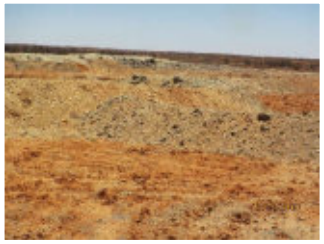
RV1-02: 2017 Q3

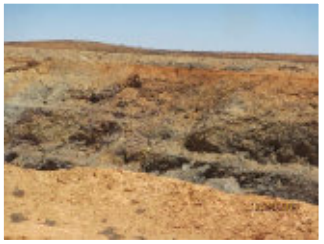





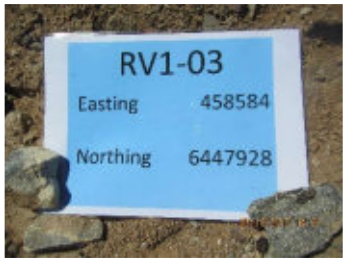


RV1-02: 2019 Q4



RV1-03: 2017 Q3










RV1-03: 2019 Q4




RV1-04: 2017 Q3

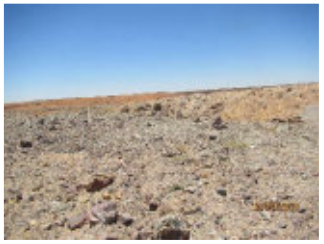


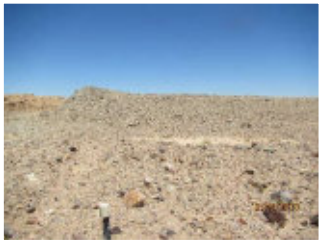





RV1-04: 2019 Q4







RV1-05: 2017 Q3



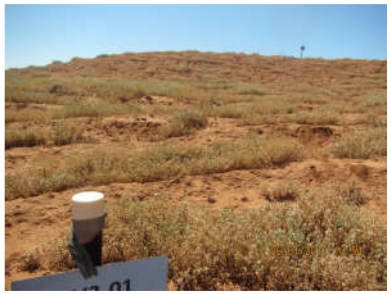


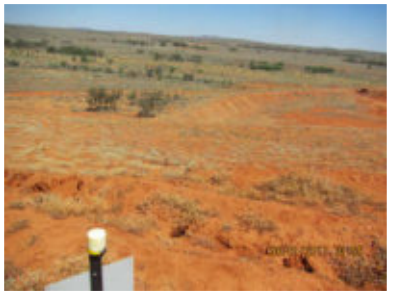



RV1-05: 2019 Q4




RV3-01: 2016 Q4



RV3-01: 2017 Q3







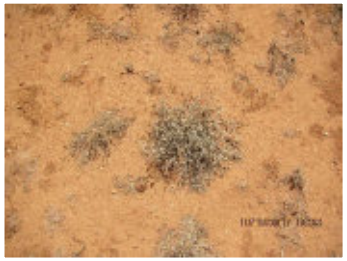

RV3-02: 2016 Q4




RV3-02: 2017 Q3

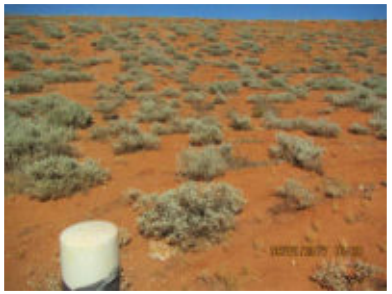




RV3-03: 2016 Q4

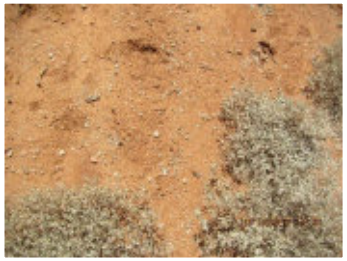


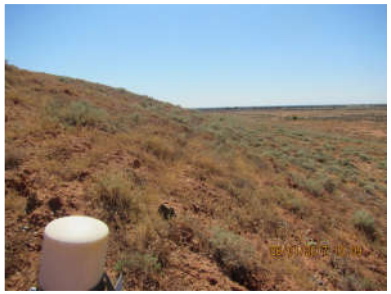
RV3-03: 2017 Q3

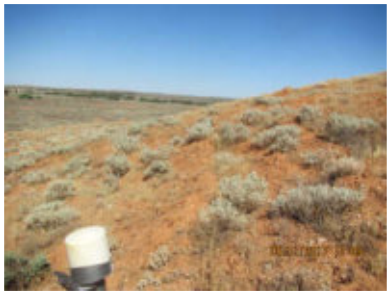




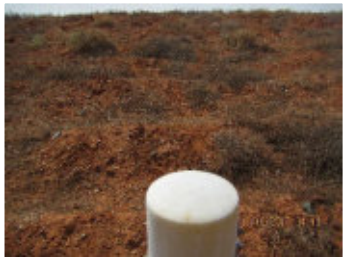
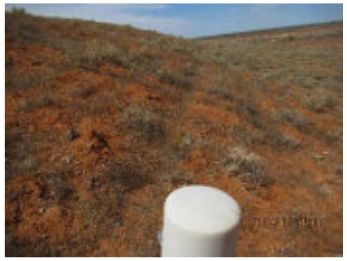



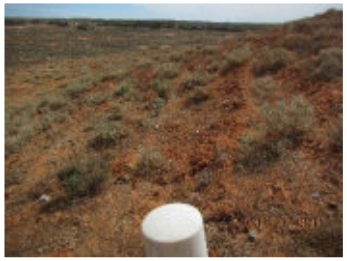
RV3-04: 2016 Q4

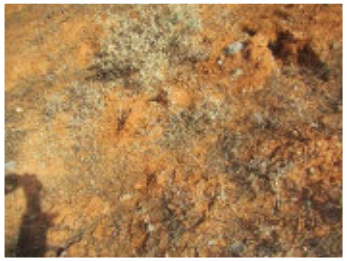


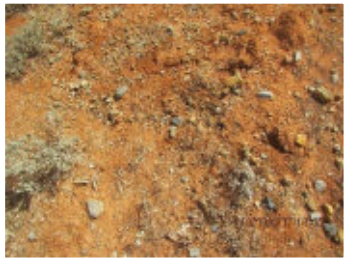



RV3-04: 2017 Q3







RV3-05: 2016 Q4




RV3-05: 2017 Q3








RV3-06: 2016 Q4

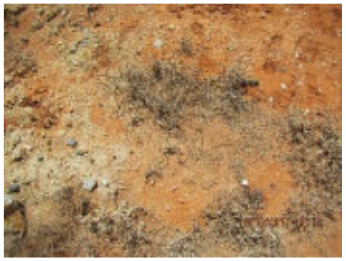



RV3-06: 2017 Q3









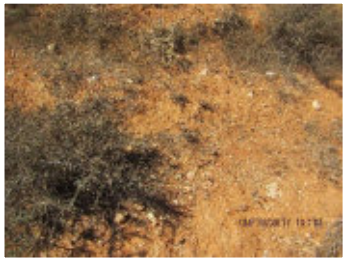

RV3-07: 2016 Q4

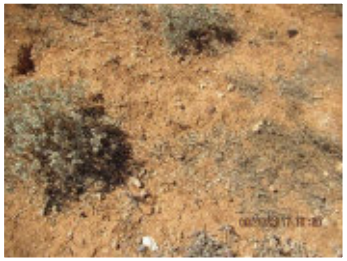



RV3-07: 2017 Q3

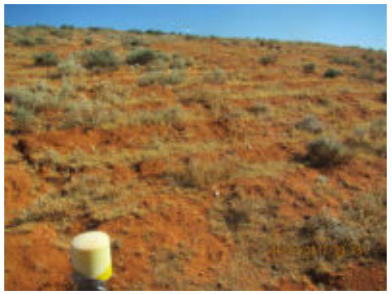




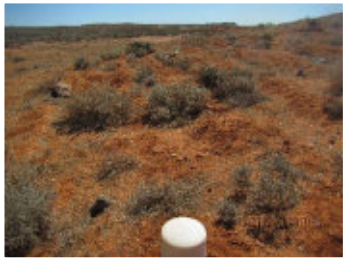


RV3-08: 2016 Q4

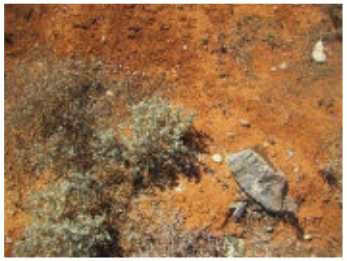



RV3-08: 2017 Q3

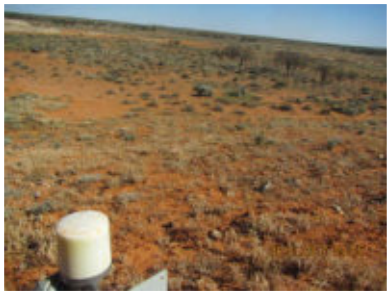
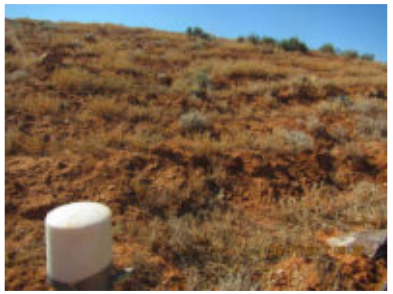


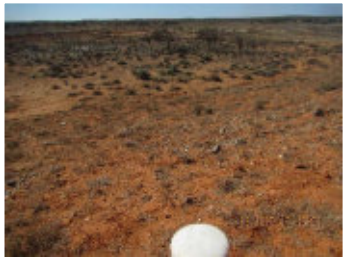


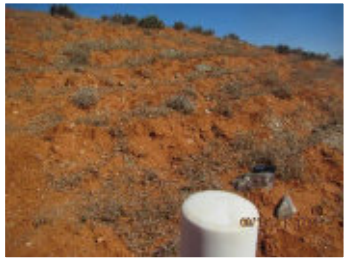


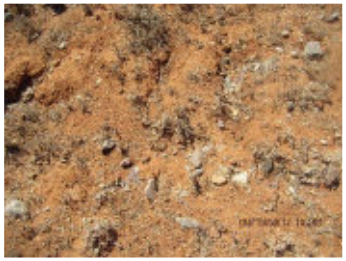
RV3-09: 2016 Q4


RV3-09: 2017 Q3








RV3-10: 2016 Q4

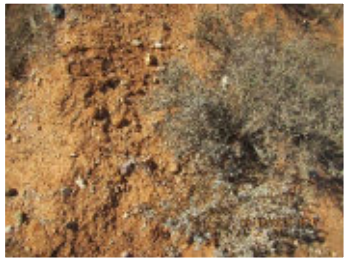



RV3-10: 2017 Q3





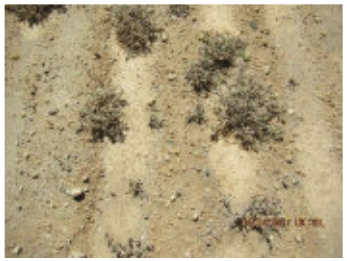


RV9-01: 2017 Q3








RV9-03: 2017 Q3








RV9-05: 2017 Q3

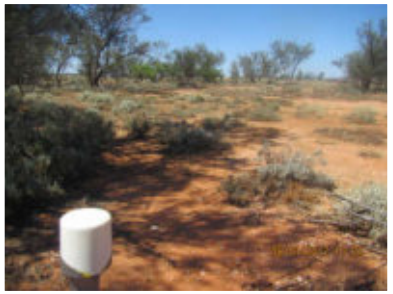







WD1: 2016 Q4



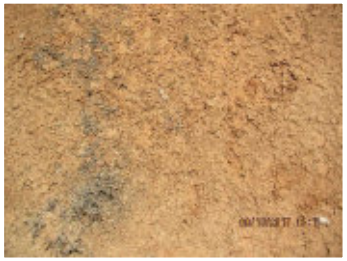



WD1: 2017 Q3







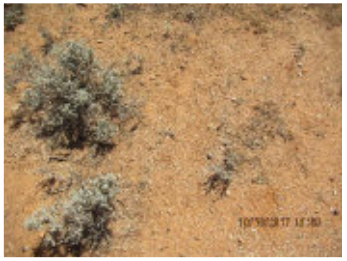
WD10: 2016 Q4

WD10: 2017 Q3









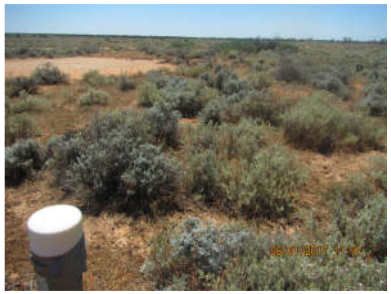
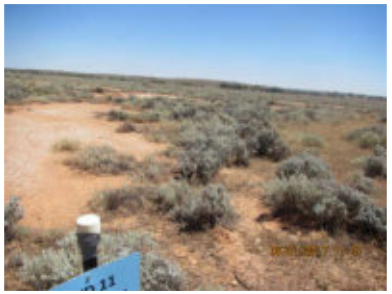

WD10: 2018 Q3








WD11: 2016 Q4

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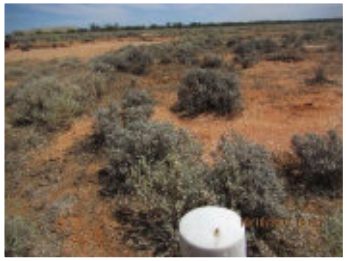
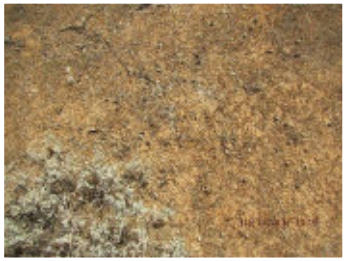


WD11: 2018 Q3


WD 11
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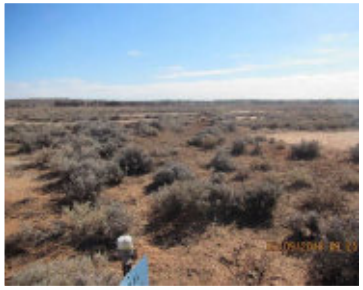
Northing 6449438




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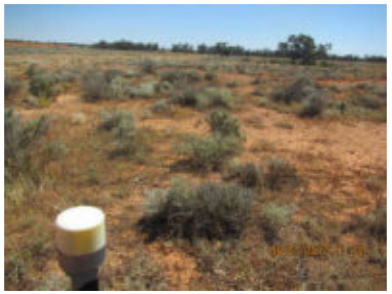
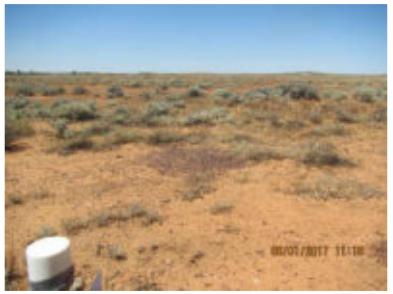


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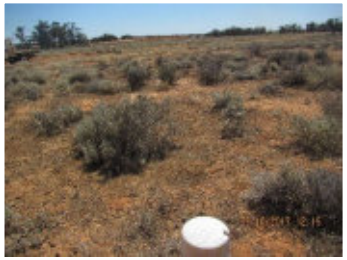
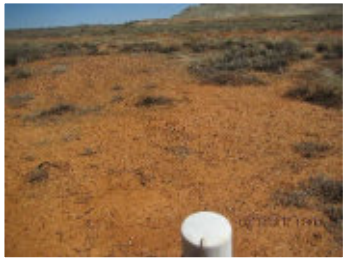
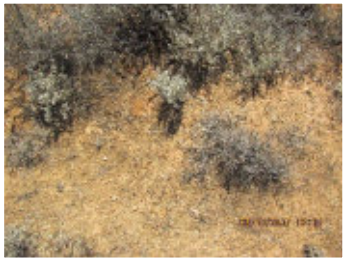
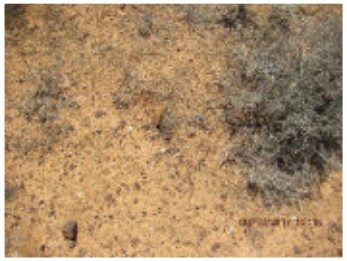
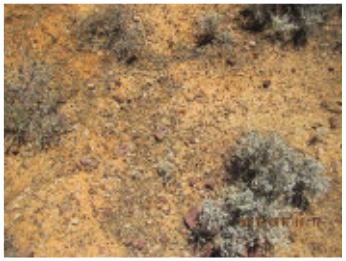


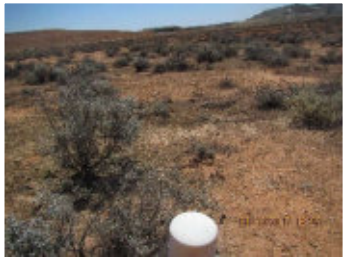
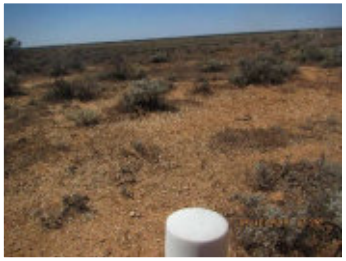






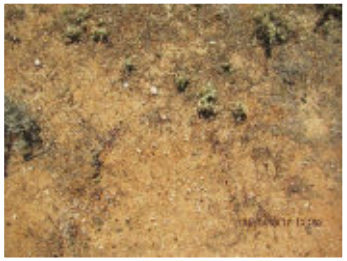

WD2: 2019 Q4

WD3: 2016 Q4




WD3: 2017 Q3

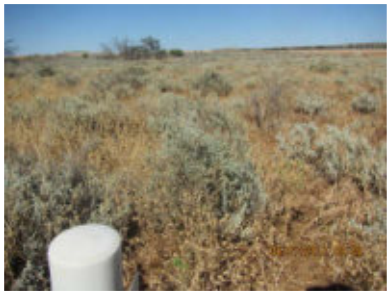




WD3: 2019 Q4

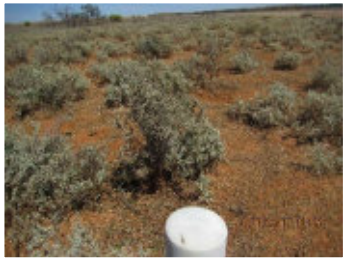
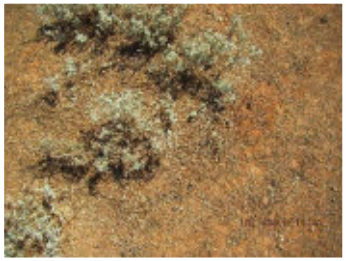
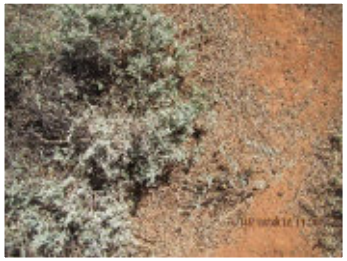
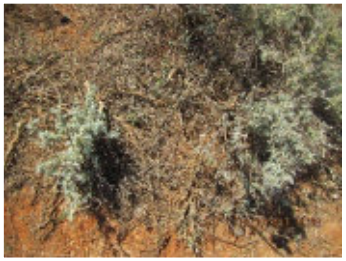
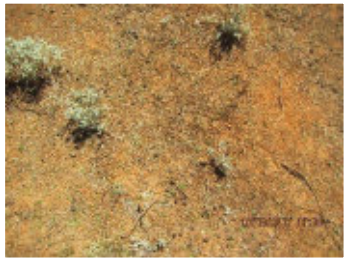
WD4: 2016 Q4



WD4: 2017 Q3



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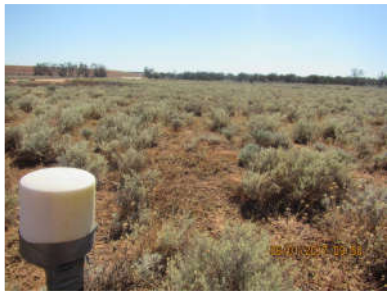
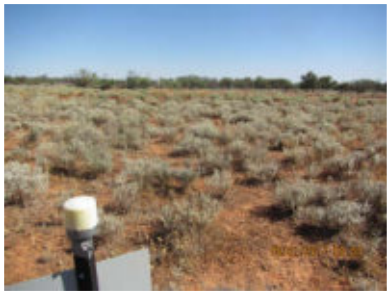
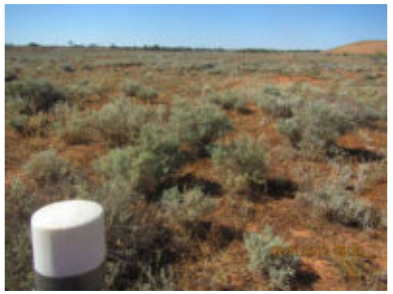


