16 June 2021

Stawell Gold Mines

Earth Resources Regulation

2020 Public Sustainability Report

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1. INTRODUCTION

This annual Public Sustainability Report for 2020 has been prepared for Mining Licence 5260 in accordance with section 26 4AA of the Mineral Resources (Sustainable Development) Act 1990.

Stawell Gold Mines (SGM) is located approximately 240 km northwest of Melbourne, 70 km southeast of Horsham and 2 km east of the Stawell CBD (see **Figure 1**). All surface and underground infrastructure associated with SGM's operations is located within the MIN5260 lease area, which covers approximately 50% of the town.

SGM has operated at its current location since 1983, which has involved the progressive mining of gold in a series of above ground open pits and extensive underground workings. SGM surface operations are situated adjacent to the eastern boundary of the Stawell Township and encompass an approximate area of 380 ha. SGM underground workings extend from the Magdala portal in a north-westerly direction underneath the town, and on the East Flank of the Magdala Basalt, which hosts the Aurora B discovery which is the new area of production.

The SGM operation hosts the following infrastructure:

- Mill and Run of Mine (ROM) pad;
- Tailings storage facilities;
- Wonga and Davis pits;
- Magdala portal and support infrastructure for the underground mine (e.g., ventilation shafts, emergency egress, water reticulation, cooling and power);
- Waste rock stockpiles;
- Administration area including buildings, stores and car parks;
- Maintenance workshops;
- Core farm;
- Laydown areas; and
- Tracks, roads and fencing.

SGM operates on land parcels that include both crown land reserves and freehold land (see **Figure 2**). The majority of SGM's operation is located on freehold land owned by SGM; however, the main parcel of land that hosts the mine operations area is Unreserved Crown Land managed by the Department of Environment, Land, Water and Planning. Two additional parcels of Unreserved Crown Land are located adjacent to the Stawell Clay Target Complex, which host an access road, the Wonga Pit and Mt Micke stockpile.

Land that adjoins SGM to the north and east of the mine site is freehold land predominantly used for grazing. The Stawell Township is located to the west and northwest of the mine. Crown Land used for recreation is situated immediately northwest of the mine site. To the south of the mine the land use is a mix of forested Crown Land and rural residential interspersed with agricultural use.

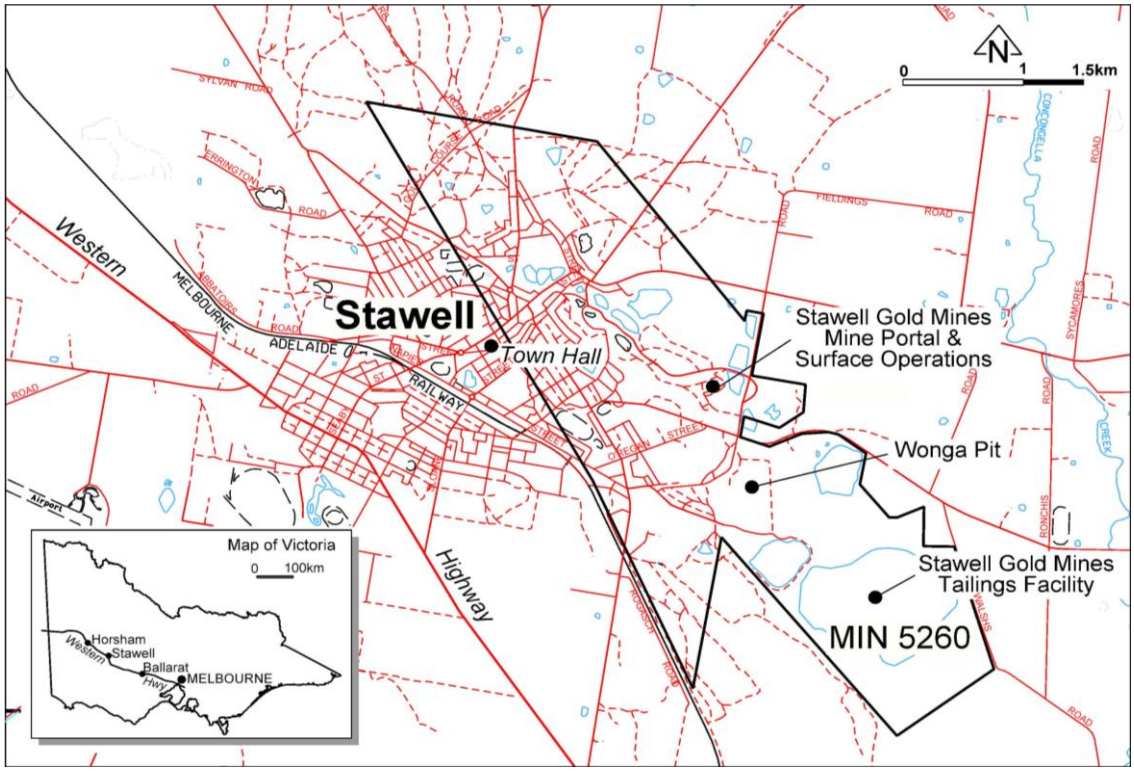

Figure 1 - SGM location plan

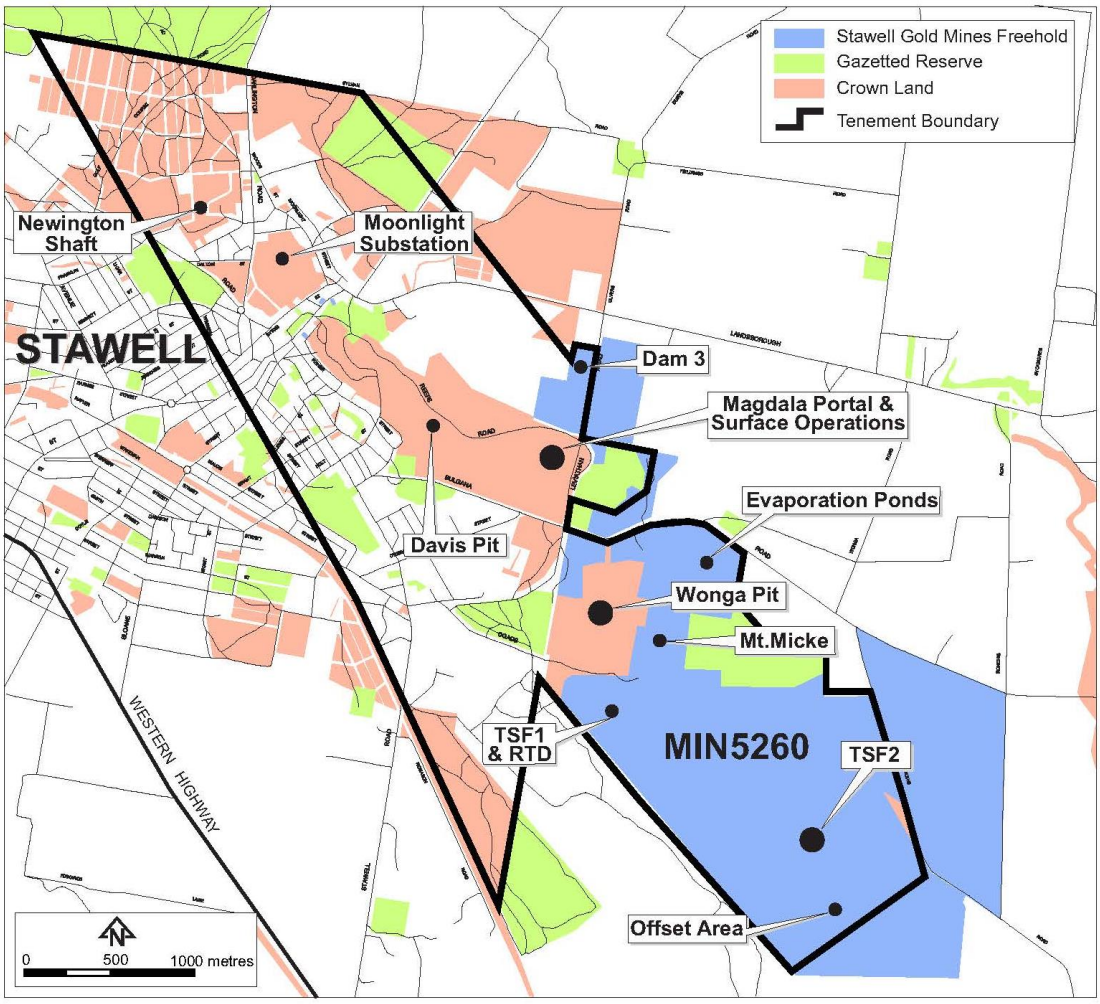

Figure 2 - Land tenure within MIN5260 lease area

2. Economic Benefit

Modern era production at SGM began in 1984 and involved the progressive mining of gold in a series of above ground open pits and extensive underground workings.