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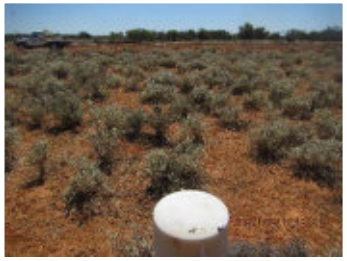
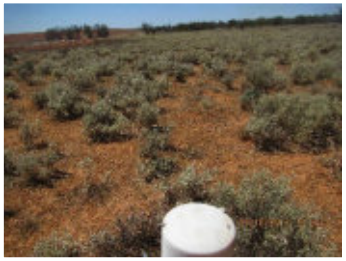

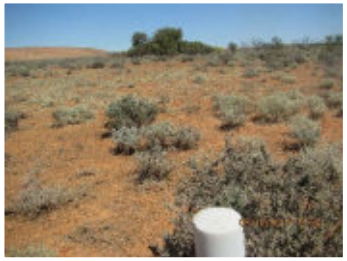
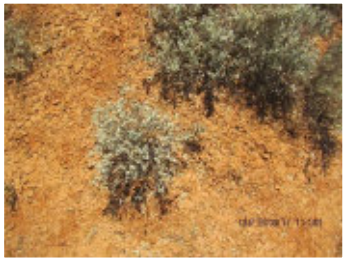
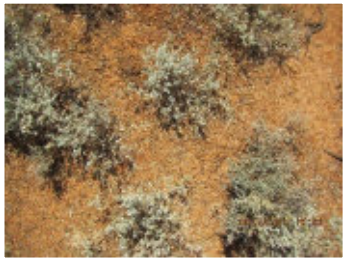
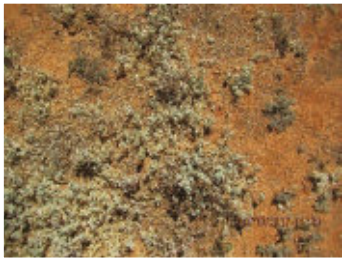
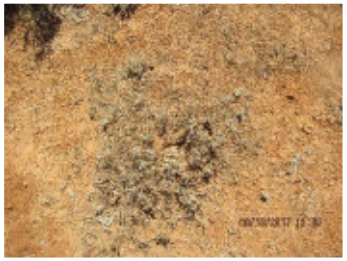

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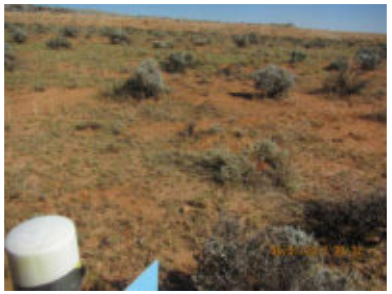
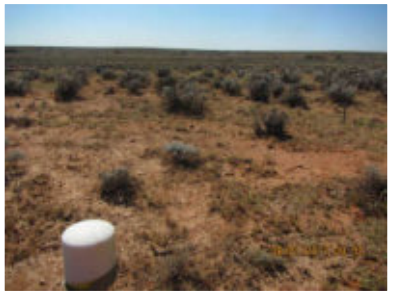


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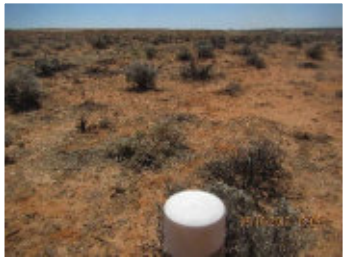
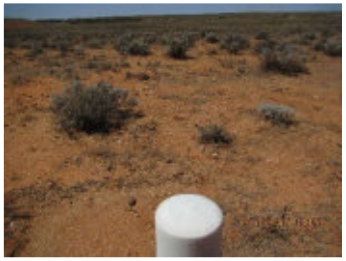
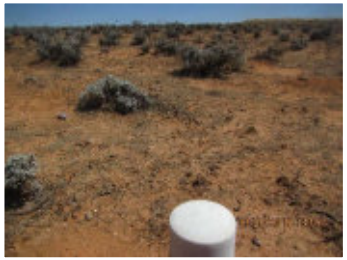





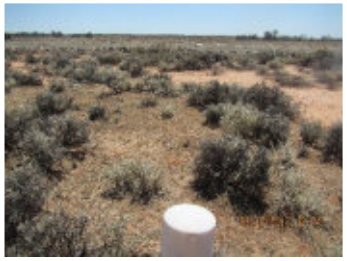
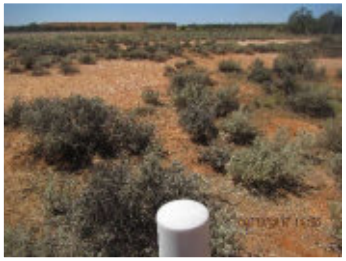


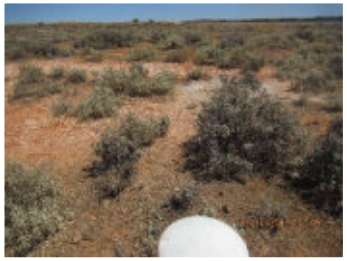
WD6: 2019 Q4

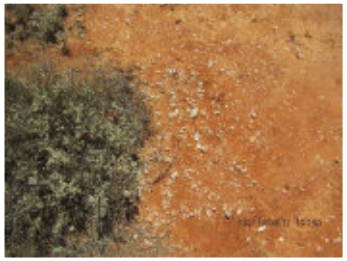
WD7: 2016 Q4

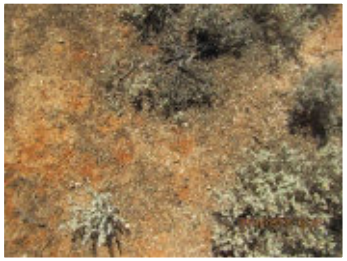



WD7: 2017 Q3







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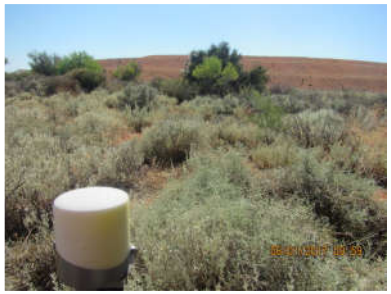
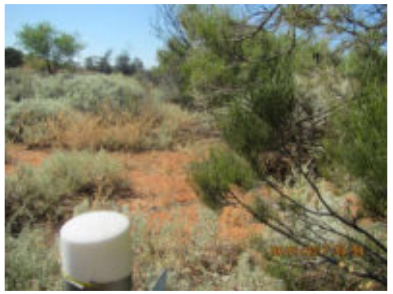
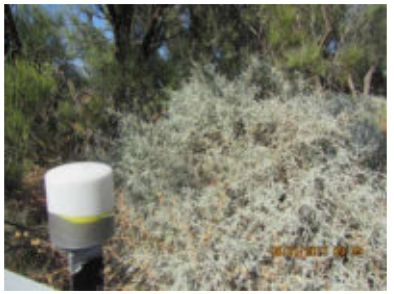
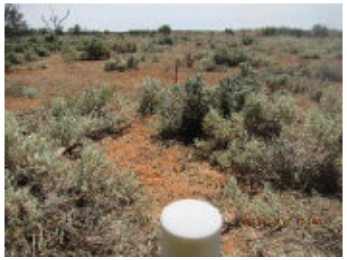
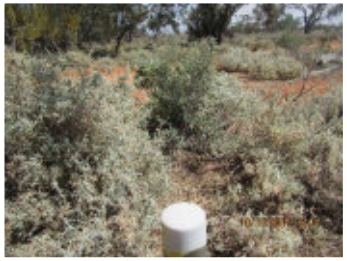
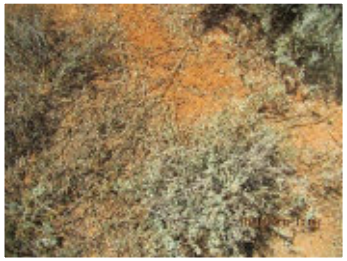
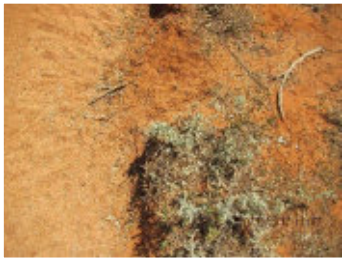


WD8: 2017 Q3



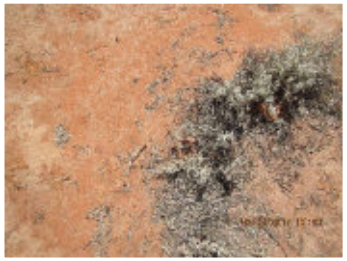

WD9: 2016 Q4

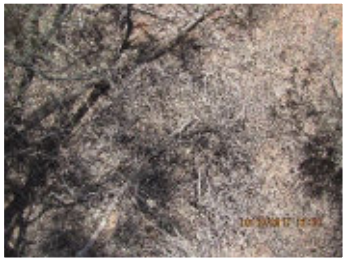



WD9: 2017 Q3







WD9: 2018 Q3


WD 9







Appendix C

Groundwater Quality Data

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Gemma Connolly	Manager	Huong Crawford
Client	COPPERCHEM LTD	Laboratory	SGS Alexandria Environmental
Address	PMB 23 via Cockburn Via Boolcoomata Rd Near Mingary SA 5440	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
Telephone	61 8 8919 4455	Telephone	+61 2 8594 0400
Facsimile	61 7 4742 1688	Facsimile	+61 2 8594 0499
Email	gconnolly@excoresources.com.au	Email	au.environmental.sydney@sgs.com
Project	**White Dam Gold Mine**	SGS Reference	**SE189898 R0**
Order Number	(Not specified)	Date Received	18 Mar 2019
Samples	12	Date Reported	25 Mar 2019

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Anions - Ion Chromatography - The Limit of Reporting (LOR) has been raised due to high conductivity of the sample requiring dilution.

SIGNATORIES

Dong Liang
Metals/Inorganics Team Leader

Huong Crawford
Production Manager

Kamrul Ahsan
Senior Chemist

Ly Kim Ha
Organic Section Head

Shane McDermott
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number: SE189898.001 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB01	SE189898.002 Water 11 Mar 2019 MB02	SE189898.003 Water 11 Mar 2019 MB03	SE189898.004 Water 11 Mar 2019 MB04
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 20/3/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
Dibromofluoromethane (Surrogate)	%	-	**121**	**113**	**111**	**117**
d4-1,2-dichloroethane (Surrogate)	%	-	**116**	**108**	**109**	**105**
d8-toluene (Surrogate)	%	-	**107**	**105**	**107**	**109**
Bromofluorobenzene (Surrogate)	%	-	**79**	**74**	**76**	**77**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 19/3/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C36	µg/L	450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 20/3/2019						
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

Parameter	Units	LOR	Sample Number: SE189898.001 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB01	SE189898.002 Water 11 Mar 2019 MB02	SE189898.003 Water 11 Mar 2019 MB03	SE189898.004 Water 11 Mar 2019 MB04
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 20/3/2019						
Weak Acid Dissociable Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 20/3/2019						
Free Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
pH in water Method: AN101 Tested: 18/3/2019						
pH**	No unit	-	**7.1**	**6.9**	**7.5**	**7.1**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 18/3/2019						
Conductivity @ 25 C	µS/cm	2	**37000**	**34000**	**8200**	**35000**
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 19/3/2019						
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**23000**	**22000**	**5800**	**24000**
Alkalinity Method: AN135 Tested: 20/3/2019						
Bicarbonate Alkalinity as CaCO3	mg/L	5	**140**	**140**	**230**	**130**
Total Alkalinity as CaCO3	mg/L	5	**140**	**140**	**230**	**130**

Parameter	Units	LOR	Sample Number: SE189898.001 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB01	SE189898.002 Water 11 Mar 2019 MB02	SE189898.003 Water 11 Mar 2019 MB03	SE189898.004 Water 11 Mar 2019 MB04
Anions by Ion Chromatography in Water Method: AN245 Tested: 19/3/2019						
Fluoride	mg/L	0.1	**1.9**	**2.3**	**4.7**	**1.3**
Chloride	mg/L	1	**10000**	**9300**	**2500**	**10000**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**0.96**	<0.25↑	**6.2**	<0.25↑
Sulfate, SO4	mg/L	1	**2700**	**2500**	**850**	**2700**
Sulfide by Titration in Water Method: AN149 Tested: 19/3/2019						
Sulfide	mg/L	0.5	<0.5	<0.5	<0.5	<0.5
Nitrite in Water Method: AN277 Tested: 19/3/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	**0.006**	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**0.96**	<0.005	**6.2**	<0.005
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 19/3/2019						
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.04**	**0.03**	<0.01	**0.01**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 19/3/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.32**	**0.38**	**0.14**	**0.20**
Total Nitrogen (calc)	mg/L	0.05	**1.3**	**0.38**	**6.3**	**0.21**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 19/3/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.21**	**0.08**	**0.05**	**0.12**

Parameter	Units	LOR	Sample Number: SE189898.001 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB01	SE189898.002 Water 11 Mar 2019 MB02	SE189898.003 Water 11 Mar 2019 MB03	SE189898.004 Water 11 Mar 2019 MB04
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 19/3/2019						
Total Calcium	mg/L	0.1	1100	1200	190	1200
Total Lithium, Li	mg/L	0.005	0.031	0.053	0.017	0.042
Total Magnesium	mg/L	0.1	640	570	140	580
Total Sodium	mg/L	0.1	5600	5200	1700	5500
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 19/3/2019						
Total Aluminium	µg/L	5	2900	1300	1200	2700
Total Arsenic	µg/L	1	2	<1	1	3
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	4800	3800	2900	3700
Total Cadmium	µg/L	0.1	0.4	0.2	0.1	2.0
Total Chromium	µg/L	1	5	4	9	5
Total Cobalt	µg/L	1	2	3	<1	1
Total Copper	µg/L	1	10	10	3	5
Total Iron	µg/L	5	2900	1600	1300	2500
Total Lead	µg/L	1	7	3	2	4
Total Manganese	µg/L	1	56	140	21	45
Total Molybdenum	µg/L	1	43	20	41	21
Total Nickel	µg/L	1	9	12	2	3
Total Selenium	µg/L	1	8	15	18	11
Total Uranium	µg/L	1	160	47	19	100
Total Vanadium	µg/L	1	9	4	16	8
Total Zinc	µg/L	5	60	540	44	120
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 24/3/2019						
Total Mercury	mg/L	0.0001	<0.0001	0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number: SE189898.005 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB06	SE189898.006 Water 11 Mar 2019 MB07	SE189898.007 Water 11 Mar 2019 RB04	SE189898.008 Water 12 Mar 2019 Gum Bore
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 20/3/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
Dibromofluoromethane (Surrogate)	%	-	**119**	**120**	**109**	**119**
d4-1,2-dichloroethane (Surrogate)	%	-	**110**	**119**	**103**	**108**
d8-toluene (Surrogate)	%	-	**107**	**106**	**102**	**108**
Bromofluorobenzene (Surrogate)	%	-	**77**	**76**	**78**	**77**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 19/3/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C36	µg/L	450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 20/3/2019						
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

Parameter	Units	LOR	Sample Number: SE189898.005 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB06	SE189898.006 Water 11 Mar 2019 MB07	SE189898.007 Water 11 Mar 2019 RB04	SE189898.008 Water 12 Mar 2019 Gum Bore
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 20/3/2019						
Weak Acid Dissociable Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 20/3/2019						
Free Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
pH in water Method: AN101 Tested: 18/3/2019						
pH**	No unit	-	**6.9**	**7.1**	**7.0**	**7.2**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 18/3/2019						
Conductivity @ 25 C	µS/cm	2	**38000**	**39000**	**37000**	**1800**
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 19/3/2019						
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**28000**	**25000**	**24000**	**1300**
Alkalinity Method: AN135 Tested: 20/3/2019						
Bicarbonate Alkalinity as CaCO3	mg/L	5	**110**	**120**	**410**	**440**
Total Alkalinity as CaCO3	mg/L	5	**110**	**120**	**410**	**440**

Parameter	Units	LOR	Sample Number: SE189898.005 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB06	SE189898.006 Water 11 Mar 2019 MB07	SE189898.007 Water 11 Mar 2019 RB04	SE189898.008 Water 12 Mar 2019 Gum Bore
Anions by Ion Chromatography in Water Method: AN245 Tested: 19/3/2019						
Fluoride	mg/L	0.1	**2.4**	**2.0**	**4.0**	**1.1**
Chloride	mg/L	1	**11000**	**11000**	**9500**	**170**
Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.25↑	<0.25↑	<0.25↑	**3.7**
Sulfate, SO4	mg/L	1	**2400**	**2300**	**4100**	**390**
Sulfide by Titration in Water Method: AN149 Tested: 19/3/2019						
Sulfide	mg/L	0.5	<0.5	<0.5	<0.5	<0.5
Nitrite in Water Method: AN277 Tested: 19/3/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	**0.005**	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	<0.005	**0.005**	<0.005	**3.7**
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 19/3/2019						
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	<0.01	**0.01**	<0.01	**0.03**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 19/3/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.11**	**0.16**	**0.29**	**0.34**
Total Nitrogen (calc)	mg/L	0.05	**0.11**	**0.17**	**0.29**	**4.1**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 19/3/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.14**	**0.05**	**0.08**	**0.06**

Parameter	Units	LOR	Sample Number: SE189898.005 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB06	SE189898.006 Water 11 Mar 2019 MB07	SE189898.007 Water 11 Mar 2019 RB04	SE189898.008 Water 12 Mar 2019 Gum Bore
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 19/3/2019						
Total Calcium	mg/L	0.1	**1400**	**1200**	**630**	**210**
Total Lithium, Li	mg/L	0.005	**0.040**	**0.035**	**0.027**	**0.005**
Total Magnesium	mg/L	0.1	**730**	**580**	**770**	**38**
Total Sodium	mg/L	0.1	**5700**	**5700**	**6200**	**210**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 19/3/2019						
Total Aluminium	µg/L	5	**2500**	**370**	**810**	**1300**
Total Arsenic	µg/L	1	**1**	<1	**1**	<1
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	**3900**	**3900**	**6300**	**640**
Total Cadmium	µg/L	0.1	**0.3**	**0.3**	**0.3**	<0.1
Total Chromium	µg/L	1	**5**	<1	**2**	**2**
Total Cobalt	µg/L	1	**1**	<1	**10**	**2**
Total Copper	µg/L	1	**10**	**3**	**6**	**18**
Total Iron	µg/L	5	**4100**	**480**	**850**	**4700**
Total Lead	µg/L	1	**5**	**1**	**1**	**18**
Total Manganese	µg/L	1	**80**	**14**	**63**	**93**
Total Molybdenum	µg/L	1	**46**	**12**	**130**	**6**
Total Nickel	µg/L	1	**4**	**2**	**8**	**3**
Total Selenium	µg/L	1	**4**	**2**	**3**	**1**
Total Uranium	µg/L	1	**25**	**60**	**300**	**14**
Total Vanadium	µg/L	1	**8**	**1**	**15**	**7**
Total Zinc	µg/L	5	**27**	**71**	**25**	**170**
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 24/3/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number: SE189898.009 Sample Matrix: Water Sample Date: 12 Mar 2019 Sample Name: Gum Bore QC	SE189898.010 Water 12 Mar 2019 HF PIT	SE189898.011 Water 11 Mar 2019 RB08	SE189898.012 Water 12 Mar 2019 RB12
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 20/3/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
Dibromofluoromethane (Surrogate)	%	-	**112**	**122**	**116**	**96**
d4-1,2-dichloroethane (Surrogate)	%	-	**103**	**116**	**102**	**91**
d8-toluene (Surrogate)	%	-	**108**	**103**	**104**	**118**
Bromofluorobenzene (Surrogate)	%	-	**73**	**83**	**76**	**76**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 19/3/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C36	µg/L	450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 20/3/2019						
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE189898.009 Water 12 Mar 2019 Gum Bore QC	SE189898.010 Water 12 Mar 2019 HF PIT	SE189898.011 Water 11 Mar 2019 RB08	SE189898.012 Water 12 Mar 2019 RB12
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 20/3/2019						
Weak Acid Dissociable Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 20/3/2019						
Free Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
pH in water Method: AN101 Tested: 18/3/2019						
pH**	No unit	-	**7.2**	**7.6**	**7.7**	**8.4**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 18/3/2019						
Conductivity @ 25 C	µS/cm	2	**1600**	**46000**	**9300**	**16000**
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 19/3/2019						
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**1500**	**29000**	**6600**	**11000**
Alkalinity Method: AN135 Tested: 20/3/2019						
Bicarbonate Alkalinity as CaCO3	mg/L	5	**440**	**150**	**440**	**47**
Total Alkalinity as CaCO3	mg/L	5	**440**	**150**	**440**	**47**

Parameter	Units	LOR	Sample Number: SE189898.009 Sample Matrix: Water Sample Date: 12 Mar 2019 Sample Name: Gum Bore QC	SE189898.010 Water 12 Mar 2019 HF PIT	SE189898.011 Water 11 Mar 2019 RB08	SE189898.012 Water 12 Mar 2019 RB12
Anions by Ion Chromatography in Water Method: AN245 Tested: 19/3/2019						
Fluoride	mg/L	0.1	**1.0**	**2.4**	**11**	**0.51**
Chloride	mg/L	1	**170**	**14000**	**2500**	**5400**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**3.7**	<0.25↑	**0.86**	<0.10↑
Sulfate, SO4	mg/L	1	**390**	**3000**	**1200**	**1400**
Sulfide by Titration in Water Method: AN149 Tested: 19/3/2019						
Sulfide	mg/L	0.5	<0.5	<0.5	<0.5	<0.5
Nitrite in Water Method: AN277 Tested: 19/3/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	**0.005**	**0.007**	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**3.7**	**0.005**	**0.87**	<0.005
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 19/3/2019						
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	<0.01	<0.01	**0.05**	**2.4**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 19/3/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.34**	**0.34**	**0.33**	**3.0**
Total Nitrogen (calc)	mg/L	0.05	**4.1**	**0.34**	**1.2**	**3.0**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 19/3/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.08**	**0.29**	**0.05**	**0.08**

Parameter	Units	LOR	Sample Number: SE189898.009 Sample Matrix: Water Sample Date: 12 Mar 2019 Sample Name: Gum Bore QC	SE189898.010 Water 12 Mar 2019 HF PIT	SE189898.011 Water 11 Mar 2019 RB08	SE189898.012 Water 12 Mar 2019 RB12
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 19/3/2019						
Total Calcium	mg/L	0.1	220	1300	130	150
Total Lithium, Li	mg/L	0.005	0.005	0.033	0.011	0.017
Total Magnesium	mg/L	0.1	39	810	140	170
Total Sodium	mg/L	0.1	230	7200	2100	3600
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 19/3/2019						
Total Aluminium	µg/L	5	1100	260	260	790
Total Arsenic	µg/L	1	<1	2	2	<1
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	580	5900	3900	3200
Total Cadmium	µg/L	0.1	<0.1	5.1	0.1	<0.1
Total Chromium	µg/L	1	2	<1	1	2
Total Cobalt	µg/L	1	<1	40	<1	2
Total Copper	µg/L	1	12	140	1	3
Total Iron	µg/L	5	2600	430	300	14000
Total Lead	µg/L	1	7	1	<1	2
Total Manganese	µg/L	1	55	590	7	1900
Total Molybdenum	µg/L	1	5	210	130	4
Total Nickel	µg/L	1	2	52	3	1
Total Selenium	µg/L	1	2	45	5	<1
Total Uranium	µg/L	1	14	240	130	<1
Total Vanadium	µg/L	1	6	2	80	2
Total Zinc	µg/L	5	160	270	11	29
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 24/3/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Alkalinity Method: ME-(AU)-[ENV]AN135

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Bicarbonate Alkalinity as CaCO3	LB169472	mg/L	5	<5	1 - 2%	NA
Total Alkalinity as CaCO3	LB169472	mg/L	5	<5	1 - 2%	103%

Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH_3 as N	LB169342	mg/L	0.01	<0.01	1%	102%	98%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Fluoride	LB169368	mg/L	0.1	<0.10		95 - 97%
Chloride	LB169368	mg/L	1	<0.05	1%	94%
Nitrate Nitrogen, NO3-N	LB169368	mg/L	0.005	<0.005		94 - 95%
Sulfate, SO4	LB169368	mg/L	1	<1.0	1%	93 - 94%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB169297	µS/cm	2	<2	2%	101%

Mercury (total) in Water Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Total Mercury	LB169787	mg/L	0.0001	<0.0001	NA

Metals in Water (Total) by ICPOES Method: ME-(AU)-[ENV]AN022/AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Calcium	LB169314	mg/L	0.1	<0.1	2%	97%	105%
Total Lithium, Li	LB169314	mg/L	0.005	<0.005	2%	104%	NA
Total Magnesium	LB169314	mg/L	0.1	<0.1	3%	102%	123%
Total Sodium	LB169314	mg/L	0.1	<0.1	2%	103%	93%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Nitrite in Water **Method: ME-(AU)-[ENV]AN277**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Nitrite Nitrogen, NO2 as N	LB169342	mg/L	0.005	<0.005	0 - 26%	107%	98%
Total Oxidised Nitrogen, NOx-N	LB169342	mg/L	0.005	<0.005			

pH in water **Method: ME-(AU)-[ENV]AN101**

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH**	LB169297	No unit	-	1%	100%

Sulfide by Titration in Water **Method: ME-(AU)-[ENV]AN149**

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Sulfide	LB169311	mg/L	0.5	<0.5	79%

TKN Kjeldahl Digestion by Discrete Analyser **Method: ME-(AU)-[ENV]AN281/AN292(Sydney only)**

Parameter	QC Reference	Units	LOR	DUP %RPD
Total Kjeldahl Nitrogen	LB169306	mg/L	0.05	2 - 5%

Total Cyanide in water by Discrete Analyser (Aquakem) **Method: ME-(AU)-[ENV]AN077/AN287**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Cyanide	LB169432	mg/L	0.004	<0.004	0%	83%	80%

Total Dissolved Solids (TDS) in water **Method: ME-(AU)-[ENV]AN113**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Dissolved Solids Dried at 175-185°C	LB169305	mg/L	10	<10	0 - 4%	102%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Phosphorus by Kjeldahl Digestion DA in Water **Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Phosphorus (Kjeldahl Digestion) as P	LB169306	mg/L	0.02	<0.02	6 - 17%	98%

Trace Metals (Total) in Water by ICPMS **Method: ME-(AU)-[ENV]AN022/AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Aluminium	LB169411	µg/L	5	<5	1 - 2%	111%	842%
Total Arsenic	LB169411	µg/L	1	<1	5 - 15%	91%	127%
Total Beryllium	LB169411	µg/L	1	<1	0%	97%	112%
Total Boron	LB169411	µg/L	5	<5	1 - 8%	110%	1992%
Total Cadmium	LB169411	µg/L	0.1	<0.1	0 - 3%	100%	109%
Total Chromium	LB169411	µg/L	1	<1	0%	NA	NA
Total Cobalt	LB169411	µg/L	1	<1	4%	107%	99%
Total Copper	LB169411	µg/L	1	<1	1 - 3%	107%	92%
Total Iron	LB169411	µg/L	5	<5	2%	NA	NA
Total Lead	LB169411	µg/L	1	<1	4 - 8%	99%	113%
Total Manganese	LB169411	µg/L	1	<1	4%	105%	118%
Total Molybdenum	LB169411	µg/L	1	<1	8%	111%	141%
Total Nickel	LB169411	µg/L	1	<1	2 - 3%	104%	89%
Total Selenium	LB169411	µg/L	1	<1	9 - 11%	84%	143%
Total Uranium	LB169411	µg/L	1	<1	4%	102%	44%
Total Vanadium	LB169411	µg/L	1	<1	1%	112%	122%
Total Zinc	LB169411	µg/L	5	<5	2%	91%	79%

TRH (Total Recoverable Hydrocarbons) in Water **Method: ME-(AU)-[ENV]AN403**

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
TRH C10-C14	LB169307	µg/L	50	<50	82%
TRH C15-C28	LB169307	µg/L	200	<200	103%
TRH C29-C36	LB169307	µg/L	200	<200	115%
TRH C37-C40	LB169307	µg/L	200	<200	NA
TRH C10-C36	LB169307	µg/L	450	<450	NA
TRH C10-C40	LB169307	µg/L	650	<650	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
TRH >C10-C16	LB169307	µg/L	60	<60	93%
TRH >C10-C16 - Naphthalene (F2)	LB169307	µg/L	60	<60	NA
TRH >C16-C34 (F3)	LB169307	µg/L	500	<500	111%
TRH >C34-C40 (F4)	LB169307	µg/L	500	<500	120%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Volatile Petroleum Hydrocarbons in Water **Method: ME-(AU)-[ENV]AN433**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C6-C10	LB169508	µg/L	50	<50	0%	100%	96%
TRH C6-C9	LB169508	µg/L	40	<40	0%	94%	92%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Dibromofluoromethane (Surrogate)	LB169508	%	-	111%	1 - 4%	99%	113%
d4-1,2-dichloroethane (Surrogate)	LB169508	%	-	104%	1 - 2%	95%	104%
d8-toluene (Surrogate)	LB169508	%	-	105%	3 - 7%	104%	98%
Bromofluorobenzene (Surrogate)	LB169508	%	-	79%	2 - 3%	105%	128%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene (F0)	LB169508	µg/L	0.5	<0.5	0%	NA	NA
TRH C6-C10 minus BTEX (F1)	LB169508	µg/L	50	<50	0%	100%	92%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN022/AN320	Total (acid soluble) Metals by ICP-OES: Samples are digested in nitric or nitric and hydrochloric acids prior to analysis for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN076/AN287	Discrete Analyser. A buffered distillate or water sample is treated with chloramine/barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration.
AN077	Hydrogen cyanide is liberated from an acidified sample by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN078	Hydrogen cyanide is liberated from a slightly acidified sample (pH 4.5-6.0) by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN113	The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN149	sulfide by Iodometric Titration: sulfide is precipitated as zinc sulfide to overcome interferences with sulphite and thiosulfate. After filtration, sulfide is determined titrimetrically. Reference APHA 4500-S2-

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277/WC250.312	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN287	A buffered distillate or water sample is treated with chloramine/barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration by Aquakem DA.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser.
AN311(Perth) /AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions taken from unfiltered sample are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoveerable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been perfomed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here : http://www.sgs.com.au/~/media/Local/Australia/Documents/Technical%20Documents/MP-AU-ENV-QU-022%20QA%20QC%20Plan.pdf

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
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Project	**White Dam Gold Mine**	SGS Reference	**SE194121 R0**
Order Number	(Not specified)	Date Received	17 Jun 2019
Samples	12	Date Reported	25 Jun 2019

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Ion Chromatography - The Limit of Reporting (LOR) has been raised for Fluoride (F) and Nitrate-Nitrogen (NO3-N) due to high conductivity of the sample requiring dilution.

SIGNATORIES

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Parameter	Units	LOR	Sample Number: SE194121.001 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB01	SE194121.002 Water 11 Mar 2019 MB02	SE194121.003 Water 11 Mar 2019 MB03	SE194121.004 Water 11 Mar 2019 MB04
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 21/6/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
Dibromofluoromethane (Surrogate)	%	-	**107**	**127**	**112**	**108**
d4-1,2-dichloroethane (Surrogate)	%	-	**127**	**115**	**104**	**110**
d8-toluene (Surrogate)	%	-	**85**	**90**	**89**	**80**
Bromofluorobenzene (Surrogate)	%	-	**110**	**108**	**75**	**70**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 18/6/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C36	µg/L	450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 19/6/2019						
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

Parameter	Units	LOR	Sample Number: SE194121.001 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB01	SE194121.002 Water 11 Mar 2019 MB02	SE194121.003 Water 11 Mar 2019 MB03	SE194121.004 Water 11 Mar 2019 MB04
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 20/6/2019						
Weak Acid Dissociable Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 20/6/2019						
Free Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
pH in water Method: AN101 Tested: 17/6/2019						
pH**	No unit	-	**7.1**	**6.9**	**7.1**	**7.1**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 17/6/2019						
Conductivity @ 25 C	µS/cm	2	**32000**	**29000**	**20000**	**31000**
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 19/6/2019						
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**22000**	**19000**	**15000**	**23000**
Alkalinity Method: AN135 Tested: 17/6/2019						
Bicarbonate Alkalinity as CaCO3	mg/L	5	**140**	**140**	**200**	**140**
Total Alkalinity as CaCO3	mg/L	5	**140**	**140**	**200**	**140**

Parameter	Units	LOR	Sample Number: SE194121.001 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB01	SE194121.002 Water 11 Mar 2019 MB02	SE194121.003 Water 11 Mar 2019 MB03	SE194121.004 Water 11 Mar 2019 MB04
Anions by Ion Chromatography in Water Method: AN245 Tested: 18/6/2019						
Fluoride	mg/L	0.1	**0.63**	**0.90**	**1.2**	**0.29**
Chloride	mg/L	1	**11000**	**10000**	**6900**	**11000**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**2.2**	<0.25↑	**0.74**	**0.25**
Sulfate, SO4	mg/L	1	**2900**	**2700**	**2000**	**2700**
Sulfide by Titration in Water Method: AN149 Tested: 21/6/2019						
Sulfide	mg/L	0.5	<0.5	<0.5	<0.5	<0.5
Nitrite in Water Method: AN277 Tested: 17/6/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**2.2**	<0.005	**0.74**	**0.25**
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 17/6/2019						
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.02**	**0.02**	**0.01**	<0.01
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 21/6/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**1.4**	**0.66**	**0.12**	**1.4**
Total Nitrogen (calc)	mg/L	0.05	**3.6**	**0.67**	**0.86**	**1.6**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 21/6/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.19**	**0.10**	**0.05**	**0.14**

Parameter	Units	LOR	Sample Number: SE194121.001 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB01	SE194121.002 Water 11 Mar 2019 MB02	SE194121.003 Water 11 Mar 2019 MB03	SE194121.004 Water 11 Mar 2019 MB04
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 18/6/2019						
Total Calcium	mg/L	0.1	**1100**	**1100**	**570**	**1200**
Total Lithium, Li	mg/L	0.005	**0.025**	**0.042**	**0.030**	**0.033**
Total Magnesium	mg/L	0.1	**570**	**500**	**440**	**510**
Total Sodium	mg/L	0.1	**5500**	**4700**	**3400**	**5100**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 18/6/2019						
Total Aluminium	µg/L	5	**4300**	**1700**	**1200**	**2300**
Total Arsenic	µg/L	1	**2**	<1	**1**	**3**
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	**4800**	**3900**	**3200**	**3800**
Total Cadmium	µg/L	0.1	**0.2**	<0.1	<0.1	**1.7**
Total Chromium	µg/L	1	**6**	**5**	**2**	**4**
Total Cobalt	µg/L	1	**2**	**4**	<1	<1
Total Copper	µg/L	1	**12**	**14**	**4**	**9**
Total Iron	µg/L	5	**3500**	**2100**	**3400**	**2000**
Total Lead	µg/L	1	**8**	**4**	**1**	**3**
Total Manganese	µg/L	1	**75**	**160**	**440**	**27**
Total Molybdenum	µg/L	1	**44**	**18**	**13**	**20**
Total Nickel	µg/L	1	**13**	**10**	<1	**3**
Total Selenium	µg/L	1	**8**	**13**	<1	**9**
Total Uranium	µg/L	1	**150**	**43**	**7**	**89**
Total Vanadium	µg/L	1	**9**	**4**	**3**	**7**
Total Zinc	µg/L	5	**84**	**410**	**11**	**100**
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 18/6/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number: SE194121.005 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB06	SE194121.006 Water 11 Mar 2019 MB07	SE194121.007 Water 11 Mar 2019 RB04	SE194121.008 Water 11 Mar 2019 Gum Bore
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 21/6/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
Dibromofluoromethane (Surrogate)	%	-	**125**	**120**	**119**	**123**
d4-1,2-dichloroethane (Surrogate)	%	-	**94**	**121**	**117**	**124**
d8-toluene (Surrogate)	%	-	**86**	**82**	**89**	**88**
Bromofluorobenzene (Surrogate)	%	-	**79**	**76**	**78**	**70**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 18/6/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C36	µg/L	450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 19/6/2019						
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

Parameter	Units	LOR	Sample Number: SE194121.005 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB06	SE194121.006 Water 11 Mar 2019 MB07	SE194121.007 Water 11 Mar 2019 RB04	SE194121.008 Water 11 Mar 2019 Gum Bore
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 20/6/2019						
Weak Acid Dissociable Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 20/6/2019						
Free Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
pH in water Method: AN101 Tested: 17/6/2019						
pH**	No unit	-	**6.9**	**7.2**	**7.2**	**7.1**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 17/6/2019						
Conductivity @ 25 C	µS/cm	2	**33000**	**32000**	**29000**	**2100**
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 19/6/2019						
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**24000**	**24000**	**25000**	**1400**
Alkalinity Method: AN135 Tested: 17/6/2019						
Bicarbonate Alkalinity as CaCO3	mg/L	5	**110**	**130**	**450**	**440**
Total Alkalinity as CaCO3	mg/L	5	**110**	**130**	**450**	**440**

Parameter	Units	LOR	Sample Number: SE194121.005 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB06	SE194121.006 Water 11 Mar 2019 MB07	SE194121.007 Water 11 Mar 2019 RB04	SE194121.008 Water 11 Mar 2019 Gum Bore
Anions by Ion Chromatography in Water Method: AN245 Tested: 18/6/2019						
Fluoride	mg/L	0.1	**1.1**	**0.76**	**3.9**	**0.74**
Chloride	mg/L	1	**12000**	**11000**	**9400**	**200**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**0.12**	<0.25↑	<0.25↑	**4.0**
Sulfate, SO4	mg/L	1	**2500**	**2500**	**4100**	**410**
Sulfide by Titration in Water Method: AN149 Tested: 21/6/2019						
Sulfide	mg/L	0.5	<0.5	<0.5	<0.5	<0.5
Nitrite in Water Method: AN277 Tested: 17/6/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**0.12**	<0.005	<0.005	**4.0**
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 17/6/2019						
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	<0.01	<0.01	**0.06**	**0.04**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 21/6/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.16**	**0.54**	**0.75**	**0.37**
Total Nitrogen (calc)	mg/L	0.05	**0.29**	**0.54**	**0.75**	**4.3**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 21/6/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.24**	**0.26**	**0.13**	**0.06**

Parameter	Units	LOR	Sample Number: SE194121.005 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: MB06	SE194121.006 Water 11 Mar 2019 MB07	SE194121.007 Water 11 Mar 2019 RB04	SE194121.008 Water 11 Mar 2019 Gum Bore
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 18/6/2019						
Total Calcium	mg/L	0.1	**1400**	**1200**	**430**	**210**
Total Lithium, Li	mg/L	0.005	**0.031**	**0.028**	**0.022**	<0.005
Total Magnesium	mg/L	0.1	**650**	**530**	**540**	**35**
Total Sodium	mg/L	0.1	**5500**	**5100**	**5300**	**190**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 18/6/2019						
Total Aluminium	µg/L	5	**1800**	**1400**	**3300**	**820**
Total Arsenic	µg/L	1	**1**	<1	**3**	<1
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	**4000**	**4000**	**8100**	**640**
Total Cadmium	µg/L	0.1	<0.1	**0.2**	**0.3**	<0.1
Total Chromium	µg/L	1	**4**	**2**	**6**	**1**
Total Cobalt	µg/L	1	**1**	<1	**2**	<1
Total Copper	µg/L	1	**7**	**4**	**17**	**11**
Total Iron	µg/L	5	**4200**	**1300**	**2500**	**2100**
Total Lead	µg/L	1	**3**	**2**	**3**	**6**
Total Manganese	µg/L	1	**94**	**21**	**39**	**40**
Total Molybdenum	µg/L	1	**46**	**12**	**170**	**7**
Total Nickel	µg/L	1	**2**	**2**	**6**	<1
Total Selenium	µg/L	1	**3**	**1**	**7**	**1**
Total Uranium	µg/L	1	**23**	**57**	**360**	**13**
Total Vanadium	µg/L	1	**5**	**4**	**61**	**6**
Total Zinc	µg/L	5	**15**	**65**	**41**	**110**
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 18/6/2019						
Total Mercury	mg/L	0.0001	**0.0001**	<0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number: SE194121.009 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: Gum Bore QC	SE194121.010 Water 11 Mar 2019 HF PIT	SE194121.011 Water 11 Mar 2019 RB08	SE194121.012 Water 11 Mar 2019 RB12
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 21/6/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
Dibromofluoromethane (Surrogate)	%	-	**114**	**125**	**122**	**110**
d4-1,2-dichloroethane (Surrogate)	%	-	**119**	**121**	**113**	**105**
d8-toluene (Surrogate)	%	-	**87**	**79**	**81**	**86**
Bromofluorobenzene (Surrogate)	%	-	**76**	**74**	**76**	**77**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 18/6/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C36	µg/L	450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 19/6/2019						
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