SGM is capable of processing approximately 850,000 t/year. The processing plant at SGM is a conventional gravity/leaching process which recovers gold from both underground (sulphide) and surface (oxide) ore sources. Processing involves a two-stage crushing, milling and a Carbon in Leach (CIL) circuit. Most ore types require further liberation of the gold from sulphide materials. This is achieved in a two-stage flotation circuit where gold-bearing sulphides (e.g., pyrite, arsenopyrite and some pyrrhotite) are concentrated. The ground sulphides and flotation tail are then recombined and sent to the CIL circuit, where sodium cyanide was used to leach the gold from the slurry.

Gold from SGM is sent to The Perth Mint for further refining and is then able to be used in a variety of products including electronics, aerospace applications, jewellery and medical equipment.

Throughout the life of SGM there has been a substantial contribution directly to the local and regional economy through employment, the supply chain, government revenue, sponsorships, donations and community grants (see **Table 2**). As of December 2020, SGM employed approximately 251 full time equivalent (FTE) staff which includes SGM employees and contractors. SGM has provided ongoing in-kind support to the construction of the Stawell Underground Physics Laboratory.

Table 1 - SGM Sponsorship and donations 2020

Contribution	Value
Sponsorship, Grants & Donations	$ 30,386
SUPL in kind	$400,000

3. COMMUNITY ENGAGEMENT

3.1. Overview of Community Engagement Plan

SGM's Community Engagement Plan (CEP) was developed to provide a consistent management framework to identify and engage with stakeholders associated with SGM's operations. The CEP outlines the key aspects of community engagement for the company, which include:

- Identify the key stakeholders and assess the level of engagement required;
- Identify community attitudes and expectations with respect to SGM's operations;
- Establish a process for consistent and meaningful engagement with stakeholders;
- Communicate openly and clearly with stakeholders, via a range of engagement methods; and
- Provide a means for registering, documenting and responding to feedback and/or complaints.

Stawell Gold Mines recognize the different needs and expectations of stakeholders with respect to engagement and consultation. Consequently, SGM implements a variety of engagement methods to achieve its engagement objectives, including the following:

- Environmental Review Committee (ERC) - consists of representatives from the community, council and government regulatory authorities. This group reviews environmental performance and raises issues relating to the operations.
- Community meetings and information sessions.
- Direct contact (either in person, via phone, emails or mail, as appropriate).
- Open and information days.
- Community newsletters.
- Local newspaper publications.
- Social media (Facebook) publications (i.e., fact sheets).
- Website materials.
- Community surveys.
- Company publications and statutory reports.

3.2. Overview of Community Engagement Activities, 2020

Community engagement undertaken by SGM during the 2020 reporting period was severely hindered due to COVID-19 restrictions for the majority of the year. A summary of SGM's engagement activities conducted in 2020 included:

- The Environment Review Committee (ERC) Meeting was held quarterly (February, May, August & November).
- ERC Snapshot Poster and Meeting Minutes were produced detailing the site activities and a summary of the environmental monitoring data discussed at the meeting were made available to the public though the site Facebook page and Community Hub Website.
- Community newsletter was released in March and September providing an update on site activities, exploration, production and future blasting locations, which was made available to the public through the site Facebook page and Community Hub website.
- Community Grants Program opened to all local organisations and individuals in June and December.

- Visit to local bushland in site fire truck to meet Cooinda class and test our their new rain coats and gumboots, sponsored by SGM
- Visit to Stawell Regional Health, Marrang Kindergarten, Stawell Primary School and other community organisations to view items sponsored as part of SGM's community grants program.

4. Environmental Management

4.1. Overview of Environmental Management Plan

SGM's Environmental Management Plan (EMP) was prepared to address the environmental risks associated with site operations. The EMP describes how SGM's Environmental Management System is implemented and details the strategies and control measures for environmental management. The EMP also details monitoring and reporting requirements, key roles and responsibilities, stakeholder engagement processes, and performance indicators for each aspect of environmental or community management.

The EMP is supported by several key documents, such as the environmental risk register, standard operating procedures and an environmental monitoring program, designed to achieve appropriate standards and consistency in SGM's environmental performance. All these documents form part of the site Work Plan approval.

4.2. Environmental Risk and Monitoring

SGM's environmental risk register identifies relevant environmental aspects and associated potential impacts, along with appropriate control measures and monitoring requirements. Environment risks and associated potential impacts have been assessed in accordance with the methods outlined in the Department of Jobs, Precincts and Regions (DJPR) Risk-based Work Plan - Guidelines for mining industry projects[1]. Environmental control measures have been developed in the context of DJPR's standard controls, industry best practice, Australian and International standards, site characteristics, the nature of the operations, and relevant regulatory and other requirements.

Environmental risks, potential impacts and associated monitoring activities relating to SGM's operations are summarized in the following sections.

4.2.1. Surface Water

Risk Sources, Potential Impacts and Controls

Operational activities on site can present a risk to surface water. Examples of these include:

- Landform construction and earthworks that change catchment hydrology;
- Operation of water storage dams associated with the site water management system;
- Storage and use of hazardous materials (e.g. chemicals and hydrocarbons); and
- Storage and transfer of mine tailings and process water.

Potential impacts associated with surface water risk sources can include:

- Sedimentation of surface water systems from exposed areas and stockpiles;
- Contamination from hazardous materials spills and/or septic wastewater systems;

[1] RRAM Guidelines for Mining industry Projects version 0.7, June 2017

- Contamination from contaminated groundwater or process water entering surface water systems;
- Altered catchment hydrology, resulting in changed water flow paths, quantities and/or velocities; and
- Degradation of surface water ecosystems.

Controls are put in place to ensure that potential risks are mitigated. For surface water management these include:

- Runoff capture systems are created that separate clean and dirty water;
- All hazardous materials are stored in bunding appropriate to Australian Standards;
- Reuse water captured onsite; and
- Design and construct dams and drains to appropriate standards and guidelines.

Surface Water Monitoring

SGM conducted surface water monitoring at seven sites located outside the MIN5260 boundary during the 2020 reporting period (see **Figure 3**). Surface water sites are differentiated into creeks (SW-C) and farm dams (SW-FD).

The standards adopted for surface water quality monitoring is sourced from the:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000).

Surface water quality results for farm dams are assessed against the ANZECC guidelines for stock drinking water and the ANZECC guidelines for irrigation and general use. Natural water bodies (i.e., streams and creeks) are also compared against the guidelines for aquatic ecosystems (80% species protection). The 80% species protection trigger values are adopted for disturbed areas, such as heavily farmed areas and altered landscapes. All surface water quality monitoring results were below guideline values during the 2020 reporting period, except for the following indicated in **Table 3**. All other surface water quality results were below the guideline values for the designated reporting period.

All exceedances and investigations are presented to regulators and community representatives through the Environmental Review Committee.

Table 2 – Surface water quality exceedances or anomalous results

Location	Analyte	Guideline	Reason	Action
SW-FD1 SW-FD2 SW-FD4 SW-FD5 SW-C3	Al	Aquatic Ecosystems - 80% Protection (ANZECC, 2000)	The elevated aluminium concentration is understood to be caused by the aluminium content in localised clays. This result is consistent with historical aluminium concentrations at the respective sites and does not warrant further investigation.	No further action.

SW-FD1 SW-FD2 SW-FD4 SW-FD5	Cu	Aquatic Ecosystems - 80% Protection (ANZECC, 2000)	The elevated copper concentration is understood to be caused by the copper content in localised clays. Elevated copper results were recorded in groundwater samples and an independent study conducted by AECOM concluded that these readings were not because of mine related activity.	No further action.