Parameter	Units	LOR	Sample Number: SE194121.009 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: Gum Bore QC	SE194121.010 Water 11 Mar 2019 HF PIT	SE194121.011 Water 11 Mar 2019 RB08	SE194121.012 Water 11 Mar 2019 RB12
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 20/6/2019						
Weak Acid Dissociable Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 20/6/2019						
Free Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
pH in water Method: AN101 Tested: 17/6/2019						
pH**	No unit	-	**7.1**	**7.6**	**7.7**	**8.7**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 17/6/2019						
Conductivity @ 25 C	µS/cm	2	**2100**	**39000**	**12000**	**19000**
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 19/6/2019						
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**1400**	**29000**	**7100**	**8900**
Alkalinity Method: AN135 Tested: 17/6/2019						
Bicarbonate Alkalinity as CaCO3	mg/L	5	**450**	**150**	**420**	**44**
Total Alkalinity as CaCO3	mg/L	5	**450**	**150**	**420**	**51**

Parameter	Units	LOR	Sample Number: SE194121.009 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: Gum Bore QC	SE194121.010 Water 11 Mar 2019 HF PIT	SE194121.011 Water 11 Mar 2019 RB08	SE194121.012 Water 11 Mar 2019 RB12
Anions by Ion Chromatography in Water Method: AN245 Tested: 18/6/2019						
Fluoride	mg/L	0.1	**0.75**	**0.69**	**7.2**	<0.40↑
Chloride	mg/L	1	**200**	**15000**	**3100**	**6000**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**4.0**	<0.25↑	**1.6**	<0.10↑
Sulfate, SO4	mg/L	1	**410**	**3000**	**1500**	**1600**
Sulfide by Titration in Water Method: AN149 Tested: 21/6/2019						
Sulfide	mg/L	0.5	<0.5	<0.5	<0.5	<0.5
Nitrite in Water Method: AN277 Tested: 17/6/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	**0.009**
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**4.0**	<0.005	**1.6**	**0.009**
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 17/6/2019						
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.03**	**0.01**	<0.01	**2.1**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 21/6/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.30**	**0.32**	**0.41**	**2.6**
Total Nitrogen (calc)	mg/L	0.05	**4.3**	**0.33**	**2.0**	**2.6**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 21/6/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.04**	**0.39**	**0.08**	**0.10**

Parameter	Units	LOR	Sample Number: SE194121.009 Sample Matrix: Water Sample Date: 11 Mar 2019 Sample Name: Gum Bore QC	SE194121.010 Water 11 Mar 2019 HF PIT	SE194121.011 Water 11 Mar 2019 RB08	SE194121.012 Water 11 Mar 2019 RB12
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 18/6/2019						
Total Calcium	mg/L	0.1	**210**	**1300**	**140**	**170**
Total Lithium, Li	mg/L	0.005	<0.005	**0.025**	**0.011**	**0.016**
Total Magnesium	mg/L	0.1	**36**	**690**	**150**	**170**
Total Sodium	mg/L	0.1	**190**	**6700**	**2300**	**3600**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 18/6/2019						
Total Aluminium	µg/L	5	**1000**	**99**	**750**	**2600**
Total Arsenic	µg/L	1	<1	**2**	**1**	**2**
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	**550**	**5300**	**3500**	**3100**
Total Cadmium	µg/L	0.1	<0.1	**4.2**	<0.1	<0.1
Total Chromium	µg/L	1	**2**	<1	**2**	**5**
Total Cobalt	µg/L	1	<1	**46**	<1	**5**
Total Copper	µg/L	1	**13**	**170**	**5**	**9**
Total Iron	µg/L	5	**3000**	**710**	**740**	**58000**
Total Lead	µg/L	1	**8**	<1	<1	**6**
Total Manganese	µg/L	1	**57**	**500**	**9**	**3100**
Total Molybdenum	µg/L	1	**5**	**190**	**96**	**4**
Total Nickel	µg/L	1	**1**	**63**	**5**	**6**
Total Selenium	µg/L	1	**1**	**33**	**4**	<1
Total Uranium	µg/L	1	**12**	**240**	**130**	<1
Total Vanadium	µg/L	1	**6**	**1**	**55**	**5**
Total Zinc	µg/L	5	**130**	**370**	**29**	**45**
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 18/6/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Alkalinity Method: ME-(AU)-[ENV]AN135

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Bicarbonate Alkalinity as CaCO3	LB176324	mg/L	5	<5	7%	NA
Total Alkalinity as CaCO3	LB176324	mg/L	5	<5	3%	101%

Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH_3 as N	LB176332	mg/L	0.01	<0.01	1 - 16%	99%	101%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Fluoride	LB176361	mg/L	0.1	<0.10	0%	94%
Chloride	LB176361	mg/L	1	<0.05	3%	97%
Nitrate Nitrogen, NO3-N	LB176361	mg/L	0.005	<0.005	0%	96%
Sulfate, SO4	LB176361	mg/L	1	<1.0	3%	97%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB176321	µS/cm	2	<2	0%	99%

Mercury (total) in Water Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Mercury	LB176359	mg/L	0.0001	<0.0001	197%	NA

Metals in Water (Total) by ICPOES Method: ME-(AU)-[ENV]AN022/AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Calcium	LB176356	mg/L	0.1	<0.1	2%	102%	-76%
Total Lithium, Li	LB176356	mg/L	0.005	<0.005	1%	100%	NA
Total Magnesium	LB176356	mg/L	0.1	<0.1	0%	98%	54%
Total Sodium	LB176356	mg/L	0.1	<0.1	1%	99%	-617%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Nitrite in Water **Method: ME-(AU)-[ENV]AN277**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Nitrite Nitrogen, NO2 as N	LB176332	mg/L	0.005	<0.005	0 - 2%	99%	89%

pH in water **Method: ME-(AU)-[ENV]AN101**

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH**	LB176321	No unit	-	0%	100%

Sulfide by Titration in Water **Method: ME-(AU)-[ENV]AN149**

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Sulfide	LB176660	mg/L	0.5	<0.5	74%

TKN Kjeldahl Digestion by Discrete Analyser **Method: ME-(AU)-[ENV]AN281/AN292(Sydney only)**

Parameter	QC Reference	Units	LOR	DUP %RPD	MS %Recovery
Total Kjeldahl Nitrogen	LB176663	mg/L	0.05	6%	96%

Total Cyanide in water by Discrete Analyser (Aquakem) **Method: ME-(AU)-[ENV]AN077/AN287**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Cyanide	LB176499	mg/L	0.004	<0.004	0%	103%	96%

Total Dissolved Solids (TDS) in water **Method: ME-(AU)-[ENV]AN113**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Dissolved Solids Dried at 175-185°C	LB176541	mg/L	10	<10	1 - 4%	89%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Phosphorus by Kjeldahl Digestion DA in Water **Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Phosphorus (Kjeldahl Digestion) as P	LB176663	mg/L	0.02	<0.02	2 - 4%	96%	101%

Trace Metals (Total) in Water by ICPMS **Method: ME-(AU)-[ENV]AN022/AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Aluminium	LB176406	µg/L	5	<5		94%
Total Arsenic	LB176406	µg/L	1	<1	0%	90%
Total Beryllium	LB176406	µg/L	1	<1		114%
Total Boron	LB176406	µg/L	5	<5		100%
Total Cadmium	LB176406	µg/L	0.1	<0.1	0%	93%
Total Chromium	LB176406	µg/L	1	<1	0%	NA
Total Cobalt	LB176406	µg/L	1	<1		104%
Total Copper	LB176406	µg/L	1	<1	0%	103%
Total Iron	LB176406	µg/L	5	<5		NA
Total Lead	LB176406	µg/L	1	<1	0%	91%
Total Manganese	LB176406	µg/L	1	<1		100%
Total Molybdenum	LB176406	µg/L	1	<1		87%
Total Nickel	LB176406	µg/L	1	<1	0%	101%
Total Selenium	LB176406	µg/L	1	<1		89%
Total Uranium	LB176406	µg/L	1	<1		94%
Total Vanadium	LB176406	µg/L	1	<1		103%
Total Zinc	LB176406	µg/L	5	<5	0%	100%

TRH (Total Recoverable Hydrocarbons) in Water **Method: ME-(AU)-[ENV]AN403**

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
TRH C10-C14	LB176391	µg/L	50	<50	77%
TRH C15-C28	LB176391	µg/L	200	<200	96%
TRH C29-C36	LB176391	µg/L	200	<200	102%
TRH C37-C40	LB176391	µg/L	200	<200	NA
TRH C10-C36	LB176391	µg/L	450	<450	NA
TRH C10-C40	LB176391	µg/L	650	<650	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
TRH >C10-C16	LB176391	µg/L	60	<60	87%
TRH >C10-C16 - Naphthalene (F2)	LB176391	µg/L	60	<60	NA
TRH >C16-C34 (F3)	LB176391	µg/L	500	<500	102%
TRH >C34-C40 (F4)	LB176391	µg/L	500	<500	105%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Volatile Petroleum Hydrocarbons in Water **Method: ME-(AU)-[ENV]AN433**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH C6-C10	LB176661	µg/L	50	<50	0%	85%
TRH C6-C9	LB176661	µg/L	40	<40	0%	91%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Dibromofluoromethane (Surrogate)	LB176661	%	-	97%	0%	92%
d4-1,2-dichloroethane (Surrogate)	LB176661	%	-	105%	0%	104%
d8-toluene (Surrogate)	LB176661	%	-	93%	15%	99%
Bromofluorobenzene (Surrogate)	LB176661	%	-	88%	14 - 18%	104%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Benzene (F0)	LB176661	µg/L	0.5	<0.5	0%	NA
TRH C6-C10 minus BTEX (F1)	LB176661	µg/L	50	<50	0%	80%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN022/AN320	Total (acid soluble) Metals by ICP-OES: Samples are digested in nitric or nitric and hydrochloric acids prior to analysis for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN076/AN287	Discrete Analyser. A buffered distillate or water sample is treated with chloramine /barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration.
AN077	Hydrogen cyanide is liberated from an acidified sample by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN078	Hydrogen cyanide is liberated from a slightly acidified sample (pH 4.5-6.0) by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN113	The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN149	sulfide by Iodometric Titration: sulfide is precipitated as zinc sulfide to overcome interferences with sulphite and thiosulfate. After filtration, sulfide is determined titrimetrically. Reference APHA 4500-S2-

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277/WC250.312	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN287	A buffered distillate or water sample is treated with chloramine/barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration by Aquakem DA.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser.
AN311(Perth) /AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions taken from unfiltered sample are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoveerable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.

LOR	Limit of Reporting
↑↓	Raised or Lowered Limit of Reporting
QFH	QC result is above the upper tolerance
QFL	QC result is below the lower tolerance
-	The sample was not analysed for this analyte
NVL	Not Validated

Unless it is reported that sampling has been perfomed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au.pv.sgsvr/en-gb/environment.

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
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Project	**White Dam Gold**	SGS Reference	**SE197928 R1**
Order Number	(Not specified)	Date Received	23 Sep 2019
Samples	12	Date Reported	10 Oct 2019

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

This report cancels and supersedes the report No.SE197928 R0 dated 01/10/19 issued by SGS Environment, Health and Safety due to the inclusion of selenium results as per COC.

Ammonia-Nitrogen - Discrete Analyser - The Limit of Reporting (LOR) has been raised due to high conductivity of the sample requiring dilution.

SIGNATORIES

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Parameter	Units	LOR	Sample Number: SE197928.001 Sample Matrix: Water Sample Date: 16 Sep 2019 Sample Name: MB01	SE197928.002 Water 16 Sep 2019 MB02	SE197928.003 Water 16 Sep 2019 MB03	SE197928.004 Water 17 Sep 2019 MB04
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 27/9/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**126**	**130**	**118**	**131**
d8-toluene (Surrogate)	%	-	**94**	**97**	**89**	**96**
Bromofluorobenzene (Surrogate)	%	-	**81**	**85**	**81**	**84**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 24/9/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C36	µg/L	450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Anions by Ion Chromatography in Water Method: AN245 Tested: 24/9/2019						
Fluoride	mg/L	0.1	**1.8**	**2.0**	**2.1**	**1.1**
Chloride	mg/L	0.05	**11000**	**10000**	**6900**	**11000**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**2.0**	<0.005	**0.14**	**0.40**
Sulfate, SO4	mg/L	1	**2800**	**2600**	**2100**	**2800**

Parameter	Units	LOR	Sample Number: SE197928.001 Sample Matrix: Water Sample Date: 16 Sep 2019 Sample Name: MB01	SE197928.002 Water 16 Sep 2019 MB02	SE197928.003 Water 16 Sep 2019 MB03	SE197928.004 Water 17 Sep 2019 MB04
pH in water Method: AN101 Tested: 23/9/2019						
pH**	No unit	-	**7.1**	**6.9**	**7.1**	**7.2**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 23/9/2019						
Conductivity @ 25 C	µS/cm	2	**31000**	**29000**	**20000**	**30000**
Alkalinity Method: AN135 Tested: 24/9/2019						
Bicarbonate Alkalinity as CaCO3	mg/L	5	**140**	**140**	**190**	**120**
Total Alkalinity as CaCO3	mg/L	5	**140**	**140**	**190**	**120**
Nitrite in Water Method: AN277 Tested: 24/9/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**2.0**	<0.005	**0.14**	**0.40**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 25/9/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.68**	**0.41**	<0.05	**0.40**
Total Nitrogen (calc)	mg/L	0.05	**2.7**	**0.41**	**0.14**	**0.80**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 25/9/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.29**	**0.06**	**0.03**	**0.08**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE197928.001 Water 16 Sep 2019 MB01	SE197928.002 Water 16 Sep 2019 MB02	SE197928.003 Water 16 Sep 2019 MB03	SE197928.004 Water 17 Sep 2019 MB04
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 24/9/2019							
Ammonia Nitrogen, NH_3 as N	mg/L	0.005		<0.050↑	<0.050↑	<0.050↑	<0.050↑
Sulfide by Titration in Water Method: AN149 Tested: 27/9/2019							
Sulfide	mg/L	0.5		<0.5	**0.6**	**0.8**	**0.6**
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 26/9/2019							
Total Cyanide	mg/L	0.004		<0.004	<0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 26/9/2019							
Free Cyanide	mg/L	0.005		<0.005	<0.005	<0.005	<0.005
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 26/9/2019							
Weak Acid Dissociable Cyanide	mg/L	0.005		<0.005	<0.005	<0.005	<0.005
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 24/9/2019							
Total Dissolved Solids Dried at 175-185°C	mg/L	10		**23000**	**21000**	**14000**	**22000**

Parameter	Units	LOR	Sample Number: SE197928.001 Sample Matrix: Water Sample Date: 16 Sep 2019 Sample Name: MB01	SE197928.002 Water 16 Sep 2019 MB02	SE197928.003 Water 16 Sep 2019 MB03	SE197928.004 Water 17 Sep 2019 MB04
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 25/9/2019						
Calcium, Ca	mg/L	0.1	**1000**	**1100**	**590**	**1200**
Magnesium, Mg	mg/L	0.1	**600**	**530**	**440**	**530**
Sodium, Na	mg/L	0.1	**5200**	**4700**	**3300**	**4900**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 24/9/2019						
Total Aluminium	µg/L	5	**7800**	**1300**	**610**	**1300**
Total Arsenic	µg/L	1	**3**	<1	<1	**3**
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	**5000**	**3900**	**3200**	**3900**
Total Cadmium	µg/L	0.1	**0.5**	**0.2**	<0.1	**2.2**
Total Chromium	µg/L	1	**10**	**3**	**1**	**3**
Total Cobalt	µg/L	1	**5**	**17**	<1	<1
Total Copper	µg/L	1	**23**	**35**	**3**	**6**
Total Iron	µg/L	5	**8200**	**1800**	**2700**	**1400**
Total Lead	µg/L	1	**13**	**3**	<1	**2**
Total Manganese	µg/L	1	**150**	**210**	**470**	**29**
Total Molybdenum	µg/L	1	**45**	**19**	**15**	**21**
Total Nickel	µg/L	1	**10**	**25**	<1	**3**
Total Selenium	µg/L	1	**10**	**11**	**1**	**10**
Total Uranium	µg/L	1	**150**	**52**	**8**	**100**
Total Vanadium	µg/L	1	**17**	**4**	**2**	**5**
Total Zinc	µg/L	5	**84**	**510**	**20**	**180**
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 25/9/2019						
Total Lithium, Li	mg/L	0.005	**0.029**	**0.045**	**0.032**	**0.035**
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 24/9/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number: SE197928.005 Sample Matrix: Water Sample Date: 17 Sep 2019 Sample Name: MB06	SE197928.006 Water 17 Sep 2019 MB07	SE197928.007 Water 16 Sep 2019 RB04	SE197928.008 Water 16 Sep 2019 GUM BORE
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 27/9/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**123**	**116**	**123**	**106**
d8-toluene (Surrogate)	%	-	**94**	**88**	**94**	**89**
Bromofluorobenzene (Surrogate)	%	-	**82**	**82**	**82**	**81**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 24/9/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C36	µg/L	450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Anions by Ion Chromatography in Water Method: AN245 Tested: 24/9/2019						
Fluoride	mg/L	0.1	**2.1**	**1.7**	**4.8**	**0.78**
Chloride	mg/L	0.05	**12000**	**13000**	**9200**	**190**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**0.11**	**0.008**	**0.36**	**4.0**
Sulfate, SO4	mg/L	1	**2600**	**2600**	**4100**	**410**

Parameter	Units	LOR	Sample Number: SE197928.005 Sample Matrix: Water Sample Date: 17 Sep 2019 Sample Name: MB06	SE197928.006 Water 17 Sep 2019 MB07	SE197928.007 Water 16 Sep 2019 RB04	SE197928.008 Water 16 Sep 2019 GUM BORE
pH in water Method: AN101 Tested: 23/9/2019						
pH**	No unit	-	**6.9**	**7.2**	**7.1**	**7.1**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 23/9/2019						
Conductivity @ 25 C	µS/cm	2	**33000**	**32000**	**31000**	**2000**
Alkalinity Method: AN135 Tested: 24/9/2019						
Bicarbonate Alkalinity as CaCO3	mg/L	5	**110**	**120**	**410**	**410**
Total Alkalinity as CaCO3	mg/L	5	**110**	**120**	**410**	**410**
Nitrite in Water Method: AN277 Tested: 24/9/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**0.11**	**0.010**	**0.37**	**4.0**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 25/9/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.45**	**0.66**	**0.23**	**0.19**
Total Nitrogen (calc)	mg/L	0.05	**0.57**	**0.67**	**0.59**	**4.2**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 25/9/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.19**	**0.20**	**0.07**	**0.06**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE197928.005 Water 17 Sep 2019 MB06	SE197928.006 Water 17 Sep 2019 MB07	SE197928.007 Water 16 Sep 2019 RB04	SE197928.008 Water 16 Sep 2019 GUM BORE
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 24/9/2019							
Ammonia Nitrogen, NH_3 as N	mg/L	0.005		<0.050↑	<0.050↑	<0.050↑	**0.008**
Sulfide by Titration in Water Method: AN149 Tested: 27/9/2019							
Sulfide	mg/L	0.5		**0.8**	**0.8**	**4.0**	**1.4**
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 26/9/2019							
Total Cyanide	mg/L	0.004		<0.004	<0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 26/9/2019							
Free Cyanide	mg/L	0.005		<0.005	<0.005	<0.005	<0.005
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 26/9/2019							
Weak Acid Dissociable Cyanide	mg/L	0.005		<0.005	<0.005	<0.005	<0.005
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 24/9/2019							
Total Dissolved Solids Dried at 175-185°C	mg/L	10		**26000**	**25000**	**22000**	**1300**

Parameter	Units	LOR	Sample Number: SE197928.005 Sample Matrix: Water Sample Date: 17 Sep 2019 Sample Name: MB06	SE197928.006 Water 17 Sep 2019 MB07	SE197928.007 Water 16 Sep 2019 RB04	SE197928.008 Water 16 Sep 2019 GUM BORE
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 25/9/2019						
Calcium, Ca	mg/L	0.1	**1300**	**1200**	**470**	**220**
Magnesium, Mg	mg/L	0.1	**690**	**570**	**620**	**35**
Sodium, Na	mg/L	0.1	**5200**	**5300**	**5400**	**200**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 24/9/2019						
Total Aluminium	µg/L	5	**810**	**5100**	**1500**	**1800**
Total Arsenic	µg/L	1	<1	**1**	**3**	<1
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	**4000**	**4100**	**7800**	**520**
Total Cadmium	µg/L	0.1	**0.3**	**0.4**	**0.4**	<0.1
Total Chromium	µg/L	1	**2**	**7**	**3**	**2**
Total Cobalt	µg/L	1	<1	**2**	**3**	**1**
Total Copper	µg/L	1	**3**	**13**	**9**	**11**
Total Iron	µg/L	5	**1600**	**6400**	**1700**	**3400**
Total Lead	µg/L	1	**2**	**7**	**3**	**6**
Total Manganese	µg/L	1	**62**	**94**	**57**	**65**
Total Molybdenum	µg/L	1	**43**	**11**	**150**	**13**
Total Nickel	µg/L	1	**6**	**5**	**8**	**2**
Total Selenium	µg/L	1	**4**	**2**	**6**	**1**
Total Uranium	µg/L	1	**24**	**61**	**360**	**14**
Total Vanadium	µg/L	1	**2**	**11**	**56**	**7**
Total Zinc	µg/L	5	**40**	**140**	**84**	**160**
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 25/9/2019						
Total Lithium, Li	mg/L	0.005	**0.033**	**0.031**	**0.023**	**0.006**
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 24/9/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE197928.009 Water 16 Sep 2019 GUM BORE QC	SE197928.010 Water 17 Sep 2019 HF PIT	SE197928.011 Water 16 Sep 2019 RB08	SE197928.012 Water 16 Sep 2019 RB12
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 27/9/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**123**	**134**	**123**	**112**
d8-toluene (Surrogate)	%	-	**96**	**98**	**93**	**90**
Bromofluorobenzene (Surrogate)	%	-	**85**	**85**	**81**	**84**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	**0.6**
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 24/9/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C36	µg/L	450	<450	<450	<450	<450
TRH C10-C40	µg/L	650	<650	<650	<650	<650
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Anions by Ion Chromatography in Water Method: AN245 Tested: 24/9/2019						
Fluoride	mg/L	0.1	**0.77**	**2.1**	**14**	**0.23**
Chloride	mg/L	0.05	**190**	**15000**	**1600**	**6100**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**4.1**	<0.005	**0.96**	<0.005
Sulfate, SO4	mg/L	1	**410**	**3100**	**950**	**1500**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name SE197928.009 Water 16 Sep 2019 GUM BORE QC	SE197928.010 Water 17 Sep 2019 HF PIT	SE197928.011 Water 16 Sep 2019 RB08	SE197928.012 Water 16 Sep 2019 RB12
pH in water Method: AN101 Tested: 23/9/2019						
pH**	No unit	-	**7.1**	**7.7**	**8.1**	**9.1**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 23/9/2019						
Conductivity @ 25 C	µS/cm	2	**2000**	**39000**	**7300**	**17000**
Alkalinity Method: AN135 Tested: 24/9/2019						
Bicarbonate Alkalinity as CaCO3	mg/L	5	**420**	**140**	**470**	**48**
Total Alkalinity as CaCO3	mg/L	5	**420**	**140**	**520**	**48**
Nitrite in Water Method: AN277 Tested: 24/9/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**4.1**	<0.005	**0.97**	<0.005
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 25/9/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.64**	**0.55**	**0.18**	**3.0**
Total Nitrogen (calc)	mg/L	0.05	**4.7**	**0.55**	**1.1**	**3.0**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 25/9/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.12**	**0.25**	**0.11**	**0.09**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE197928.009 Water 16 Sep 2019 GUM BORE QC	SE197928.010 Water 17 Sep 2019 HF PIT	SE197928.011 Water 16 Sep 2019 RB08	SE197928.012 Water 16 Sep 2019 RB12
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 24/9/2019							
Ammonia Nitrogen, NH_3 as N	mg/L	0.005		**0.009**	<0.050↑	**0.010**	**2.4**
Sulfide by Titration in Water Method: AN149 Tested: 27/9/2019							
Sulfide	mg/L	0.5		**1.2**	**1.2**	**1.4**	**0.6**
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 26/9/2019							
Total Cyanide	mg/L	0.004		<0.004	<0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 26/9/2019							
Free Cyanide	mg/L	0.005		<0.005	<0.005	<0.005	<0.005
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 26/9/2019							
Weak Acid Dissociable Cyanide	mg/L	0.005		<0.005	<0.005	<0.005	<0.005
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 24/9/2019							
Total Dissolved Solids Dried at 175-185°C	mg/L	10		**1200**	**26000**	**4400**	**11000**

Parameter	Units	LOR	Sample Number: SE197928.009 Sample Matrix: Water Sample Date: 16 Sep 2019 Sample Name: GUM BORE QC	SE197928.010 Water 17 Sep 2019 HF PIT	SE197928.011 Water 16 Sep 2019 RB08	SE197928.012 Water 16 Sep 2019 RB12
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 25/9/2019						
Calcium, Ca	mg/L	0.1	**210**	**1300**	**66**	**170**
Magnesium, Mg	mg/L	0.1	**34**	**780**	**67**	**170**
Sodium, Na	mg/L	0.1	**200**	**6900**	**1400**	**3500**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 24/9/2019						
Total Aluminium	µg/L	5	**2000**	**47**	**1500**	**5000**
Total Arsenic	µg/L	1	<1	**2**	**3**	**2**
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	**510**	**5800**	**4400**	**3000**
Total Cadmium	µg/L	0.1	<0.1	**4.3**	**0.3**	<0.1
Total Chromium	µg/L	1	**3**	<1	**3**	**8**
Total Cobalt	µg/L	1	**1**	**41**	<1	**5**
Total Copper	µg/L	1	**12**	**140**	**5**	**10**
Total Iron	µg/L	5	**4000**	**290**	**1400**	**54000**
Total Lead	µg/L	1	**7**	<1	**1**	**6**
Total Manganese	µg/L	1	**71**	**390**	**21**	**2200**
Total Molybdenum	µg/L	1	**5**	**210**	**200**	**5**
Total Nickel	µg/L	1	**2**	**63**	**1**	**7**
Total Selenium	µg/L	1	**2**	**34**	**5**	**2**
Total Uranium	µg/L	1	**14**	**230**	**150**	<1
Total Vanadium	µg/L	1	**7**	<1	**140**	**10**
Total Zinc	µg/L	5	**160**	**380**	**60**	**81**
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 25/9/2019						
Total Lithium, Li	mg/L	0.005	**0.006**	**0.026**	**0.008**	**0.018**
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 24/9/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Alkalinity Method: ME-(AU)-[ENV]AN135

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Bicarbonate Alkalinity as CaCO3	LB183849	mg/L	5	<5	3 - 6%	NA
Total Alkalinity as CaCO3	LB183849	mg/L	5	<5	3 - 6%	99%

Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH_3 as N	LB183785	mg/L	0.005	<0.005	0 - 18%	100%	101%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Fluoride	LB183792	mg/L	0.1	<0.10	2 - 6%	96%
Chloride	LB183792	mg/L	0.05	<0.05	0%	98%
Nitrate Nitrogen, NO3-N	LB183792	mg/L	0.005	<0.005	0 - 1%	102%
Sulfate, SO4	LB183792	mg/L	1	<1.0	2%	98%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB183727	µS/cm	2	<2	0%	98%

Mercury (total) in Water Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Mercury	LB183773	mg/L	0.0001	<0.0001	19 - 198%	NA

Metals in Water (Total) by ICPOES Method: ME-(AU)-[ENV]AN022/AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Lithium, Li	LB183858	mg/L	0.005	<0.005	1 - 2%	103%	NA

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Calcium, Ca	LB183856	mg/L	0.1	<0.1	99%
Magnesium, Mg	LB183856	mg/L	0.1	<0.1	93%
Sodium, Na	LB183856	mg/L	0.1	<0.1	94%

Nitrite in Water Method: ME-(AU)-[ENV]AN277

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Nitrite Nitrogen, NO2 as N	LB183785	mg/L	0.005	<0.005	0 - 4%	111%	99%

pH in water Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH**	LB183727	No unit	-	0 - 1%	99%

Sulfide by Titration in Water Method: ME-(AU)-[ENV]AN149

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Sulfide	LB184141	mg/L	0.5	<0.5	87%

TKN Kjeldahl Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN281/AN292(Sydney only)

Parameter	QC Reference	Units	LOR	DUP %RPD	MS %Recovery
Total Kjeldahl Nitrogen	LB183860	mg/L	0.05	5 - 60%	100%

Total Cyanide in water by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN077/AN287

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Cyanide	LB183992	mg/L	0.004	<0.004	0%	96%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Dissolved Solids (TDS) in water **Method: ME-(AU)-[ENV]AN113**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Dissolved Solids Dried at 175-185°C	LB183835	mg/L	10	<10	1 - 3%	85%

Total Phosphorus by Kjeldahl Digestion DA in Water **Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Phosphorus (Kjeldahl Digestion) as P	LB183860	mg/L	0.02	<0.02	11 - 15%	102%	97%

Trace Metals (Total) in Water by ICPMS **Method: ME-(AU)-[ENV]AN022/AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Aluminium	LB183768	µg/L	5	<5	0 - 6%	105%	121%
Total Arsenic	LB183768	µg/L	1	<1	0 - 1%	99%	120%
Total Beryllium	LB183768	µg/L	1	<1	0%	107%	
Total Boron	LB183768	µg/L	5	<5	0 - 2%	113%	
Total Cadmium	LB183768	µg/L	0.1	<0.1	0 - 4%	107%	123%
Total Chromium	LB183768	µg/L	1	<1	1 - 8%	NA	NA
Total Cobalt	LB183768	µg/L	1	<1	0 - 8%	110%	
Total Copper	LB183768	µg/L	1	<1	5 - 14%	111%	108%
Total Iron	LB183768	µg/L	5	<5	3 - 7%	NA	NA
Total Lead	LB183768	µg/L	1	<1	4 - 10%	106%	117%
Total Manganese	LB183768	µg/L	1	<1	5 - 6%	105%	107%
Total Molybdenum	LB183768	µg/L	1	<1	1 - 71%	100%	
Total Nickel	LB183768	µg/L	1	<1	3 - 90%	108%	108%
Total Uranium	LB183768	µg/L	1	<1	0 - 2%	102%	
Total Vanadium	LB183768	µg/L	1	<1	1 - 3%	111%	
Total Zinc	LB183768	µg/L	5	<5	2 - 4%	104%	98%

TRH (Total Recoverable Hydrocarbons) in Water **Method: ME-(AU)-[ENV]AN403**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH C10-C14	LB183817	µg/L	50	<50	0%	79%
TRH C15-C28	LB183817	µg/L	200	<200	0%	90%
TRH C29-C36	LB183817	µg/L	200	<200	0%	87%
TRH C37-C40	LB183817	µg/L	200	<200	0%	NA
TRH C10-C36	LB183817	µg/L	450	<450	0%	NA
TRH C10-C40	LB183817	µg/L	650	<650	0%	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH >C10-C16	LB183817	µg/L	60	<60	0%	83%
TRH >C10-C16 - Naphthalene (F2)	LB183817	µg/L	60	<60	0%	NA
TRH >C16-C34 (F3)	LB183817	µg/L	500	<500	0%	98%
TRH >C34-C40 (F4)	LB183817	µg/L	500	<500	0%	79%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Volatile Petroleum Hydrocarbons in Water **Method: ME-(AU)-[ENV]AN433**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C6-C10	LB184086	µg/L	50	<50	0%	85%	99%
TRH C6-C9	LB184086	µg/L	40	<40	0%	86%	102%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d4-1,2-dichloroethane (Surrogate)	LB184086	%	-	128%	2 - 10%	97%	101%
d8-toluene (Surrogate)	LB184086	%	-	95%	2 - 11%	109%	103%
Bromofluorobenzene (Surrogate)	LB184086	%	-	84%	0 - 1%	105%	110%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene (F0)	LB184086	µg/L	0.5	<0.5	0%	NA	NA
TRH C6-C10 minus BTEX (F1)	LB184086	µg/L	50	<50	0%	86%	101%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN022/AN320	Total (acid soluble) Metals by ICP-OES: Samples are digested in nitric or nitric and hydrochloric acids prior to analysis for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN076/AN287	Discrete Analyser. A buffered distillate or water sample is treated with chloramine /barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration.
AN077	Hydrogen cyanide is liberated from an acidified sample by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN078	Hydrogen cyanide is liberated from a slightly acidified sample (pH 4.5-6.0) by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN113	The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN149	sulfide by Iodometric Titration: sulfide is precipitated as zinc sulfide to overcome interferences with sulphite and thiosulfate. After filtration, sulfide is determined titrimetrically. Reference APHA 4500-S2-

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277/WC250.312	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN287	A buffered distillate or water sample is treated with chloramine/barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration by Aquakem DA.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser.
AN311(Perth) /AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions taken from unfiltered sample are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoveerable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.
LNR	Sample listed, but not received.
*	NATA accreditation does not cover the performance of this service.
**	Indicative data, theoretical holding time exceeded.

LOR	Limit of Reporting
↑↓	Raised or Lowered Limit of Reporting
QFH	QC result is above the upper tolerance
QFL	QC result is below the lower tolerance
-	The sample was not analysed for this analyte
NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au.pv.sgsvr/en-gb/environment.

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS		LABORATORY DETAILS	
Contact	Gemma Connolly	Manager	Huong Crawford
Client	ROUND OAK MINERALS PTY LIMITED	Laboratory	SGS Alexandria Environmental
Address	GPO BOX 778 BRISBANE QLD 4000	Address	Unit 16, 33 Maddox St Alexandria NSW 2015
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Facsimile	61 7 38356207	Facsimile	+61 2 8594 0499
Email	gemma.connolly@roundoakmin.com.au	Email	au.environmental.sydney@sgs.com
Project	**White Dam Gold Mine**	SGS Reference	**SE201189 R0**
Order Number	(Not specified)	Date Received	16 Dec 2019
Samples	12	Date Reported	23 Dec 2019

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

Ion Chromatography - The Limit of Reporting (LOR) for nitrate nitrogen has been raised due to high conductivity of the sample requiring dilution.

Sample(s) received were not in appropriate containers for TRH testing , samples were in plastic instead of amber bottles as required.

SIGNATORIES

Bennet LO
Senior Organic Chemist/Metals Chemis

Dong LIANG
Metals/Inorganics Team Leader

Kamrul AHSAN
Senior Chemist

Ly Kim HA
Organic Section Head

Parameter	Units	LOR	Sample Number: SE201189.001 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: MB01	SE201189.002 Water 10 Dec 2019 MB02	SE201189.003 Water 10 Dec 2019 MB03	SE201189.004 Water 10 Dec 2019 MB04
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 18/12/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**121**	**121**	**119**	**120**
d8-toluene (Surrogate)	%	-	**119**	**120**	**118**	**119**
Bromofluorobenzene (Surrogate)	%	-	**117**	**119**	**119**	**117**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 18/12/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C40	µg/L	320	<320	<320	<320	<320
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Anions by Ion Chromatography in Water Method: AN245 Tested: 17/12/2019						
Sulfate, SO4	mg/L	1	**2900**	**2700**	**790**	**2800**
Fluoride	mg/L	0.1	**1.6**	**2.0**	**4.6**	**1.0**
Chloride	mg/L	1	**11000**	**10000**	**2200**	**11000**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**2.2**	<0.25↑	**7.7**	**0.46**

Parameter	Units	LOR	Sample Number: SE201189.001 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: MB01	SE201189.002 Water 10 Dec 2019 MB02	SE201189.003 Water 10 Dec 2019 MB03	SE201189.004 Water 10 Dec 2019 MB04
Nitrite in Water Method: AN277 Tested: 17/12/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**2.2**	<0.005	**7.7**	**0.46**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 19/12/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.98**	**0.23**	**0.43**	**0.31**
Total Nitrogen (calc)	mg/L	0.05	**3.2**	**0.23**	**8.2**	**0.77**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 19/12/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.38**	**0.06**	**0.16**	**0.07**
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 17/12/2019						
Ammonia Nitrogen, NH_3 as N	mg/L	0.005	**0.046**	**0.042**	**0.006**	**0.026**
pH in water Method: AN101 Tested: 17/12/2019						
pH**	No unit	-	**7.1**	**6.9**	**7.7**	**7.2**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 17/12/2019						
Conductivity @ 25 C	µS/cm	2	**27000**	**26000**	**7700**	**29000**

Parameter	Units	LOR	Sample Number: SE201189.001 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: MB01	SE201189.002 Water 10 Dec 2019 MB02	SE201189.003 Water 10 Dec 2019 MB03	SE201189.004 Water 10 Dec 2019 MB04
Alkalinity Method: AN135 Tested: 18/12/2019						
Total Alkalinity as CaCO3	mg/L	5	**160**	**150**	**280**	**140**
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 18/12/2019						
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**23000**	**21000**	**5000**	**23000**
Sulfide by Titration in Water Method: AN149 Tested: 23/12/2019						
Sulfide	mg/L	0.5	**1.0**	**0.8**	<0.5	**1.2**
Free Cyanide in water Method: AN076/AN287 Tested: 18/12/2019						
Free Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 18/12/2019						
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 19/12/2019						
Weak Acid Dissociable Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

Parameter	Units	LOR	Sample Number: SE201189.001 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: MB01	SE201189.002 Water 10 Dec 2019 MB02	SE201189.003 Water 10 Dec 2019 MB03	SE201189.004 Water 10 Dec 2019 MB04
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 19/12/2019						
Calcium, Ca	mg/L	0.1	1000	1000	150	1100
Magnesium, Mg	mg/L	0.1	600	510	100	540
Sodium, Na	mg/L	0.1	5400	4700	1400	5000
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 18/12/2019						
Total Aluminium	µg/L	5	18000	1200	4800	2400
Total Arsenic	µg/L	1	6	1	3	3
Total Beryllium	µg/L	1	<1	1	<1	<1
Total Boron	µg/L	5	5100	4100	3100	3900
Total Cadmium	µg/L	0.1	0.5	0.2	0.1	2.1
Total Chromium	µg/L	1	23	7	20	4
Total Cobalt	µg/L	1	8	31	2	1
Total Copper	µg/L	1	40	30	13	6
Total Iron	µg/L	5	18000	2000	5300	2600
Total Lead	µg/L	1	16	6	7	3
Total Manganese	µg/L	1	390	290	110	40
Total Molybdenum	µg/L	1	40	17	46	20
Total Nickel	µg/L	1	14	39	4	2
Total Selenium	µg/L	1	11	8	20	12
Total Uranium	µg/L	1	160	57	20	100
Total Vanadium	µg/L	1	39	3	29	7
Total Zinc	µg/L	5	170	430	170	160
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 19/12/2019						
Total Lithium, Li	mg/L	0.005	0.027	0.040	0.014	0.031
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 17/12/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number: SE201189.005 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: MB06	SE201189.006 Water 10 Dec 2019 MB07	SE201189.007 Water 10 Dec 2019 RB04	SE201189.008 Water 10 Dec 2019 GUM BORE
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 18/12/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**120**	**120**	**120**	**118**
d8-toluene (Surrogate)	%	-	**117**	**118**	**118**	**119**
Bromofluorobenzene (Surrogate)	%	-	**119**	**119**	**118**	**119**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 18/12/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C40	µg/L	320	<320	<320	<320	<320
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Anions by Ion Chromatography in Water Method: AN245 Tested: 17/12/2019						
Sulfate, SO4	mg/L	1	**2500**	**2500**	**4200**	**380**
Fluoride	mg/L	0.1	**2.1**	**1.7**	**3.9**	**0.75**
Chloride	mg/L	1	**11000**	**12000**	**10000**	**180**
Nitrate Nitrogen, NO3-N	mg/L	0.005	<0.25↑	<0.25↑	<0.25↑	**3.9**