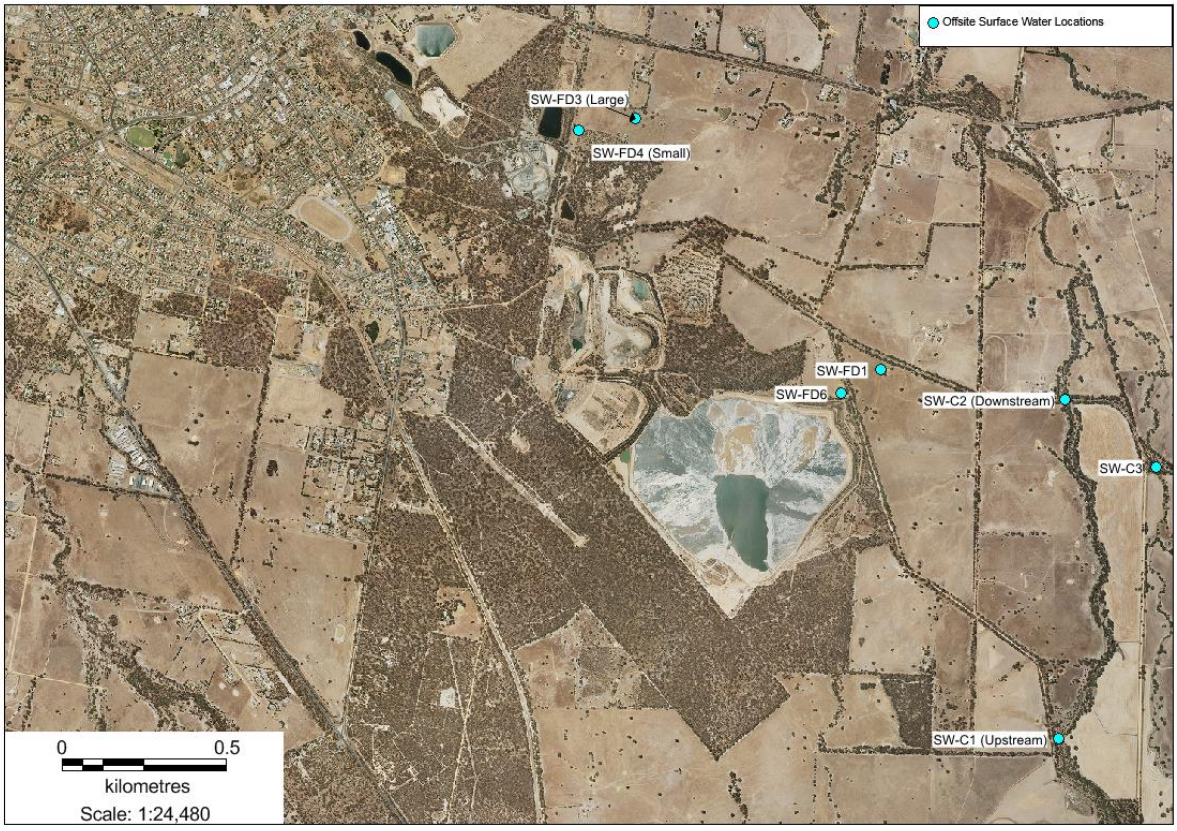

Figure 3 - SGM surface water monitoring locations [FD = Farm Dam & C = Creeks]

4.2.2. GROUNDWATER

RISK SOURCES AND POTENTIAL IMPACTS

Operational activities on site can present a risk to groundwater quality and levels. Examples of these include:

- Dewatering the underground mine and open pits;
- Operation of water storage dams associated with the site water management system;
- Storage and use of hazardous materials (e.g., chemicals and hydrocarbons); and

- Storage of mine tailings and process water.

Potential impacts associated with groundwater risk sources include:

- Decreasing groundwater levels around areas of dewatering affecting vegetation and stability;
- Increasing groundwater levels around tailings storage facilities by increasing hydraulic pressure resulting in areas of water logging and increased salinity;
- Contamination of groundwater from process water or tailings; and
- Contamination from hazardous materials spills and/or septic wastewater systems.

Controls are put in place to ensure that potential risks are mitigated. For groundwater management these include:

- Dewatering is controlled in accordance with a Groundwater Management Plan;
- Storage of process water and mine tailings in appropriately constructed and safe tailings storage facility; and
- A series of bores are installed to create a hydraulic containment system around sources of contamination.

GROUNDWATER MONITORING

All groundwater monitoring undertaken during the 2020 reporting period, was conducted in accordance with the requirements of SGM's Environment Protection Agency (EPA) approved TSF2 Groundwater Monitoring Plan.

During 2020, SGM monitored groundwater at 30 bores located outside the MIN5260 boundary (see **Figure 4**). Groundwater monitoring bores were divided into three sampling frequencies: Quarterly, Annually or Triennially – based on the water chemistry and the determination of trend lines. In addition to monitoring groundwater quality, SGM also monitored standing water levels in the bores to identify any material changes to the water table.

The standard adopted for groundwater quality monitoring is sourced from the:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000).

Groundwater quality results are assessed against the ANZECC guidelines for stock drinking water, despite the natural salinity of the groundwater at most monitoring sites being above the stock drinking water guidelines. Groundwater salinity in the area precludes its use for irrigation.

Thiocyanate (SCN) concentrations are assessed against a risk-based screening level (RBSL) used to assess impacts to groundwater from TSF2 seepage. This RBSL is used as the assessment standard for SCN in the absence of any other guidelines (i.e., ANZECC) and has been endorsed by the EPA.

All groundwater quality monitoring results were below guideline values during the 2020 reporting period, except for the following indicated within **Table 4**. All exceedances and investigations are presented to regulators and community representatives through the Environmental Review Committee.

Table 3 – Groundwater quality exceedances or anomalous results

Location	Analyte	Guideline Reference	Reason	Action
SP108	Al	ANZECC Guidelines Stock Water Drinking for Sheep	This result is consistent with historical Al concentrations; and is reflective of regional background geochemistry.	No further action.
SP920 SP921	Cu	ANZECC Guidelines Stock Water Drinking for Sheep	All historical Cu concentrations at SP920 are below guideline levels, suggesting this result is anomalous and not attributable to SGM's operations. AECOM review of groundwater copper results identified no relation between the copper exceedances at SP920 with any TSF2, or mine activity. Results continued to drop throughout 2020 to below trigger levels.	No further action.
SP604	Cu	ANZECC Guidelines Stock Water Drinking for Sheep	Investigation of the cause/source of the dissolved Cu exceedance at groundwater monitoring bore SP604 was inconclusive. AECOM review of groundwater copper results identified no relation between the copper exceedances at SP604 with any TSF2, or mine activity.	No further action.
SP921	Ni	ANZECC Guidelines Stock Water Drinking for Sheep	Subsequent samples showed this to be an anomalous reading.	No further action.
SP585	Total CN	ANZECC Guidelines Stock Water Drinking for Sheep	Groundwater monitoring results since May 2016, indicate that Total CN concentrations are relatively stable, ranging between 0.02 to 0.25 mg/L.	Review of current EPA notice due mid 2021

SP585	SCN	Clean Up Plan RBSL for Sheep	Groundwater results suggest that SCN is being effectively managed by current hydraulic containment system and has not progressed further from TSF.	Review of current EPA notice due mid 2021

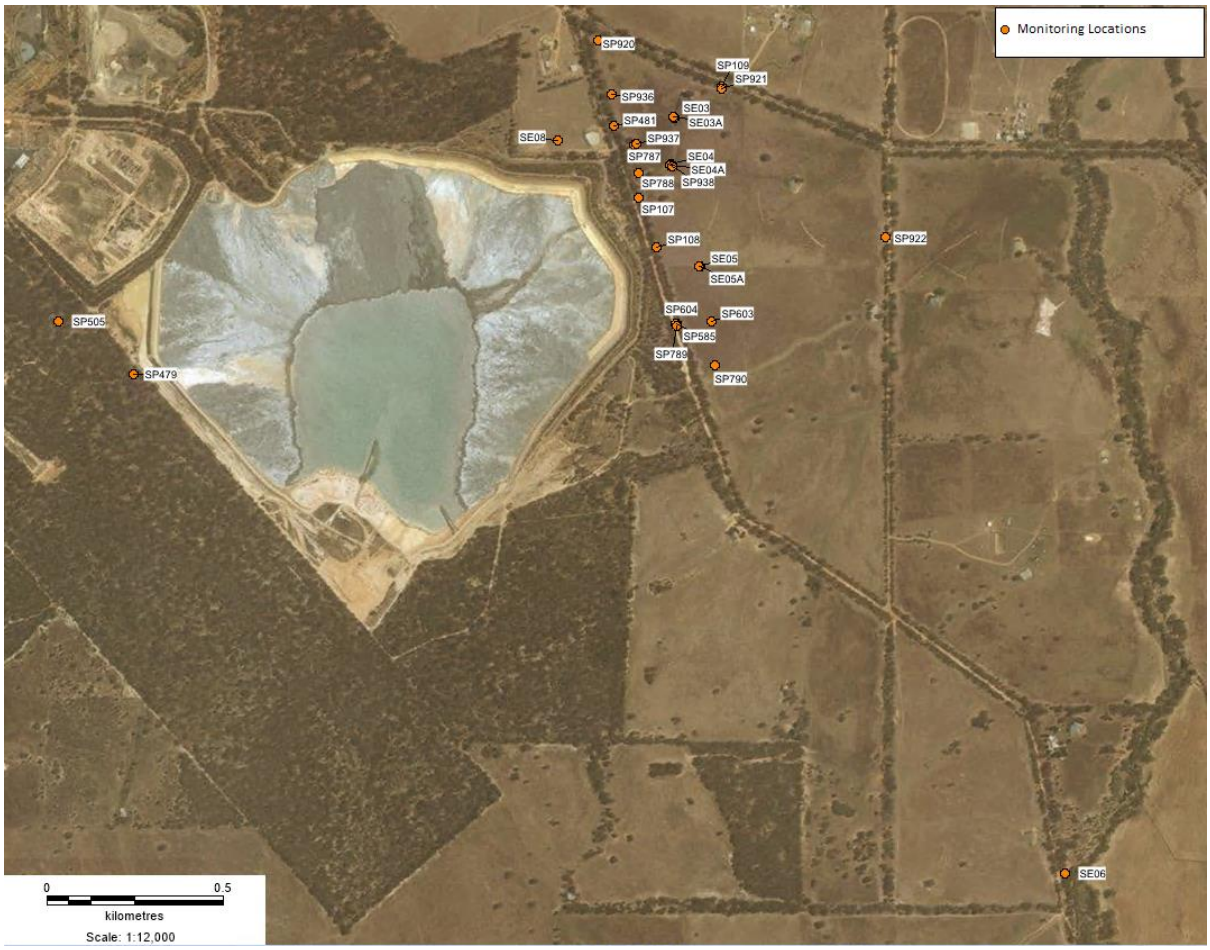

Figure 4 - SGM offsite Groundwater monitoring bore locations

4.2.3. AIR QUALITY

RISK SOURCES AND POTENTIAL IMPACTS

SGM's operations have the potential to impact air quality from a variety of sources. Examples of operational activities and risk sources that may affect the air quality of sensitive receptors include:

- Material handling/earthworks (e.g., truck dumping, excavators, scrapers, bulldozers, graders etc.);
- Processing (e.g., stockpiling, rock breaking, crushing, ore transfers/conveyors etc.)
- Wheel generated dust from mobile fleet movements;
- Wind erosion from stockpiles, tailings storage facilities or exposed areas.
- Odour emissions from underground mine ventilation, ore processing and green waste stockpiles; and
- Fugitive emissions from the storage and use of hazardous materials (e.g., chemicals and hydrocarbons).

Air quality impacts at sensitive receptors vary depending on the location and the nature of the activity/risk source, climatic conditions and ambient air quality conditions.

Potential impacts associated with air quality risk sources can include:

- Reduced amenity at sensitive receptors (e.g., general nuisance, odour and/or discomfort);
- Potential health impacts of sensitive receptors;
- Contamination of soil and/or surface water systems; and
- Vegetation damage.

Controls are put in place to ensure that potential risks are mitigated. Management actions can include:

- Dust suppression either through water sprays and cannons or use of chemical dust suppression and binders;
- Rehabilitation of land once use has completed;
- Limitation of vehicle movements in dust prone areas or during adverse weather conditions; and
- Dust extraction equipment on fixed plant.

DUST DEPOSITION MONITORING

SGM monitored dust deposition at 12 sites during the 2020 reporting period. Dust deposition gauges were located north, south, east and west of the operations area and TSF2, as well as at three background sites (see **Figure 6**).

The standard adopted for dust deposition gauge compliance assessment is sourced from the Protocol for Environmental Management – Mining and Extractive Industries (EPA, 2007). The PEM states "results of deposited dust should not exceed 4 g/m^2/month, or no more than 2 g/m^2/month above background levels, as a monthly average".

All dust deposition results were below the assessment criteria during the 2020 reporting period (see

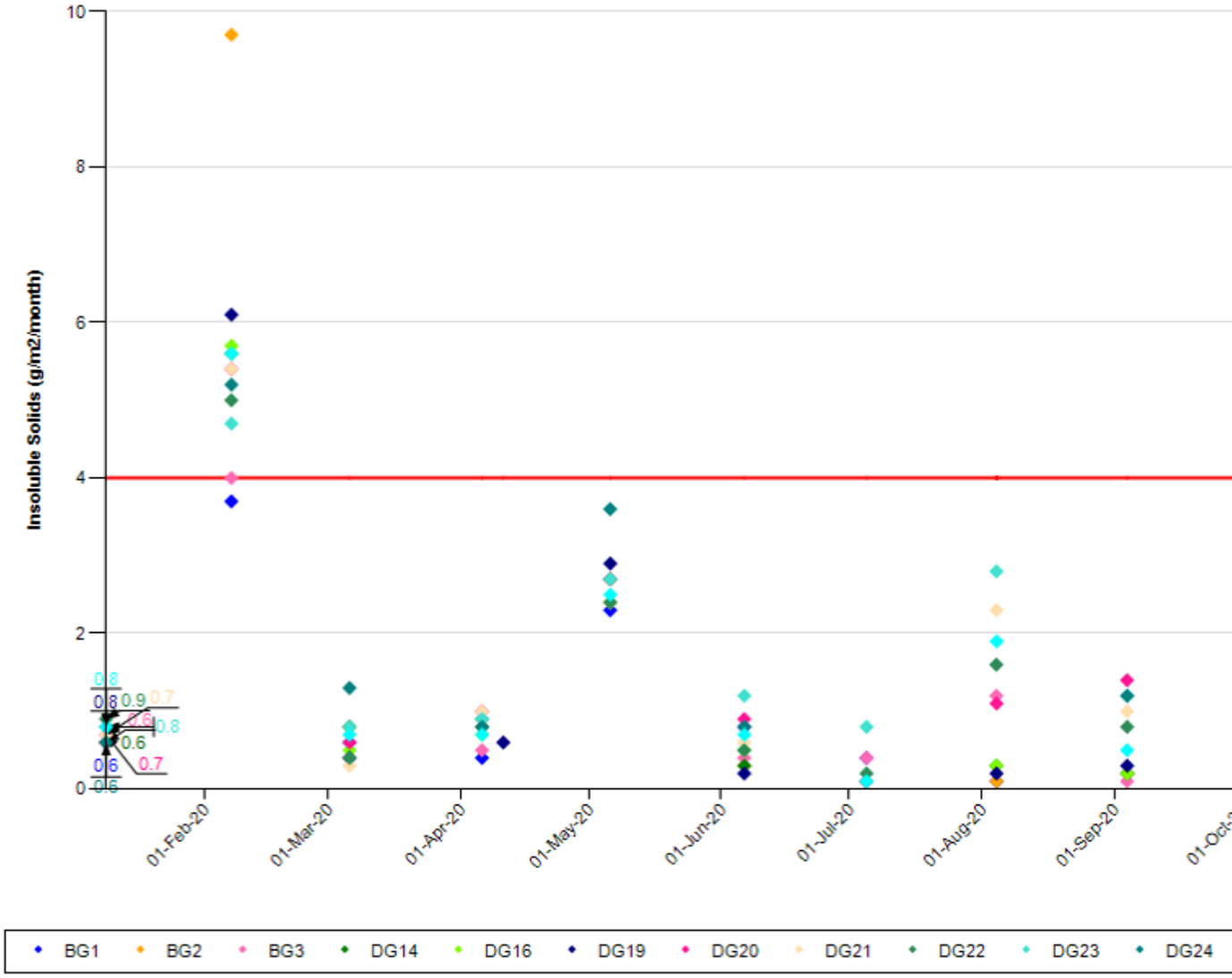

Figure 7).

SGM reported contamination events (see **Table 5**) during the 2020 reporting period. Due to the contamination the dust deposition gauges were not sent to the laboratory and are not presented in Figure 7.

Table 4 Dust Deposition contamination events during the 2020 reporting period

Location	Month	Analyte	Guideline	Reason	Action
DG24	March	Total Insoluble Matter	PEM 1192	DDG contaminated with bird faeces.	No action taken. Sample not sent for analysis
DG24	October	Total Insoluble Matter	PEM 1192	DDG contaminated with bird faeces.	No action taken. Sample not sent for analysis.