Parameter	Units	LOR	Sample Number: SE201189.005 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: MB06	SE201189.006 Water 10 Dec 2019 MB07	SE201189.007 Water 10 Dec 2019 RB04	SE201189.008 Water 10 Dec 2019 GUM BORE
Nitrite in Water Method: AN277 Tested: 17/12/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**0.084**	<0.005	**0.19**	**3.9**
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 19/12/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	**0.59**	**0.43**	**0.40**	<0.05
Total Nitrogen (calc)	mg/L	0.05	**0.68**	**0.43**	**0.59**	**3.9**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 19/12/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.20**	**0.03**	**0.06**	**0.06**
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 17/12/2019						
Ammonia Nitrogen, NH_3 as N	mg/L	0.005	**0.027**	**0.021**	**0.026**	<0.005
pH in water Method: AN101 Tested: 17/12/2019						
pH**	No unit	-	**7.1**	**7.3**	**7.2**	**7.1**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 17/12/2019						
Conductivity @ 25 C	µS/cm	2	**31000**	**30000**	**30000**	**1800**

Parameter	Units	LOR	Sample Number: SE201189.005 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: MB06	SE201189.006 Water 10 Dec 2019 MB07	SE201189.007 Water 10 Dec 2019 RB04	SE201189.008 Water 10 Dec 2019 GUM BORE
Alkalinity Method: AN135 Tested: 18/12/2019						
Total Alkalinity as CaCO3	mg/L	5	**120**	**130**	**460**	**470**
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 18/12/2019						
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**25000**	**24000**	**23000**	**1300**
Sulfide by Titration in Water Method: AN149 Tested: 23/12/2019						
Sulfide	mg/L	0.5	**0.8**	**1.0**	**1.0**	**1.4**
Free Cyanide in water Method: AN076/AN287 Tested: 18/12/2019						
Free Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 18/12/2019						
Total Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 19/12/2019						
Weak Acid Dissociable Cyanide	mg/L	0.004	<0.004	<0.004	<0.004	<0.004

Parameter	Units	LOR	Sample Number: SE201189.005 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: MB06	SE201189.006 Water 10 Dec 2019 MB07	SE201189.007 Water 10 Dec 2019 RB04	SE201189.008 Water 10 Dec 2019 GUM BORE
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 19/12/2019						
Calcium, Ca	mg/L	0.1	**1300**	**1200**	**570**	**210**
Magnesium, Mg	mg/L	0.1	**650**	**560**	**730**	**37**
Sodium, Na	mg/L	0.1	**5100**	**5300**	**6000**	**200**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 18/12/2019						
Total Aluminium	µg/L	5	**9900**	**870**	**580**	**1800**
Total Arsenic	µg/L	1	**2**	<1	**2**	<1
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	**4100**	**4200**	**6800**	**560**
Total Cadmium	µg/L	0.1	**0.5**	**0.3**	**0.6**	<0.1
Total Chromium	µg/L	1	**11**	**1**	**2**	**3**
Total Cobalt	µg/L	1	**4**	<1	**7**	**1**
Total Copper	µg/L	1	**16**	**3**	**37**	**15**
Total Iron	µg/L	5	**9100**	**870**	**680**	**4200**
Total Lead	µg/L	1	**7**	<1	**3**	**34**
Total Manganese	µg/L	1	**150**	**15**	**55**	**86**
Total Molybdenum	µg/L	1	**56**	**9**	**150**	**4**
Total Nickel	µg/L	1	**7**	**1**	**7**	**2**
Total Selenium	µg/L	1	**7**	**1**	**5**	**1**
Total Uranium	µg/L	1	**28**	**62**	**320**	**15**
Total Vanadium	µg/L	1	**20**	**2**	**32**	**7**
Total Zinc	µg/L	5	**91**	**83**	**50**	**170**
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 19/12/2019						
Total Lithium, Li	mg/L	0.005	**0.032**	**0.027**	**0.021**	**0.005**
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 17/12/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

Parameter	Units	LOR	Sample Number: SE201189.009 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: GUM BORE QC	SE201189.010 Water 10 Dec 2019 HF PIT	SE201189.011 Water 10 Dec 2019 RB08	SE201189.012 Water 10 Dec 2019 RB12
Volatile Petroleum Hydrocarbons in Water Method: AN433 Tested: 18/12/2019						
TRH C6-C10	µg/L	50	<50	<50	<50	<50
TRH C6-C9	µg/L	40	<40	<40	<40	<40
Surrogates						
d4-1,2-dichloroethane (Surrogate)	%	-	**119**	**121**	**119**	**118**
d8-toluene (Surrogate)	%	-	**119**	**118**	**118**	**117**
Bromofluorobenzene (Surrogate)	%	-	**119**	**118**	**118**	**117**
VPH F Bands						
Benzene (F0)	µg/L	0.5	<0.5	<0.5	<0.5	<0.5
TRH C6-C10 minus BTEX (F1)	µg/L	50	<50	<50	<50	<50
TRH (Total Recoverable Hydrocarbons) in Water Method: AN403 Tested: 18/12/2019						
TRH C10-C14	µg/L	50	<50	<50	<50	<50
TRH C15-C28	µg/L	200	<200	<200	<200	<200
TRH C29-C36	µg/L	200	<200	<200	<200	<200
TRH C37-C40	µg/L	200	<200	<200	<200	<200
TRH C10-C40	µg/L	320	<320	<320	<320	<320
TRH F Bands						
TRH >C10-C16	µg/L	60	<60	<60	<60	<60
TRH >C10-C16 - Naphthalene (F2)	µg/L	60	<60	<60	<60	<60
TRH >C16-C34 (F3)	µg/L	500	<500	<500	<500	<500
TRH >C34-C40 (F4)	µg/L	500	<500	<500	<500	<500
Anions by Ion Chromatography in Water Method: AN245 Tested: 17/12/2019						
Sulfate, SO4	mg/L	1	**380**	**3300**	**810**	**1400**
Fluoride	mg/L	0.1	**0.75**	**2.1**	**14**	**0.36**
Chloride	mg/L	1	**170**	**17000**	**1300**	**6200**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**3.9**	<0.25↑	**0.74**	<0.10↑

Parameter	Units	LOR	Sample Number: SE201189.009 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: GUM BORE QC	SE201189.010 Water 10 Dec 2019 HF PIT	SE201189.011 Water 10 Dec 2019 RB08	SE201189.012 Water 10 Dec 2019 RB12
Nitrite in Water Method: AN277 Tested: 17/12/2019						
Nitrite Nitrogen, NO2 as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005
Total Oxidised Nitrogen, NOx-N	mg/L	0.005	**3.9**	<0.005	**0.74**	<0.005
TKN Kjeldahl Digestion by Discrete Analyser Method: AN281/AN292(Sydney only) Tested: 19/12/2019						
Total Kjeldahl Nitrogen	mg/L	0.05	<0.05	**0.64**	**0.36**	**2.3**
Total Nitrogen (calc)	mg/L	0.05	**3.9**	**0.64**	**1.1**	**2.3**
Total Phosphorus by Kjeldahl Digestion DA in Water Method: AN279/AN293(Sydney only) Tested: 19/12/2019						
Total Phosphorus (Kjeldahl Digestion) as P	mg/L	0.02	**0.07**	**0.07**	**0.16**	**0.13**
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 17/12/2019						
Ammonia Nitrogen, NH_3 as N	mg/L	0.005	<0.005	**0.046**	<0.005	**1.8**
pH in water Method: AN101 Tested: 17/12/2019						
pH**	No unit	-	**7.1**	**7.8**	**8.1**	**8.5**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 17/12/2019						
Conductivity @ 25 C	µS/cm	2	**1900**	**42000**	**7200**	**18000**

Parameter	Units	LOR	Sample Number Sample Matrix Sample Date Sample Name	SE201189.009 Water 10 Dec 2019 GUM BORE QC	SE201189.010 Water 10 Dec 2019 HF PIT	SE201189.011 Water 10 Dec 2019 RB08	SE201189.012 Water 10 Dec 2019 RB12
Alkalinity Method: AN135 Tested: 18/12/2019							
Total Alkalinity as CaCO3	mg/L	5		460	170	560	39
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 18/12/2019							
Total Dissolved Solids Dried at 175-185°C	mg/L	10		1300	31000	4300	12000
Sulfide by Titration in Water Method: AN149 Tested: 23/12/2019							
Sulfide	mg/L	0.5		0.8	1.0	1.4	1.8
Free Cyanide in water Method: AN076/AN287 Tested: 18/12/2019							
Free Cyanide	mg/L	0.004		<0.004	<0.004	<0.004	<0.004
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 18/12/2019							
Total Cyanide	mg/L	0.004		<0.004	<0.004	<0.004	<0.004
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 19/12/2019							
Weak Acid Dissociable Cyanide	mg/L	0.004		<0.004	<0.004	<0.004	<0.004

Parameter	Units	LOR	Sample Number: SE201189.009 Sample Matrix: Water Sample Date: 10 Dec 2019 Sample Name: GUM BORE QC	SE201189.010 Water 10 Dec 2019 HF PIT	SE201189.011 Water 10 Dec 2019 RB08	SE201189.012 Water 10 Dec 2019 RB12
Metals in Water (Dissolved) by ICPOES Method: AN320 Tested: 19/12/2019						
Calcium, Ca	mg/L	0.1	**210**	**1300**	**51**	**190**
Magnesium, Mg	mg/L	0.1	**36**	**840**	**55**	**180**
Sodium, Na	mg/L	0.1	**200**	**7600**	**1300**	**3500**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 18/12/2019						
Total Aluminium	µg/L	5	**850**	**36**	**4800**	**3500**
Total Arsenic	µg/L	1	<1	**2**	**4**	<1
Total Beryllium	µg/L	1	<1	<1	<1	<1
Total Boron	µg/L	5	**530**	**7000**	**4600**	**3100**
Total Cadmium	µg/L	0.1	<0.1	**6.6**	**0.4**	<0.1
Total Chromium	µg/L	1	**2**	<1	**5**	**4**
Total Cobalt	µg/L	1	<1	**68**	**1**	**2**
Total Copper	µg/L	1	**10**	**260**	**8**	**12**
Total Iron	µg/L	5	**2500**	**200**	**3400**	**16000**
Total Lead	µg/L	1	**6**	<1	**3**	**3**
Total Manganese	µg/L	1	**50**	**590**	**56**	**1900**
Total Molybdenum	µg/L	1	**4**	**260**	**210**	**1**
Total Nickel	µg/L	1	**1**	**100**	**3**	**3**
Total Selenium	µg/L	1	<1	**48**	**4**	**1**
Total Uranium	µg/L	1	**14**	**290**	**150**	<1
Total Vanadium	µg/L	1	**5**	**1**	**150**	**7**
Total Zinc	µg/L	5	**140**	**620**	**58**	**46**
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 19/12/2019						
Total Lithium, Li	mg/L	0.005	<0.005	**0.026**	**0.008**	**0.016**
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 17/12/2019						
Total Mercury	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Alkalinity Method: ME-(AU)-[ENV]AN135

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Alkalinity as CaCO3	LB190286	mg/L	5	<5	0 - 2%	115%

Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH_3 as N	LB190129	mg/L	0.005	<0.005	1 - 6%	104%	98%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Sulfate, SO4	LB190133	mg/L	1	<1.0	0 - 1%	99%
Fluoride	LB190133	mg/L	0.1	<0.10	1%	93%
Chloride	LB190133	mg/L	1	<0.05	1 - 2%	100%
Nitrate Nitrogen, NO3-N	LB190133	mg/L	0.005	<0.005	0%	100%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB190191	µS/cm	2	<2	0 - 1%	107%

Free Cyanide in water Method: ME-(AU)-[ENV]AN076/AN287

Parameter	QC Reference	Units	LOR	DUP %RPD
Free Cyanide	LB190297	mg/L	0.004	0%

Mercury (total) in Water Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Mercury	LB190123	mg/L	0.0001	<0.0001	0 - 197%	NA	NA

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Metals in Water (Total) by ICPOES Method: ME-(AU)-[ENV]AN022/AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Lithium, Li	LB190324	mg/L	0.005	<0.005	0 - 2%	100%

Metals in Water (Dissolved) by ICPOES Method: ME-(AU)-[ENV]AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Calcium, Ca	LB190322	mg/L	0.1	<0.1	0 - 1%	97%	101%
Magnesium, Mg	LB190322	mg/L	0.1	<0.1	0 - 1%	96%	97%
Sodium, Na	LB190322	mg/L	0.1	<0.1	0%	96%	105 - 107%

Nitrite in Water Method: ME-(AU)-[ENV]AN277

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Nitrite Nitrogen, NO2 as N	LB190129	mg/L	0.005	<0.005	0%	113%	104%

pH in water Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH**	LB190191	No unit	-	0%	100%

Sulfide by Titration in Water Method: ME-(AU)-[ENV]AN149

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Sulfide	LB190580	mg/L	0.5	<0.5	83%

TKN Kjeldahl Digestion by Discrete Analyser Method: ME-(AU)-[ENV]AN281/AN292(Sydney only)

Parameter	QC Reference	Units	LOR	DUP %RPD
Total Kjeldahl Nitrogen	LB190405	mg/L	0.05	18 - 31%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Total Cyanide in water by Discrete Analyser (Aquakem) **Method: ME-(AU)-[ENV]AN077/AN287**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Cyanide	LB190225	mg/L	0.004	<0.004	0%	105%	111%

Total Dissolved Solids (TDS) in water **Method: ME-(AU)-[ENV]AN113**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Dissolved Solids Dried at 175-185°C	LB190219	mg/L	10	<10	1 - 2%	88%

Total Phosphorus by Kjeldahl Digestion DA in Water **Method: ME-(AU)-[ENV]AN279/AN293(Sydney only)**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Phosphorus (Kjeldahl Digestion) as P	LB190405	mg/L	0.02	<0.02	0 - 4%	101%

Trace Metals (Total) in Water by ICPMS **Method: ME-(AU)-[ENV]AN022/AN318**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Aluminium	LB190213	µg/L	5	<5	3%	99%
Total Arsenic	LB190213	µg/L	1	<1	0%	93%
Total Beryllium	LB190213	µg/L	1	<1	0%	99%
Total Boron	LB190213	µg/L	5	<5	0%	105%
Total Cadmium	LB190213	µg/L	0.1	<0.1	0%	98%
Total Chromium	LB190213	µg/L	1	<1	4%	NA
Total Cobalt	LB190213	µg/L	1	<1	0%	103%
Total Copper	LB190213	µg/L	1	<1	13%	103%
Total Iron	LB190213	µg/L	5	<5	1 - 2%	NA
Total Lead	LB190213	µg/L	1	<1	1%	99%
Total Manganese	LB190213	µg/L	1	<1	0 - 1%	103%
Total Molybdenum	LB190213	µg/L	1	<1	4%	91%
Total Nickel	LB190213	µg/L	1	<1	1%	100%
Total Selenium	LB190213	µg/L	1	<1	17%	87%
Total Uranium	LB190213	µg/L	1	<1	2%	107%
Total Vanadium	LB190213	µg/L	1	<1	2%	105%
Total Zinc	LB190213	µg/L	5	<5	2%	105%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

TRH (Total Recoverable Hydrocarbons) in Water **Method: ME-(AU)-[ENV]AN403**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH C10-C14	LB190222	µg/L	50	<50	0%	69%
TRH C15-C28	LB190222	µg/L	200	<200	0%	87%
TRH C29-C36	LB190222	µg/L	200	<200	0%	113%
TRH C37-C40	LB190222	µg/L	200	<200	0%	NA
TRH C10-C40	LB190222	µg/L	320	<320	0%	NA

TRH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
TRH >C10-C16	LB190222	µg/L	60	<60	0%	76%
TRH >C10-C16 - Naphthalene (F2)	LB190222	µg/L	60	<60	0%	NA
TRH >C16-C34 (F3)	LB190222	µg/L	500	<500	0%	114%
TRH >C34-C40 (F4)	LB190222	µg/L	500	<500	0%	105%

Volatile Petroleum Hydrocarbons in Water **Method: ME-(AU)-[ENV]AN433**

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
TRH C6-C10	LB190261	µg/L	50	<50	0%	89%	109%
TRH C6-C9	LB190261	µg/L	40	<40	0%	92%	108%

Surrogates

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
d4-1,2-dichloroethane (Surrogate)	LB190261	%	-	118%	12 - 23%	117%	105%
d8-toluene (Surrogate)	LB190261	%	-	118%	18 - 19%	116%	98%
Bromofluorobenzene (Surrogate)	LB190261	%	-	117%	15 - 19%	116%	101%

VPH F Bands

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Benzene (F0)	LB190261	µg/L	0.5	<0.5	0%	NA	NA
TRH C6-C10 minus BTEX (F1)	LB190261	µg/L	50	<50	0%	86%	111%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN020	Unpreserved water sample is filtered through a 0.45µm membrane filter and acidified with nitric acid similar to APHA3030B.
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN022/AN320	Total (acid soluble) Metals by ICP-OES: Samples are digested in nitric or nitric and hydrochloric acids prior to analysis for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN076/AN287	Discrete Analyser. A buffered distillate or water sample is treated with chloramine /barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration.
AN077	Hydrogen cyanide is liberated from an acidified sample by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN078	Hydrogen cyanide is liberated from a slightly acidified sample (pH 4.5-6.0) by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN113	The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN149	sulfide by Iodometric Titration: sulfide is precipitated as zinc sulfide to overcome interferences with sulphite and thiosulfate. After filtration, sulfide is determined titrimetrically. Reference APHA 4500-S2-

METHOD	METHODOLOGY SUMMARY
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277/WC250.312	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.
AN279/AN293(Sydney)	The sample is digested with Sulphuric acid, K2SO4 and CuSO4. All forms of phosphorus are converted into orthophosphate. The digest is cooled and placed on the discrete analyser for colorimetric analysis.
AN281	An unfiltered water or soil sample is first digested in a block digestor with sulfuric acid, K2SO4 and CuSO4. The ammonia produced following digestion is then measured colourimetrically using the Aquakem 250 Discrete Analyser. A portion of the digested sample is buffered to an alkaline pH, and interfering cations are complexed. The ammonia then reacts with salicylate and hypochlorite to give a blue colour whose absorbance is measured at 660nm and compared with calibration standards. This is proportional to the concentration of Total Kjeldahl Nitrogen in the original sample.
AN287	A buffered distillate or water sample is treated with chloramine/barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration by Aquakem DA.
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser.
AN311(Perth) /AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions taken from unfiltered sample are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN320	Metals by ICP-OES: Samples are preserved with 10% nitric acid for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
AN403	Total Recoverable Hydrocarbons: Determination of Hydrocarbons by gas chromatography after a solvent extraction. Detection is by flame ionisation detector (FID) that produces an electronic signal in proportion to the combustible matter passing through it. Total Recoverable Hydrocarbons (TRH) are routinely reported as four alkane groupings based on the carbon chain length of the compounds: C6-C9, C10-C14, C15-C28 and C29-C36 and in recognition of the NEPM 1999 (2013), >C10-C16 (F2), >C16-C34 (F3) and >C34-C40 (F4). Where F2 is corrected for Naphthalene, the VOC data for Naphthalene is used.
AN403	Additionally, the volatile C6-C9/C6-C10 fractions may be determined by a purge and trap technique and GC/MS because of the potential for volatiles loss. Total Recoveerable Hydrocarbons - Silica (TRH-Silica) follows the same method of analysis after silica gel cleanup of the solvent extract. Aliphatic/Aromatic Speciation follows the same method of analysis after fractionation of the solvent extract over silica with differential polarity of the eluent solvents.
AN403	The GC/FID method is not well suited to the analysis of refined high boiling point materials (ie lubricating oils or greases) but is particularly suited for measuring diesel, kerosene and petrol if care to control volatility is taken. This method will detect naturally occurring hydrocarbons, lipids, animal fats, phenols and PAHs if they are present at sufficient levels, dependent on the use of specific cleanup/fractionation techniques. Reference USEPA 3510B, 8015B.