Figure 5 - Dust deposition gauge

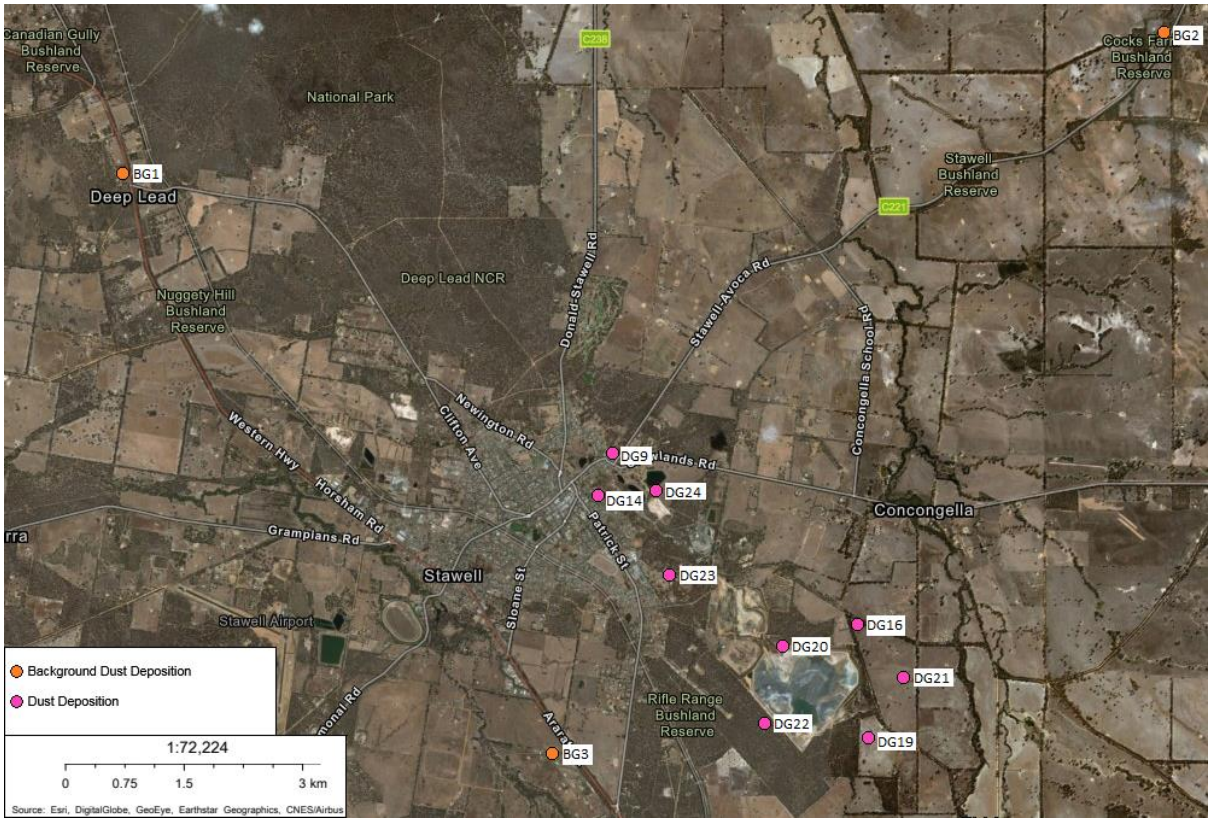

Figure 6 - SGM dust deposition monitoring locations

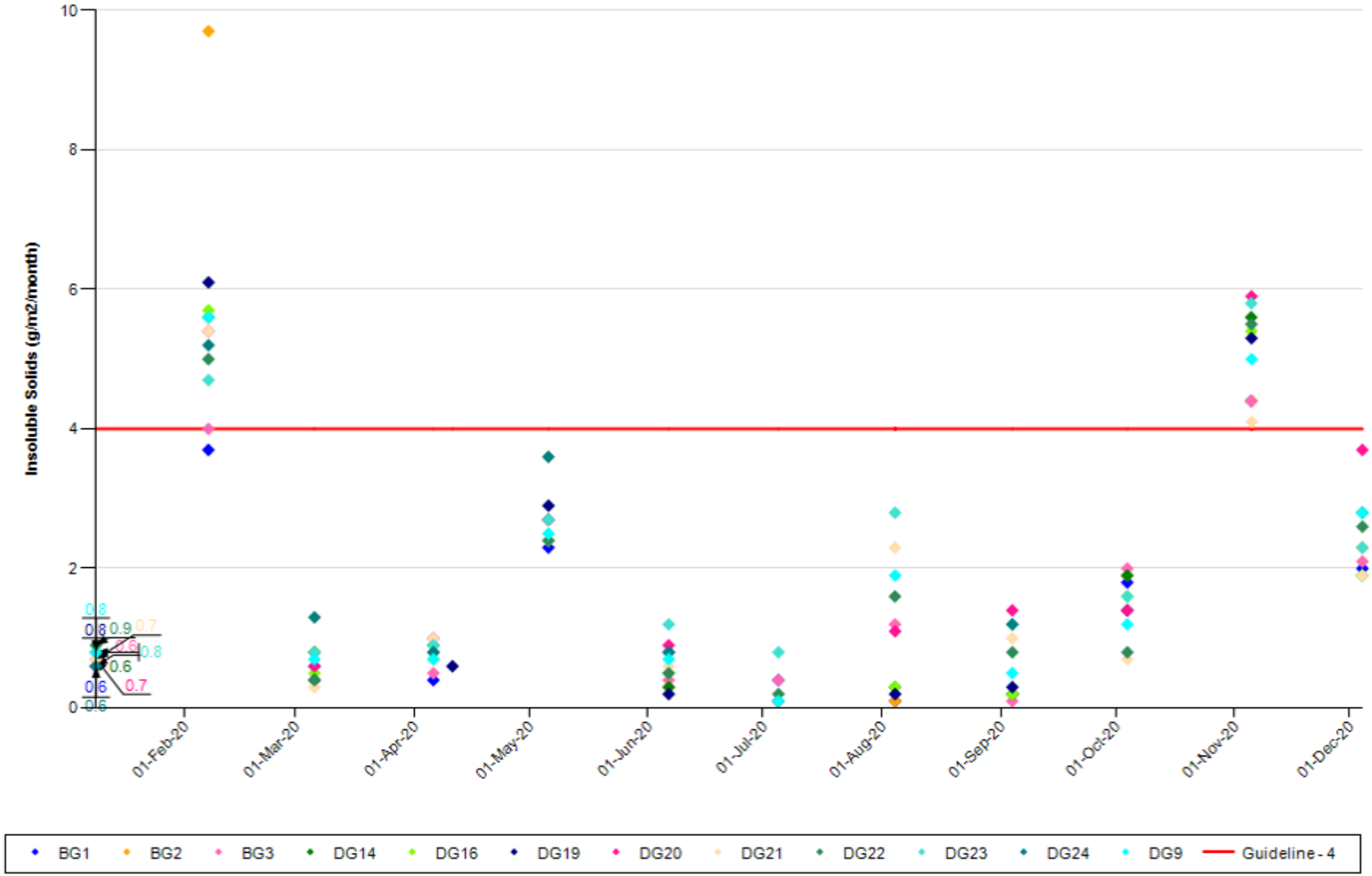

Figure 7 - SGM dust deposition monitoring results for 2020

AMBIENT AIR QUALITY MONITORING

SGM's ambient air quality monitoring station (AAQMS) was reinstated at Fisher Street in October 2020, with the purpose of using this monitor for background and regional monitoring of air quality within the Stawell air shed; and will not be used to assess site compliance against any State or Federal regulatory standards.

In April 2016, SGM installed the TSF2 North AAQMS to monitor air quality in the vicinity of TSF2. This unit is self-sustaining, powered by solar panels and it measures PM10 and PM2.5 concurrently using a gravimetric photometer.

In June 2019, SGM commissioned the TSF2 East AAQMS to monitor air quality to the east of TSF2. This unit is self-sustaining, powered by solar panels and measures PM_{10} and $PM_{2.5}$

In December 2019, SGM commissioned the Processing North AAQMS to monitor air quality to the east of TSF2. This unit is self-sustaining, powered by solar panels and measures PM_{10} and $PM_{2.5}$.

The standards adopted for ambient air quality monitoring are sourced from the:

- Protocol for Environmental Management – Mining and Extractive Industries (EPA, 2007).
- State Environment Protection Policy (Air Quality Management) (EPA, 2001).
- State Environment Protection Policy (Ambient Air Quality) (EPA, 1999).

Data exceptions/exclusions from the reporting period include:

- 1/5/2020 to 29/05/2020 Data loss at TSF2 East, TSF2 North and Processing North monitors due to communication failure.

All particulate matter results (PM10 and PM2.5) from the TSF2 North AAQMS, TSF2 East AAQMS and Processing North AAQMS were below regulatory limits for the 2020 reporting period, except for the following event/s which were unrelated to any activity emanating from SGM's operations. (see **Figures 9, 10, 11, 12, 13, and 14**). These events were also noted in the Stawell air shed background monitor at Fisher St.

- 7/1/2020 – 19/1/2020 – All monitors recorded a period of high PM10 and PM2.5 concentration over a number of days as a result of thick regional smoke and haze emanating from a number of fires burning across the state.
- Several elevated readings were recorded across all monitors during the winter period. These exceedances were investigated and it was found that the calm weather conditions, atmospheric fog and dewy conditions during the period can result in falsely elevated readings above the PEM limit.

Figure 8 - SGM AAQMS locations

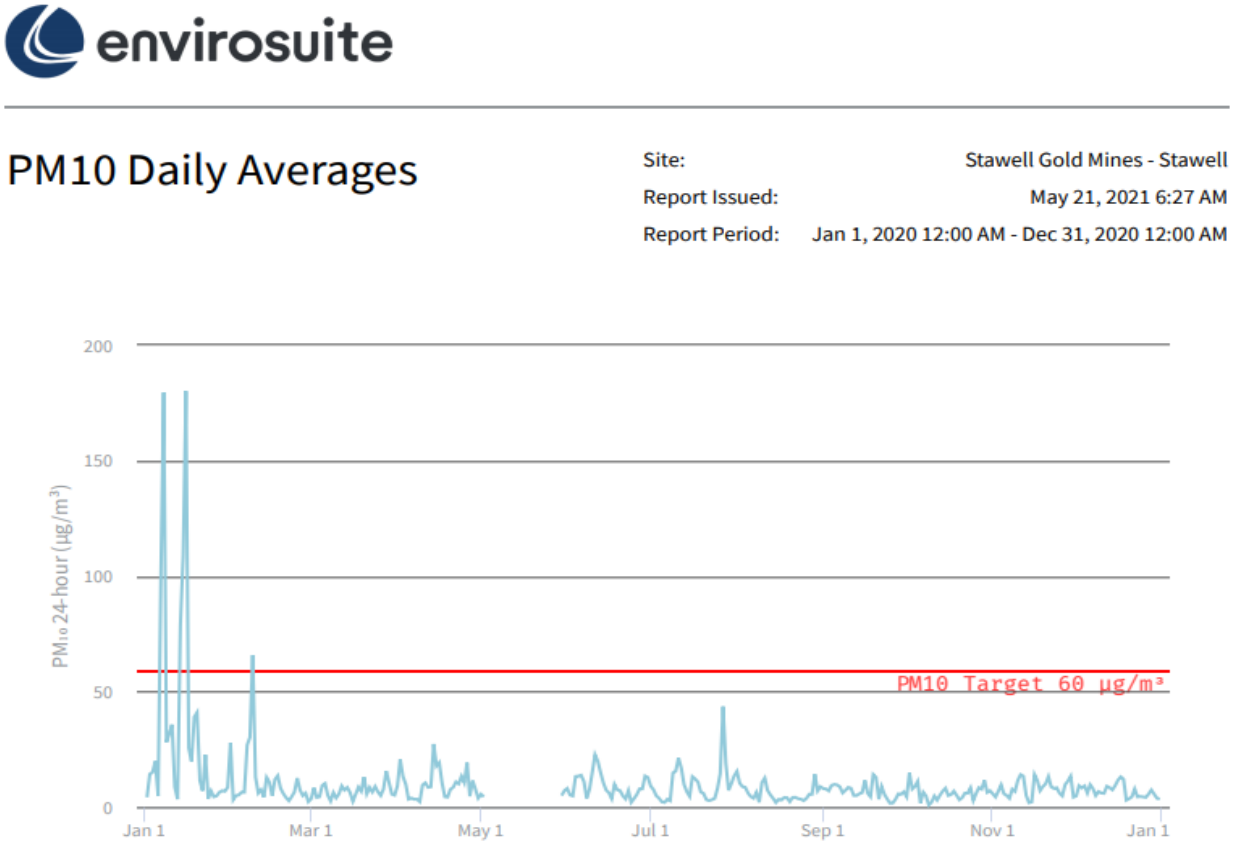

Figure 9 – TSF2 North AAQMS PM10 results for 2020

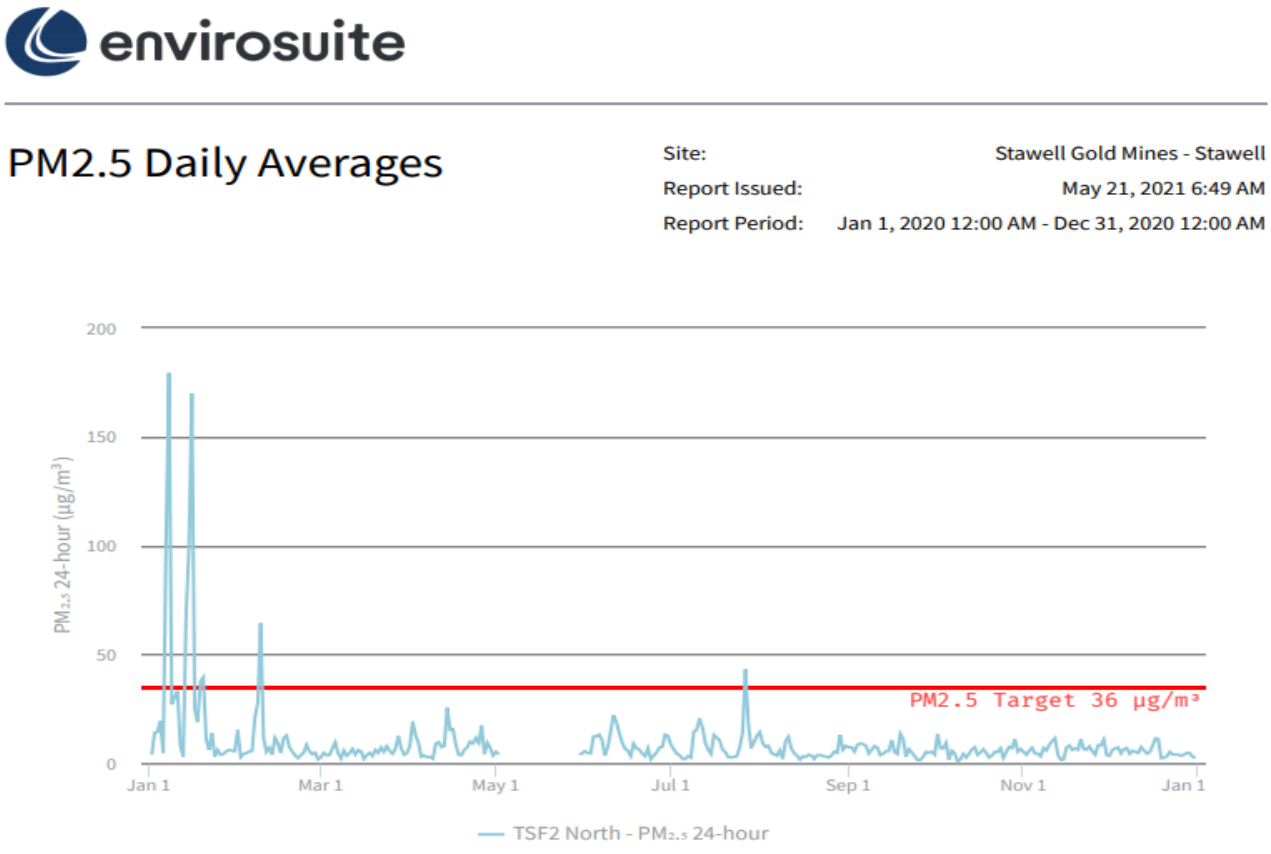

Figure 10 – TSF2 North AAQMS PM2.5 results for 2020

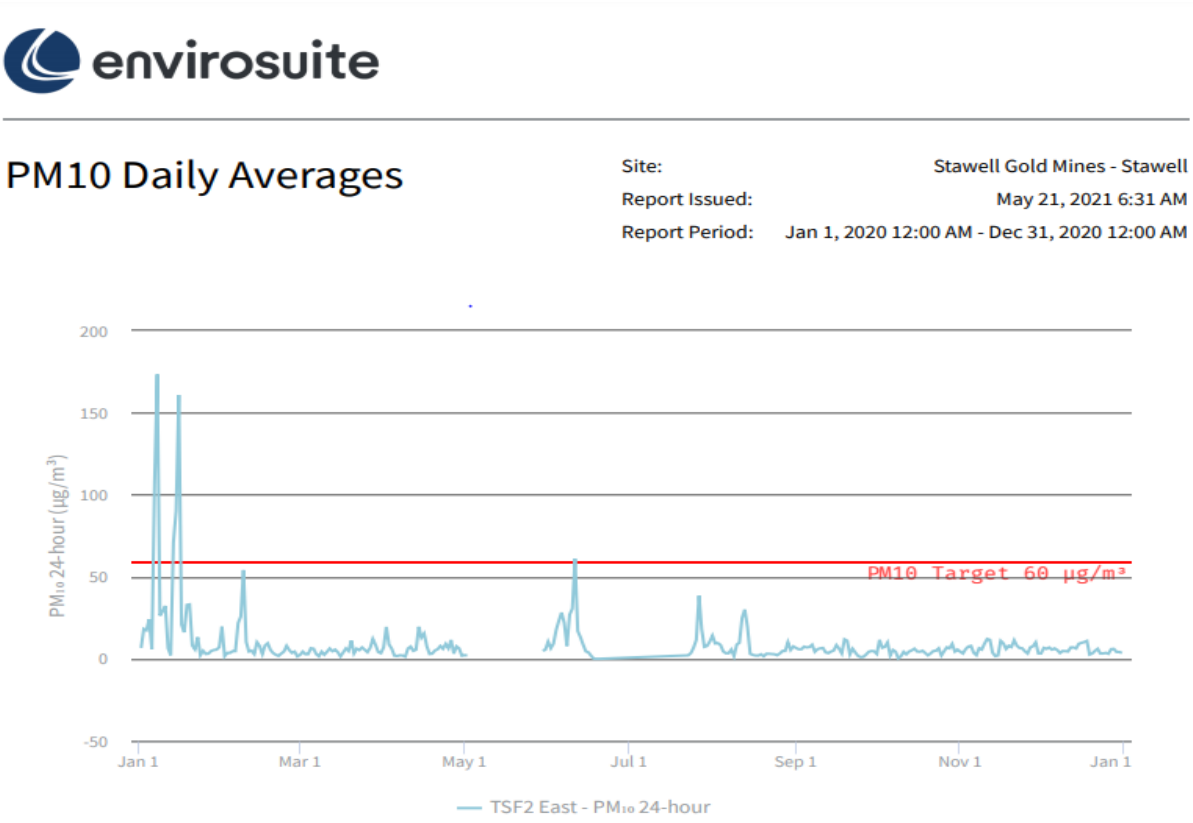

Figure 11 - TSF2 East PM10 Results for 2020

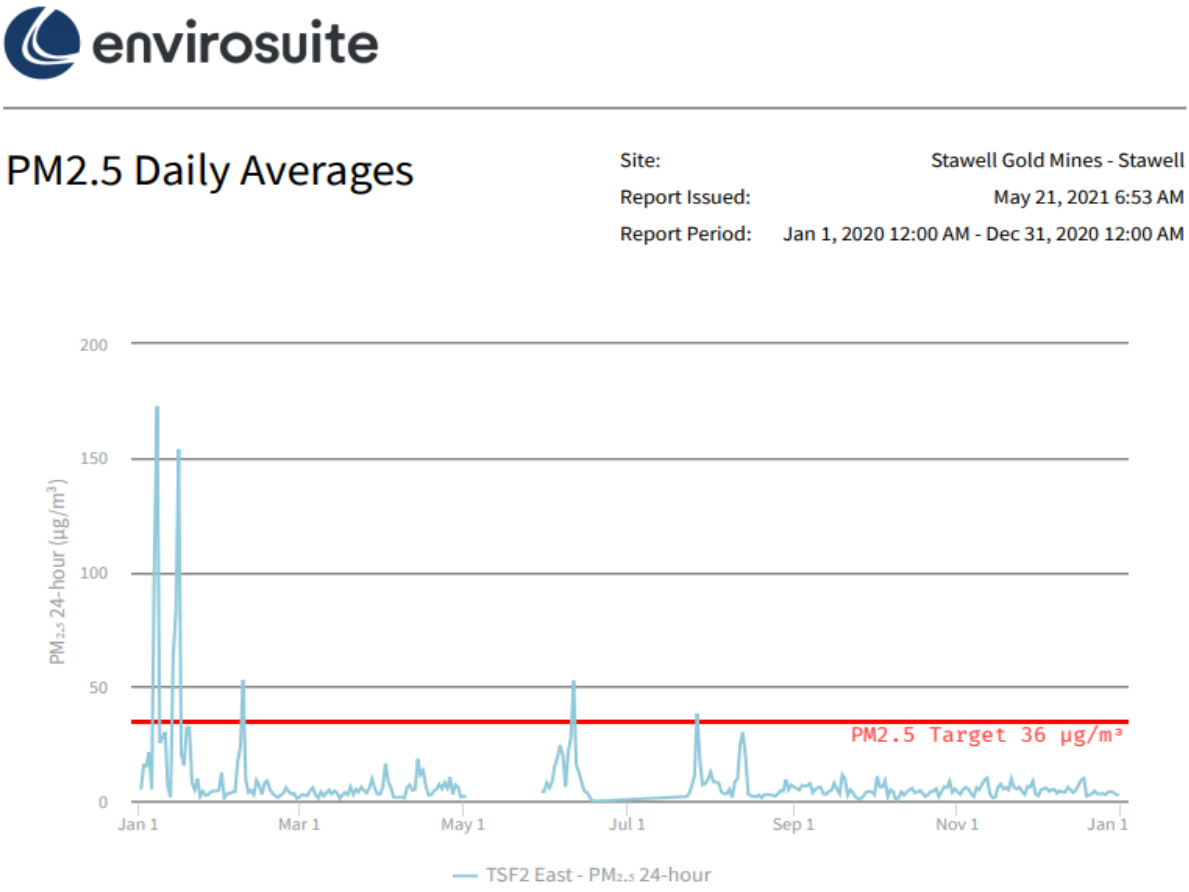

Figure 12 - TSF2 East PM2.5 Results for 2020

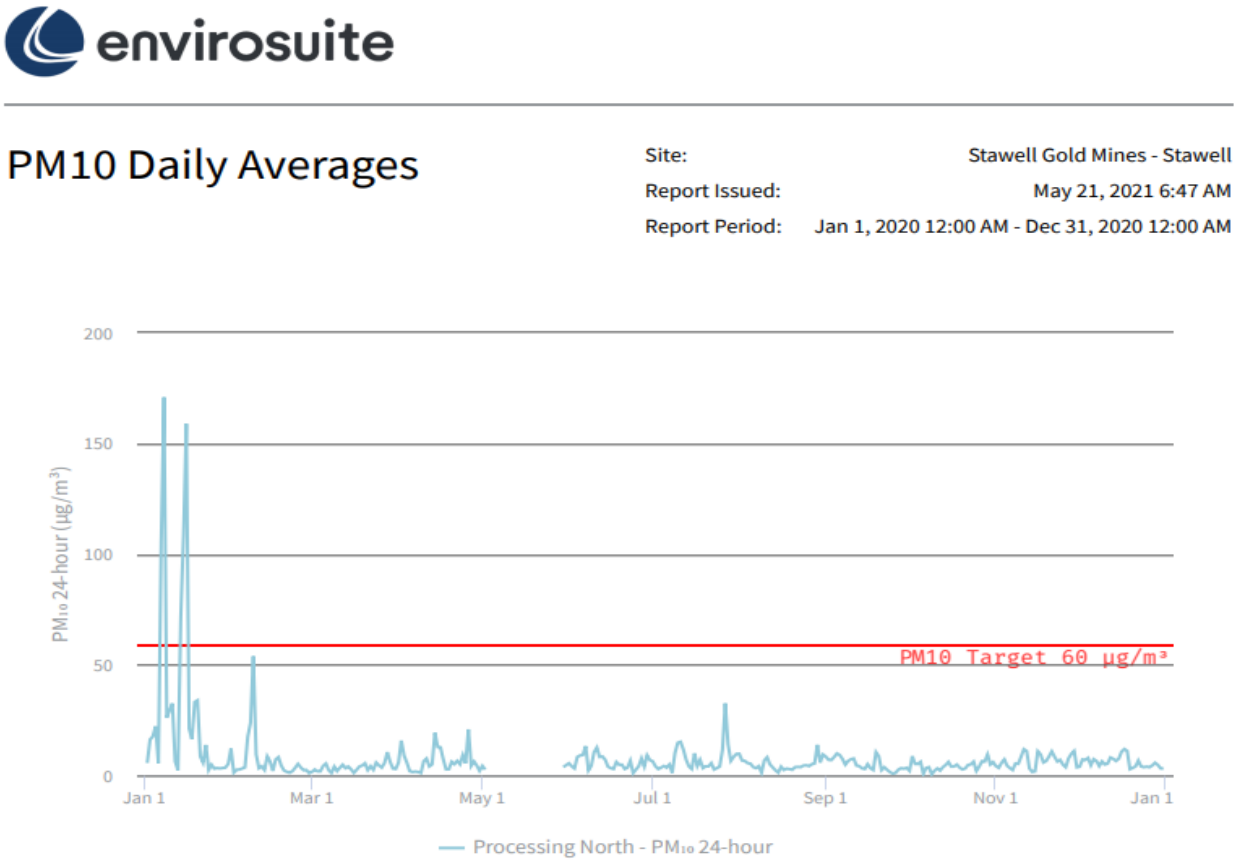

Figure 13 Processing North PM10 Results for 2020

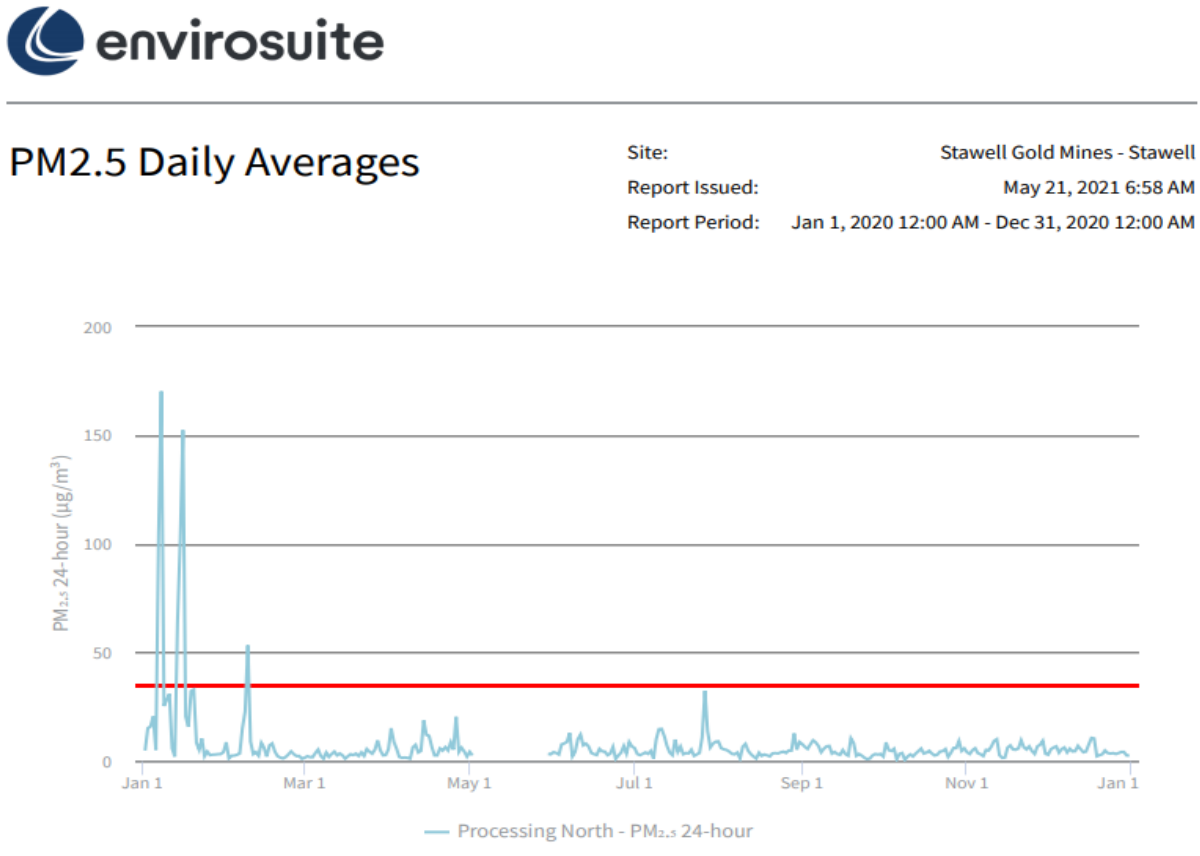

Figure 14 Processing North PM2.5 Results for 2020

HYDROGEN CYANIDE MONITORING

Cyanide, in the form of sodium cyanide solution, is used to dissolve and separate gold from the ore in the processing facility. Hydrogen cyanide (HCN) gas can be formed under acid conditions through the conversion of cyanide ions in the slurry.

To manage the risk of HCN gas developing during processing SGM implements control measures (e.g. the addition of lime or other alkali solutions) to ensure that the pH of the slurry is maintained at approximately pH 10.

SGM undertakes HCN monitoring between the TSF and the closest sensitive receptor located north of TSF2 (see **Figure 16**). HCN emissions are monitored using HCN GasBadge detectors.

The standards adopted for HCN emissions monitoring are sourced from the:

- Protocol for Environmental Management – Mining and Extractive Industries (EPA, 2007).
- State Environment Protection Policy (Air Quality Management) (EPA, 2001).

All HCN monitoring results from the monitoring point were below regulatory limits for the 2020 reporting period (see **Figure 15**).

A secondary monitor is located onsite for HCN management purposes on the north bank of TSF2.