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN433	VOCs and C6-C9 Hydrocarbons by GC-MS P&T: VOC`s are volatile organic compounds. The sample is presented to a gas chromatograph via a purge and trap (P&T) concentrator and autosampler and is detected with a Mass Spectrometer (MSD). Solid samples are initially extracted with methanol whilst liquid samples are processed directly. References: USEPA 5030B, 8020A, 8260.
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported. APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been performed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au.pv.sgsvr/en-gb/environment.

Appendix D

Surface Water Quality Data

ANALYTICAL REPORT

Accreditation No. 2562

CLIENT DETAILS

Contact	Gemma Connolly
Client	COPPERCHEM LTD
Address	PMB 23 via Cockburn Via Boolcoomata Rd Near Mingary SA 5440
Telephone	61 8 8919 4455
Facsimile	61 7 4742 1688
Email	gconnolly@excoresources.com.au
Project	**White Dam Gold Mine**
Order Number	(Not specified)
Samples	2

LABORATORY DETAILS

Manager	Huong Crawford
Laboratory	SGS Alexandria Environmental
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SGS Reference	**SE191318 R0**
Date Received	08 Apr 2019
Date Reported	15 Apr 2019

COMMENTS

Accredited for compliance with ISO/IEC 17025 - Testing. NATA accredited laboratory 2562(4354).

SIGNATORIES

Bennet Lo
Senior Organic Chemist/Metals Chemis

Dong Liang
Metals/Inorganics Team Leader

Shane McDermott
Inorganic/Metals Chemist

Parameter	Units	LOR	Sample Number: SE191318.001 Sample Matrix: Water Sample Date: 25 Mar 2019 Sample Name: SWUP	Sample Number: SE191318.002 Sample Matrix: Water Sample Date: 25 Mar 2019 Sample Name: SWDOWN
Total Cyanide in water by Discrete Analyser (Aquakem) Method: AN077/AN287 Tested: 11/4/2019				
Total Cyanide	mg/L	0.004	<0.004	<0.004
Weak Acid Dissociable Cyanide in Water by Discrete Analyser (Aquakem) Method: AN078/AN287 Tested: 12/4/2019				
Weak Acid Dissociable Cyanide	mg/L	0.004	<0.004	<0.004
Free Cyanide in water Method: AN076/AN287 Tested: 12/4/2019				
Free Cyanide	mg/L	0.004	<0.004	<0.004
pH in water Method: AN101 Tested: 9/4/2019				
pH**	No unit	-	**7.2**	**7.0**
Conductivity and TDS by Calculation - Water Method: AN106 Tested: 9/4/2019				
Conductivity @ 25 C	µS/cm	2	**240**	**320**
Total Dissolved Solids (TDS) in water Method: AN113 Tested: 12/4/2019				
Total Dissolved Solids Dried at 175-185°C	mg/L	10	**240**	**330**

Parameter	Units	LOR	Sample Number: SE191318.001 Sample Matrix: Water Sample Date: 25 Mar 2019 Sample Name: SWUP	Sample Number: SE191318.002 Sample Matrix: Water Sample Date: 25 Mar 2019 Sample Name: SWDOWN
Alkalinity Method: AN135 Tested: 9/4/2019				
Bicarbonate Alkalinity as CaCO3	mg/L	5	**57**	**100**
Total Alkalinity as CaCO3	mg/L	5	**57**	**100**
Anions by Ion Chromatography in Water Method: AN245 Tested: 9/4/2019				
Fluoride	mg/L	0.1	<0.10	**0.15**
Chloride	mg/L	1	**30**	**21**
Nitrate Nitrogen, NO3-N	mg/L	0.005	**0.16**	**0.37**
Sulfate, SO4	mg/L	1	**3.7**	**12**
Nitrite in Water Method: AN277 Tested: 9/4/2019				
Nitrite Nitrogen, NO2 as N	mg/L	0.005	**0.038**	**0.076**
Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: AN291 Tested: 9/4/2019				
Ammonia Nitrogen, NH_3 as N	mg/L	0.01	**0.35**	**0.76**
Metals in Water (Total) by ICPOES Method: AN022/AN320 Tested: 11/4/2019				
Total Calcium	mg/L	0.1	**5.8**	**14**
Total Magnesium	mg/L	0.1	**2.7**	**13**
Total Sodium	mg/L	0.1	**28**	**30**
Trace Metals (Total) in Water by ICPMS Method: AN022/AN318 Tested: 11/4/2019				
Total Aluminium	µg/L	5	**4600**	**33000**
Total Arsenic	µg/L	1	**2**	**4**
Total Cadmium	µg/L	0.1	<0.1	**0.1**
Total Chromium	µg/L	1	**4**	**32**
Total Cobalt	µg/L	1	**2**	**13**
Total Copper	µg/L	1	**12**	**54**
Total Iron	µg/L	5	**3700**	**28000**
Total Lead	µg/L	1	**2**	**16**
Total Manganese	µg/L	1	**76**	**470**
Total Nickel	µg/L	1	**4**	**20**
Total Selenium	µg/L	1	<1	**6**
Total Zinc	µg/L	5	**10**	**110**

Parameter	Units	LOR	Sample Number: SE191318.001 Sample Matrix: Water Sample Date: 25 Mar 2019 Sample Name: SWUP	Sample Number: SE191318.002 Sample Matrix: Water Sample Date: 25 Mar 2019 Sample Name: SWDOWN
Mercury (total) in Water Method: AN311(Perth) /AN312 Tested: 15/4/2019				
Total Mercury	mg/L	0.0001	<0.0001	<0.0001

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Alkalinity Method: ME-(AU)-[ENV]AN135

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Bicarbonate Alkalinity as CaCO3	LB171063	mg/L	5	<5	1 - 4%	NA
Total Alkalinity as CaCO3	LB171063	mg/L	5	<5	1 - 4%	104%

Ammonia Nitrogen by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN291

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Ammonia Nitrogen, NH_3 as N	LB171020	mg/L	0.01	<0.01	18%	100%	97%

Anions by Ion Chromatography in Water Method: ME-(AU)-[ENV]AN245

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Fluoride	LB171017	mg/L	0.1	<0.10	11%	92%
Chloride	LB171017	mg/L	1	<0.05	0%	91%
Nitrate Nitrogen, NO3-N	LB171017	mg/L	0.005	<0.005	15%	94%
Sulfate, SO4	LB171017	mg/L	1	<1.0	1 - 3%	91%

Conductivity and TDS by Calculation - Water Method: ME-(AU)-[ENV]AN106

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Conductivity @ 25 C	LB171032	µS/cm	2	<2	0 - 1%	103%

Mercury (total) in Water Method: ME-(AU)-[ENV]AN311(Perth) /AN312

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery	MS %Recovery
Total Mercury	LB171469	mg/L	0.0001	<0.0001	NA	NA

Metals in Water (Total) by ICPOES Method: ME-(AU)-[ENV]AN022/AN320

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Total Calcium	LB171221	mg/L	0.1	<0.1	1 - 2%	95%
Total Magnesium	LB171221	mg/L	0.1	<0.1	2%	98%
Total Sodium	LB171221	mg/L	0.1	<0.1	3%	94%

QC SUMMARY

MB blank results are compared to the Limit of Reporting
LCS and MS spike recoveries are measured as the percentage of analyte recovered from the sample compared the the amount of analyte spiked into the sample.
DUP and MSD relative percent differences are measured against their original counterpart samples according to the formula : *the absolute difference of the two results divided by the average of the two results as a percentage*. Where the DUP RPD is 'NA' , the results are less than the LOR and thus the RPD is not applicable.

Nitrite in Water Method: ME-(AU)-[ENV]AN277

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery
Nitrite Nitrogen, NO2 as N	LB171020	mg/L	0.005	<0.005	2%	100%

pH in water Method: ME-(AU)-[ENV]AN101

Parameter	QC Reference	Units	LOR	DUP %RPD	LCS %Recovery
pH**	LB171032	No unit	-	0 - 1%	100%

Total Cyanide in water by Discrete Analyser (Aquakem) Method: ME-(AU)-[ENV]AN077/AN287

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Cyanide	LB171235	mg/L	0.004	<0.004	0%	98%	104%

Total Dissolved Solids (TDS) in water Method: ME-(AU)-[ENV]AN113

Parameter	QC Reference	Units	LOR	MB	LCS %Recovery
Total Dissolved Solids Dried at 175-185°C	LB171335	mg/L	10	<10	106 - 108%

Trace Metals (Total) in Water by ICPMS Method: ME-(AU)-[ENV]AN022/AN318

Parameter	QC Reference	Units	LOR	MB	DUP %RPD	LCS %Recovery	MS %Recovery
Total Aluminium	LB171226	µg/L	5	<5	12%	104%	1821%
Total Arsenic	LB171226	µg/L	1	<1	0 - 2%	90%	94%
Total Cadmium	LB171226	µg/L	0.1	<0.1	0%	103%	109%
Total Chromium	LB171226	µg/L	1	<1	8%	NA	NA
Total Cobalt	LB171226	µg/L	1	<1	0%	112%	113%
Total Copper	LB171226	µg/L	1	<1	1%	115%	115%
Total Iron	LB171226	µg/L	5	<5	4%	NA	NA
Total Lead	LB171226	µg/L	1	<1	0%	104%	111%
Total Manganese	LB171226	µg/L	1	<1	1%	103%	100%
Total Nickel	LB171226	µg/L	1	<1	0%	103%	104%
Total Selenium	LB171226	µg/L	1	<1	0 - 4%	89%	95%
Total Zinc	LB171226	µg/L	5	<5	0%	106%	101%

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN022	The water sample is digested with Nitric Acid and made up to the original volume similar to APHA3030E.
AN022/AN318	Following acid digestion of un filtered sample, determination of elements at trace level in waters by ICP-MS technique, in accordance with USEPA 6020A.
AN022/AN320	Total (acid soluble) Metals by ICP-OES: Samples are digested in nitric or nitric and hydrochloric acids prior to analysis for a wide range of metals and some non-metals. This solution is measured by Inductively Coupled Plasma. Solutions are aspirated into an argon plasma at 8000-10000K and emit characteristic energy or light as a result of electron transitions through unique energy levels. The emitted light is focused onto a diffraction grating where it is separated into components.
AN076/AN287	Discrete Analyser. A buffered distillate or water sample is treated with chloramine /barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration.
AN077	Hydrogen cyanide is liberated from an acidified sample by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution. The scrubbing solution will then be analysed for cyanide by the appropriate method.
AN078	Hydrogen cyanide is liberated from a slightly acidified sample (pH 4.5-6.0) by distillation and purging with air. The hydrogen cyanide gas is then collected by passing it through a sodium hydroxide scrubbing solution.
AN101	pH in Soil Sludge Sediment and Water: pH is measured electrometrically using a combination electrode (glass plus reference electrode) and is calibrated against 3 buffers purchased commercially. For soils, an extract with water is made at a ratio of 1:5 and the pH determined and reported on the extract. Reference APHA 4500-H+.
AN106	Conductivity and TDS by Calculation: Conductivity is measured by meter with temperature compensation and is calibrated against a standard solution of potassium chloride. Conductivity is generally reported as µmhos/cm or µS/cm @ 25°C. For soils, an extract with water is made at a ratio of 1:5 and the EC determined and reported on the extract, or calculated back to the as-received sample. Total Dissolved Salts can be estimated from conductivity using a conversion factor, which for natural waters, is in the range 0.55 to 0.75. SGS use 0.6. Reference APHA 2510 B.
AN106	Salinity may be calculated in terms of NaCl from the sample conductivity. This assumes all soluble salts present, measured by the conductivity, are present as NaCl.
AN113	Total Dissolved Solids: A well-mixed filtered sample of known volume is evaporated to dryness at 180°C and the residue weighed. Approximate methods for correlating chemical analysis with dissolved solids are available. Reference APHA 2540 C.
AN113	The Total Dissolved Solids residue may also be ignited at 550 C and volatile TDS (Organic TDS) and non-volatile TDS (Inorganic) can be determined.
AN135	Alkalinity (and forms of) by Titration: The sample is titrated with standard acid to pH 8.3 (P titre) and pH 4.5 (T titre) and permanent and/or total alkalinity calculated. The results are expressed as equivalents of calcium carbonate or recalculated as bicarbonate, carbonate and hydroxide. Reference APHA 2320. Internal Reference AN135
AN245	Anions by Ion Chromatography: A water sample is injected into an eluent stream that passes through the ion chromatographic system where the anions of interest ie Br, Cl, NO2, NO3 and SO4 are separated on their relative affinities for the active sites on the column packing material. Changes to the conductivity and the UV-visible absorbance of the eluent enable identification and quantitation of the anions based on their retention time and peak height or area. APHA 4110 B
AN277/WC250.312	Nitrite ions, when reacted with a reagent containing sulphanilamide and N-(1-naphthyl)-ethylenediamine dihydrochloride produce a highly coloured azo dye that is measured photometrically at 540nm.

METHOD SUMMARY

METHOD	METHODOLOGY SUMMARY
AN287	A buffered distillate or water sample is treated with chloramine /barbituric acid reagents and the intensity of the colour developed is proportional to the cyanide concentration by Aquakem DA .
AN291	Ammonia in solution reacts with hypochlorite ions from Sodium Dichloroisocyanuate, and salicylate in the presence of Sodium Nitroprusside to form indophenol blue and measured at 670 nm by Discrete Analyser.
AN311(Perth) /AN312	Mercury by Cold Vapour AAS in Waters: Mercury ions taken from unfiltered sample are reduced by stannous chloride reagent in acidic solution to elemental mercury. This mercury vapour is purged by nitrogen into a cold cell in an atomic absorption spectrometer or mercury analyser. Quantification is made by comparing absorbances to those of the calibration standards. Reference APHA 3112/3500.
AN320	Photomultipliers or CCDs are used to measure the light intensity at specific wavelengths. This intensity is directly proportional to concentration. Corrections are required to compensate for spectral overlap between elements. Reference APHA 3120 B.
Calculation	Free and Total Carbon Dioxide may be calculated using alkalinity forms only when the samples TDS is <500mg/L. If TDS is >500mg/L free or total carbon dioxide cannot be reported . APHA4500CO2 D.

FOOTNOTES

IS	Insufficient sample for analysis.	LOR	Limit of Reporting
LNR	Sample listed, but not received.	↑↓	Raised or Lowered Limit of Reporting
*	NATA accreditation does not cover the performance of this service.	QFH	QC result is above the upper tolerance
		QFL	QC result is below the lower tolerance
**	Indicative data, theoretical holding time exceeded.	-	The sample was not analysed for this analyte
		NVL	Not Validated

Unless it is reported that sampling has been perfomed by SGS, the samples have been analysed as received.
Solid samples expressed on a dry weight basis.

Where "Total" analyte groups are reported (for example, Total PAHs, Total OC Pesticides) the total will be calculated as the sum of the individual analytes, with those analytes that are reported as <LOR being assumed to be zero. The summed (Total) limit of reporting is calcuated by summing the individual analyte LORs and dividing by two. For example, where 16 individual analytes are being summed and each has an LOR of 0.1 mg/kg, the "Totals" LOR will be 1.6 / 2 (0.8 mg/kg). Where only 2 analytes are being summed, the " Total" LOR will be the sum of those two LORs.

Some totals may not appear to add up because the total is rounded after adding up the raw values.

If reported, measurement uncertainty follow the ± sign after the analytical result and is expressed as the expanded uncertainty calculated using a coverage factor of 2, providing a level of confidence of approximately 95%, unless stated otherwise in the comments section of this report.

Results reported for samples tested under test methods with codes starting with ARS-SOP, radionuclide or gross radioactivity concentrations are expressed in becquerel (Bq) per unit of mass or volume or per wipe as stated on the report. Becquerel is the SI unit for activity and equals one nuclear transformation per second.
Note that in terms of units of radioactivity:

a. 1 Bq is equivalent to 27 pCi
b. 37 MBq is equivalent to 1 mCi

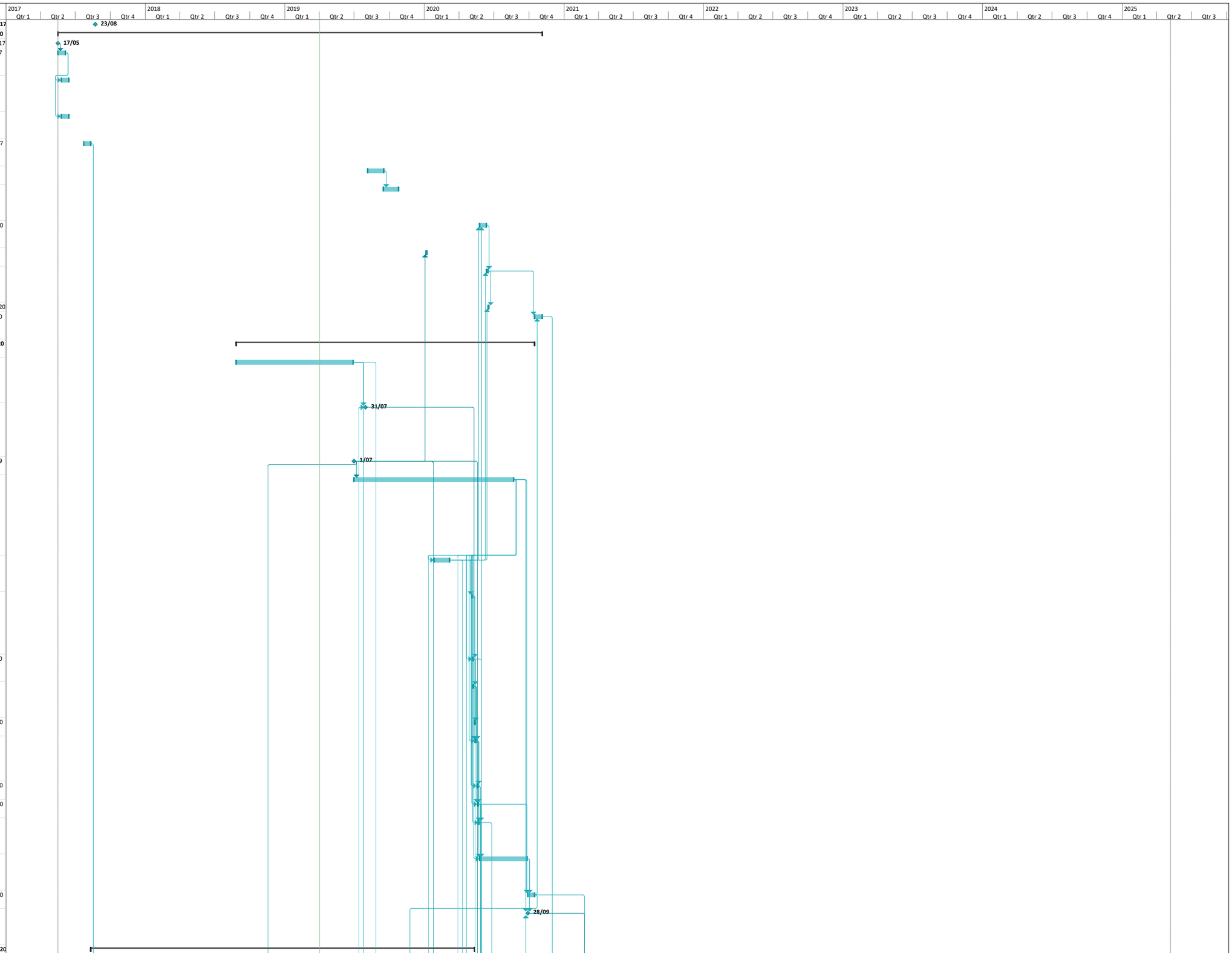
For results reported for samples tested under test methods with codes starting with ARS-SOP, less than (<) values indicate the detection limit for each radionuclide or parameter for the measurement system used. The respective detection limits have been calculated in accordance with ISO 11929.

The QC and MU criteria are subject to internal review according to the SGS QAQC plan and may be provided on request or alternatively can be found here: www.sgs.com.au.pv.sgsvr/en-gb/environment.