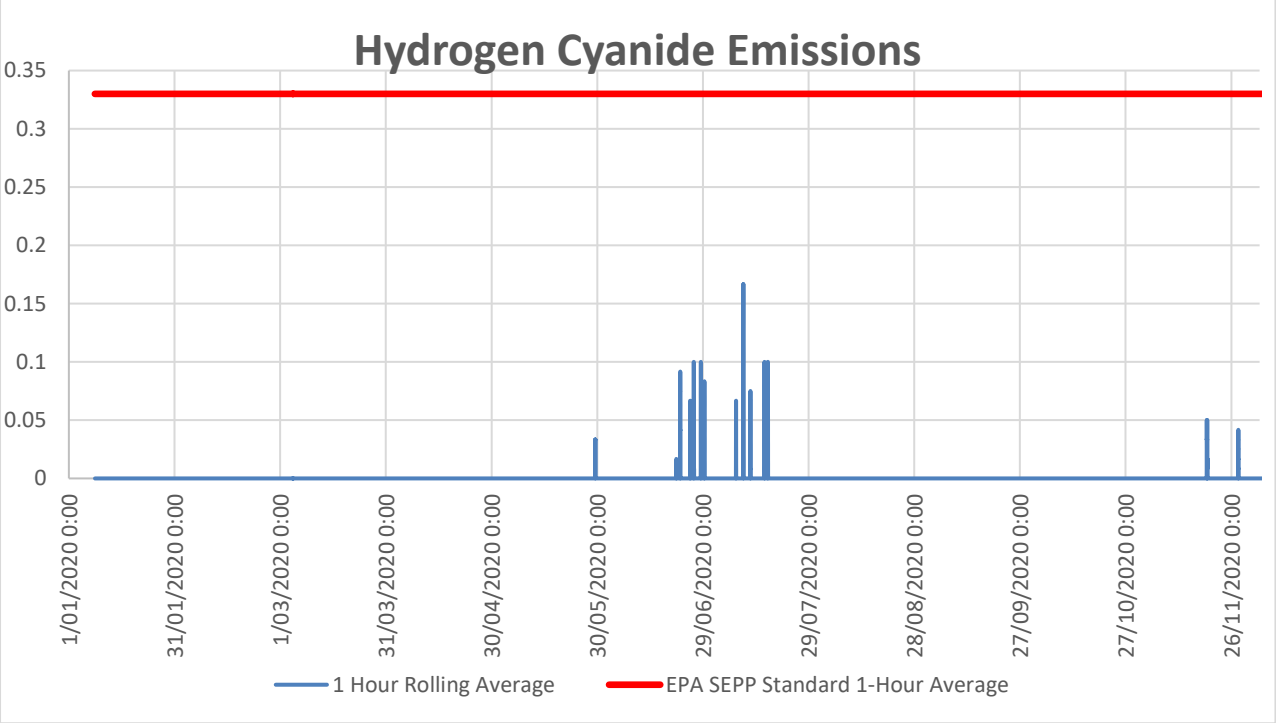

Figure 15 – HCN monitor results for AQ1 TSF2 North onsite for 2020

Figure 16 – HCN monitoring locations

GASEOUS EMISSIONS MONITORING

VENTILATION SHAFT

The William McLaughlin Ventilation Shaft (Vent Shaft No. 4) is a critical part of SGM's underground mine ventilation system. Fresh air enters the mine through the Magdala Portal and inlet shafts, and air is extracted from the underground mine into the atmosphere via Vent Shaft No. 4. Mining activities, such as blasting and the operation of diesel powered plant and equipment generate air emissions, including nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), particulates and odour.

Ventilation shaft monitoring is undertaken at Vent Shaft No. 4 biannually (see **Figure 17**).

The standards adopted for ventilation shaft emission monitoring are sourced from the:

- Protocol for Environmental Management – Mining and Extractive Industries (EPA, 2007).
- State Environment Protection Policy (Air Quality Management) (EPA, 2001).
- State Environment Protection Policy (Ambient Air Quality) (EPA, 1999).

The assessment criteria detailed in these standards specify air quality concentrations at receptor (not at the emission point source). Emissions monitoring results for Vent Shaft No. 4 from the 2020 reporting period are presented in **Table 5Error! Reference source not found.**. The 'less than' (<) results presented are the 'limit of r eporting' for these parameters (i.e., the smallest concentration of analyte that can be reported by the

monitoring equipment/laboratory). Emissions monitoring results from Vent Shaft No. 4 were all below the modelled point source limits for the April and October 2020 monitoring events.