Appendix E

WDGM Rehabilitation and Closure Schedule

ID	Task Mode	Task Name	Duration	Start	Finish
1		**PEPR Review (v3)**	**0 days**	**Wed 23/08/17**	**Wed 23/08/17**
2		**Domain 1: Open Pits**	**906 days**	**Wed 17/05/17**	**Wed 4/11/20**
3		End of mining in pits	0 days	Wed 17/05/17	Wed 17/05/17
4		All PAF waste rock encapsulated with 5m thickness of NAF	14 days	Wed 17/05/17	Mon 5/06/17
5		Inpit WRDs coarse NAF graded towards outer batter and depressions removed, slopes at angle of repose	14 days	Fri 26/05/17	Wed 14/06/17
6		Block model of in-pit WRD and PAF encapsulation	14 days	Fri 26/05/17	Wed 14/06/17
7		End of mine geotechnical pit wall stability assessment	14 days	Mon 24/07/17	Thu 10/08/17
8		Review flood protection / abandonment bunds	30 days	Tue 6/08/19	Mon 16/09/19
9		Engineering design of flood protection bunds / stream diversion	30 days	Mon 16/09/19	Fri 25/10/19
10		Construction works on sections of stream diversion & flood bund	14 days	Mon 25/05/20	Thu 11/06/20
11		Decommission any pit bore & pumps	2 days	Mon 6/01/20	Tue 7/01/20
12		Abandonement bunds constructed over entrance to prevent access to pits & HF WRD	2 days	Fri 12/06/20	Mon 15/06/20
13		Seed disturbed areas	2 days	Tue 16/06/20	Wed 17/06/20
14		Audit (as constructed) flood protection / abandonement bund	14 days	Fri 16/10/20	Wed 4/11/20
15		**Domain 2: Heap Leach Pad**	**559 days**	**Mon 27/08/18**	**Thu 15/10/20**
16		Heap Leach trial cover columns to determine cover thickness of NAF/topsoil	220 days	Mon 27/08/18	Fri 28/06/19
17		SA govt. approve cover design based on trials and prelim numerical model, prior to placement on the heap	0 days	Wed 31/07/19	Wed 31/07/19
18		Heap Leach no longer economicaly viable	0 days	Mon 1/07/19	Mon 1/07/19
19		Stop addition of make up water, continue irrigating with process water in circuit until no further pumping possible, residual seepage to evaporate in ponds	300 days	Mon 1/07/19	Fri 21/08/20
20		Monitor seepage flow in W drain to confirm 0L/sec flow for 4 consecutive weeks	30 days	Mon 27/01/20	Fri 6/03/20
21		2m thick NAF bund around future toe of heap leach batter slopes. NAF recovered from HF in-pit NAF WRD or toe of the surface HF WRD nearest the pit	2 days	Mon 4/05/20	Tue 5/05/20
22		Bury (encapsulate) contaminated soil from HF WRD within heap	1 day	Wed 6/05/20	Wed 6/05/20
23		Batter slopes dozed down to meet inner edge of NAF bund (15 degrees)	2 days	Thu 7/05/20	Fri 8/05/20
24		NAF toe bund pushed up batter slope	2 days	Mon 11/05/20	Tue 12/05/20
25		Cover batter slopes with recovered NAF rock by end dumping from crest & dozer spreading to 0.2m thickness	3 days	Wed 13/05/20	Fri 15/05/20
26		Spread 0.3m topsoil over NAF cover	2 days	Mon 18/05/20	Tue 19/05/20
27		Close space contour rip and seed	2 days	Wed 20/05/20	Thu 21/05/20
28		Construct containment bund (v-drain and bund) around perimeter of heap to contain run-off	1 day	Fri 22/05/20	Fri 22/05/20
29		Monitor surface run-off and residual seepage (if any) for quality	90 days	Mon 25/05/20	Fri 25/09/20
30		Audit by SQP (as constructed)	14 days	Mon 28/09/20	Thu 15/10/20
31		Remove containment bund and replace with fence (livestock and fauna proof)	0 days	Mon 28/09/20	Mon 28/09/20
32		**Domain 3: Surface WRD**	**717 days**	**Fri 11/08/17**	**Mon 11/05/20**



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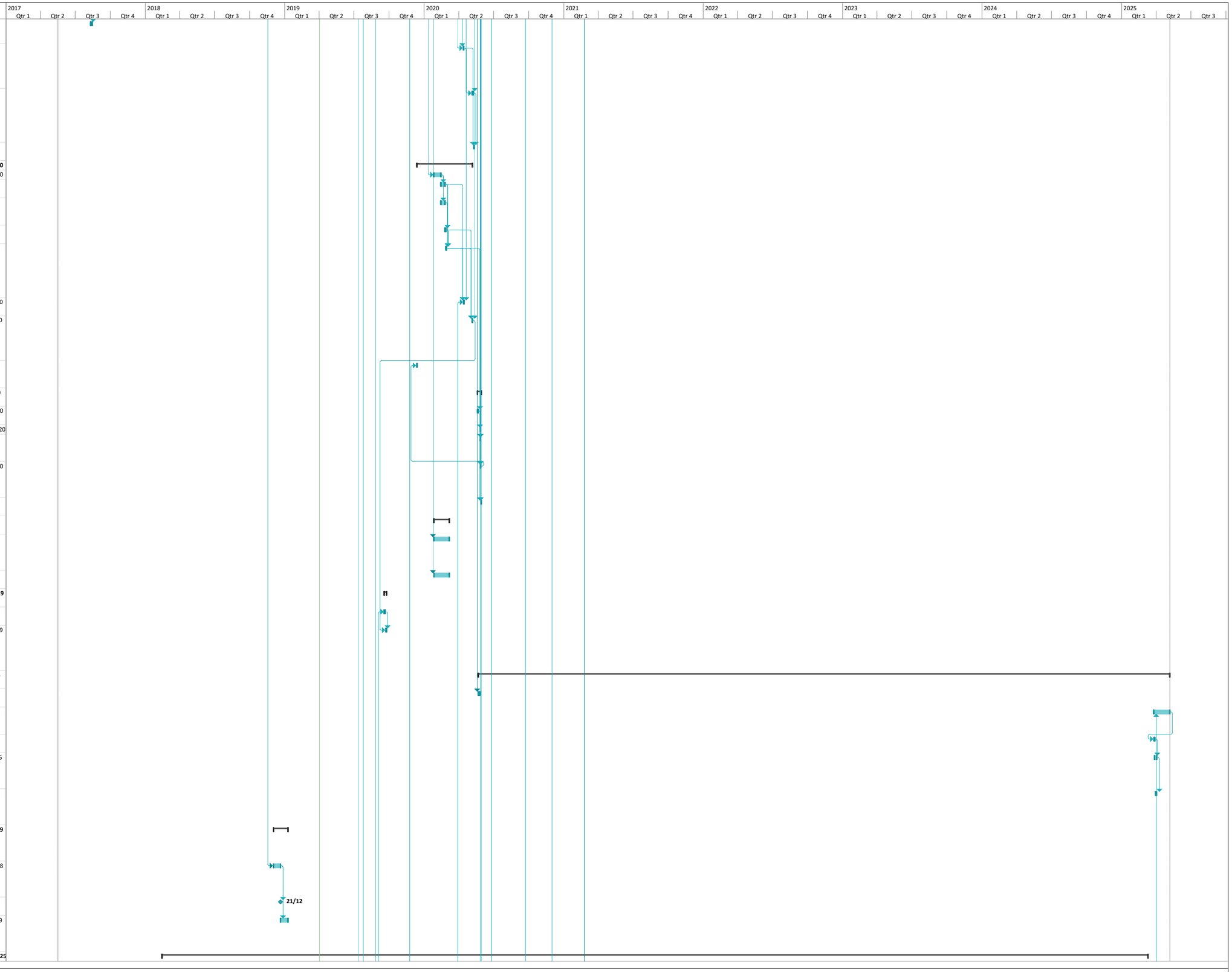
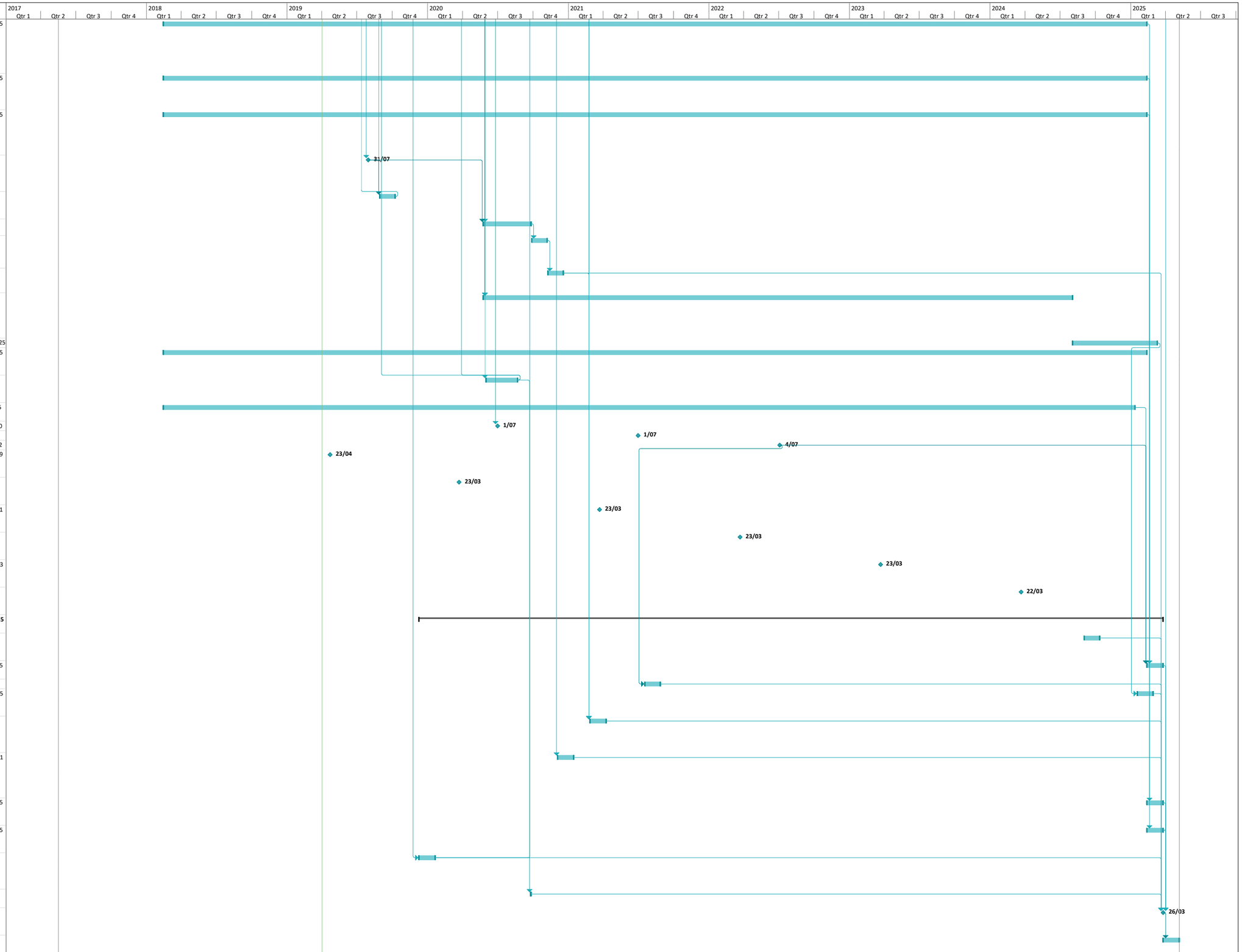
Date: Tue 2/04/19

Task | Milestone | Project Summary | External Milestone | Inactive Milestone | Manual Task | Manual Summary Rollup | Start-only | Deadline | Manual Progress
Split | Summary | External Tasks | Inactive Task | Inactive Summary | Duration-only | Manual Summary | Finish-only | Progress

ID	Task Mode	Task Name	Duration	Start	Finish
33		Grade over cracks in HF WRD toe, restrict access and monitor	2 days	Fri 11/08/17	Mon 14/08/17
34		Remove hydrocarbon contaminated soil to the heap leach for encapsulation prior to cover	1 day	Mon 13/04/20	Mon 13/04/20
35		Recover NAF material from HF dump toe nearest the pit for the Heap leach cover if required, reshape, topsoil, rip and seed	3 days	Wed 6/05/20	Fri 8/05/20
36		Implement soil remediation if required	1 day	Mon 11/05/20	Mon 11/05/20
37		**Domain 4: Plant & Admin**	**104 days?**	**Fri 13/12/19**	**Wed 6/05/20**
38		Wash and clean plant	14 days	Mon 27/01/20	Thu 13/02/20
39		Dismantle plant & remove from site	7 days	Fri 14/02/20	Mon 24/02/20
40		Decommission RO plant, workshops, offices and other support facilities	7 days	Fri 14/02/20	Mon 24/02/20
41		Remove footings and pipes to a depth of 1m	2 days	Tue 25/02/20	Wed 26/02/20
42		Recover salvageable infrastructure and assets. Abandon buried cables and pipelines in situ (survey and record in place)	2 days	Thu 27/02/20	Fri 28/02/20
43		Implement soil remediation if required	1 day?	Tue 14/04/20	Tue 14/04/20
44		Contour to original surface and establish drainage, rip hardstand areas, topsoil if available and seed	1 day?	Wed 6/05/20	Wed 6/05/20
45		Close main access to site, Install signage and lock gates	1 day	Fri 13/12/19	Fri 13/12/19
46		**Domain 5: Process Ponds and W-drains**	**8 days**	**Wed 20/05/20**	**Fri 29/05/20**
47		Plug slotted w-drain pipe	2 days	Wed 20/05/20	Thu 21/05/20
48		Remove fencing	1 day	Wed 27/05/20	Wed 27/05/20
49		Liner in dry ponds cut & folded into bottom of ponds	1 day	Wed 27/05/20	Wed 27/05/20
50		Walls of ponds used to backfill ponds to natural ground surface	1 day	Thu 28/05/20	Thu 28/05/20
51		Implement soil remediation if required	1 day	Fri 29/05/20	Fri 29/05/20
52		**Domain 6: Internal & access roads & pipelines**	**30 days**	**Mon 27/01/20**	**Fri 6/03/20**
53		All supporting infrastructure above ground decommissioned and dismantled	30 days	Mon 27/01/20	Fri 6/03/20
54		Regrade roads, scarify and spread of seed	30 days	Mon 27/01/20	Fri 6/03/20
55		**Domain 7: Camp Admin & Accomm.**	**4 days**	**Thu 19/09/19**	**Tue 24/09/19**
56		Implement soil remediation if required	2 days	Thu 19/09/19	Fri 20/09/19
57		Contour to original surface and establish drainage, rip hardstand areas and seed	2 days	Mon 23/09/19	Tue 24/09/19
58		**Domain 8: Borefield (Regional & Monitoring)**	**1293 days**	**Fri 22/05/20**	**Tue 6/05/25**
59		Remove bore pumping equipment	2 days	Fri 22/05/20	Mon 25/05/20
60		Obtain permits to permanantly seal a well from SA govt.	30 days	Wed 26/03/25	Tue 6/05/25
61		Photograph bores prior to sealing	2 days	Thu 27/03/25	Fri 28/03/25
62		Decommission, cut collar and backfill bore in accordance with national guidelines	4 days	Fri 28/03/25	Wed 2/04/25
63		Visual inspection and photo of decommissioned bores	2 days	Mon 31/03/25	Tue 1/04/25
64		**Domain 9: Contractors Workshop, go bay, laydown yard, explosives**	**28 days**	**Mon 3/12/18**	**Wed 9/01/19**
65		Contractor dismantles areas & removes from site including mobile equipment	14 days	Mon 3/12/18	Thu 20/12/18
66		Implement soil remediation if required	0 days	Fri 21/12/18	Fri 21/12/18
67		Contour to original surface and establish drainage, rip hardstand areas and seed	14 days	Fri 21/12/18	Wed 9/01/19
68		**Closure Monitoring**	**1844 days**	**Wed 14/02/18**	**Mon 10/03/25**



ID	Task Mode	Task Name	Duration	Start	Finish
69		Surface Water Monitoring (after rainfall events ~ 25mm in 24 hrs) / Sediment monitoring if no rainfall within 12 months	1825 days	Wed 14/02/18	Tue 11/02/25
70		Groundwater level and quality monitoring for monitoring and regional bores (quarterly)	1825 days	Wed 14/02/18	Tue 11/02/25
71		Photographic evidence of rehabiltation and analogue site vegetation condition , cover & erosion	1825 days	Wed 14/02/18	Tue 11/02/25
72		HLP: Preliminary Numerical Model and performance monitoring plan	0 days	Wed 31/07/19	Wed 31/07/19
73		HLP: DPC review and endorse numerical model	28 days	Fri 30/08/19	Tue 8/10/19
74		HLP: performance monitoring	90 days	Mon 25/05/20	Fri 25/09/20
75		HLP: Numerical model validation (using performance monitoring)	30 days	Mon 28/09/20	Fri 6/11/20
76		HLP: Final numerical model (predictive rainfall events)	30 days	Mon 9/11/20	Fri 18/12/20
77		Year 1 to 3 Annual Land Function Analysis (first three years after heap leach cover placement)	1095 days	Mon 25/05/20	Fri 2/08/24
78		Year 4 Final LFA	157 days	Sat 3/08/24	Mon 10/03/25
79		Weed and Feral Animal monitoring and management	1825 days	Wed 14/02/18	Tue 11/02/25
80		Soil Contamination Investigation (all domains)	60 days	Mon 1/06/20	Fri 21/08/20
81		Monitor gullies and rills on landforms	1804 days	Wed 14/02/18	Sat 11/01/25
82		LiDAR Survey 1	0 days	Wed 1/07/20	Wed 1/07/20
83		LiDAR Survey 2	0 days	Thu 1/07/21	Thu 1/07/21
84		LiDAR Survey 3	0 days	Mon 4/07/22	Mon 4/07/22
85		Annual Mine and Rehabilitation Compliance Report 1	0 days	Tue 23/04/19	Tue 23/04/19
86		Annual Mine and Rehabilitation Compliance Report 2	0 days	Mon 23/03/20	Mon 23/03/20
87		Annual Mine and Rehabilitation Compliance Report 3	0 days	Tue 23/03/21	Tue 23/03/21
88		Annual Mine and Rehabilitation Compliance Report 4	0 days	Wed 23/03/22	Wed 23/03/22
89		Annual Mine and Rehabilitation Compliance Report 5	0 days	Thu 23/03/23	Thu 23/03/23
90		Annual Mine and Rehabilitation Compliance Report 6	0 days	Fri 22/03/24	Fri 22/03/24
91		**Mine Completion Report**	**1381 days?**	**Tue 10/12/19**	**Tue 25/03/25**
92		Geotechnical Assessment & Monitoring Report	30 days	Mon 2/09/24	Fri 11/10/24
93		Erosion Monitoring Complaince Report	30 days	Wed 12/02/25	Tue 25/03/25
94		LiDAR Survey Report	30 days	Mon 19/07/21	Fri 27/08/21
95		Land Function Analysis Report and Vegetation Monitoring Report	30 days	Sat 18/01/25	Thu 27/02/25
96		Heap Leach Decommissioning Report (& as constructed survey)	30 days	Fri 26/02/21	Thu 8/04/21
97		As constructed and compaction survey reports (flood protection bund and stream diversion)	30 days	Fri 4/12/20	Thu 14/01/21
98		Surface Water Monitoring Compliance Report	30 days	Wed 12/02/25	Tue 25/03/25
99		Ground Water Monitoring Compliance Report	30 days	Wed 12/02/25	Tue 25/03/25
100		Evidence of Landholder agreement to maintain fence	30 days	Tue 10/12/19	Mon 20/01/20
101		Mine Contamination Assessment	1 day?	Fri 25/09/20	Fri 25/09/20
102		Submit Mine Completion Criteria to SA govt.	0 days	Wed 26/03/25	Wed 26/03/25
103		Relinquishment and Bond Return	30 days	Wed 26/03/25	Tue 6/05/25



Project: 20190402-GC-WDGM Reh
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Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Inactive Task | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | Deadline | Progress | Manual Progress