Table 5 – Gaseous emission monitoring result for No 4 ventilation shaft, 2020

Date	Mass Rate (g/min)		
	Carbon Monoxide	Nitrogen Oxide (as NO_2)	Sulphur Dioxide
Point Source Limit	N/A	26	55
April 2020	<20	<20	<50
October 2020	<70	<20	<30

Mill Afterburner

The Mill Afterburner is used by SGM to reactivate carbon utilised in the gold extraction process. Activated carbon is used in the carbon-in-leach process to transfer dissolved gold from cyanide leached slurry to elution where gold is desorbed from the carbon. Prior to reusing the stripped carbon it is necessary to regenerate the carbon by removing the organic and inorganic contaminants absorbed during processing. The carbon regeneration process generates air emissions, including NO_2, SO_2 and CO.

Mill Afterburner monitoring is undertaken at SGM's processing facility biannually (see **Figure 17**).

The standards adopted for the Mill Afterburner monitoring assessment are the same as those applied to the Vent Shaft No.4 monitoring. In September 2016, AECOM undertook emissions modelling for the mill afterburner to determine point source limits for the mill afterburner. These limits are presented in Table 6.

Emissions monitoring results for the Mill Afterburner from the 2020 reporting period are presented in **Table 6**. Gaseous emissions concentrations are all below the modelled point source limits and therefore do not present a risk to nearby receptors.

Table 6 – Gaseous emission monitoring result for the Mill Afterburner, 2020

Date	Mass Rate (g/min)		
	Carbon Monoxide	Nitrogen Oxide (as NO_2)	Sulphur Dioxide
Point Source Limit	75,060	511.2	978
April 2020	5.1	4.5	0.39
October 2020	<0.1	5.4	4.6

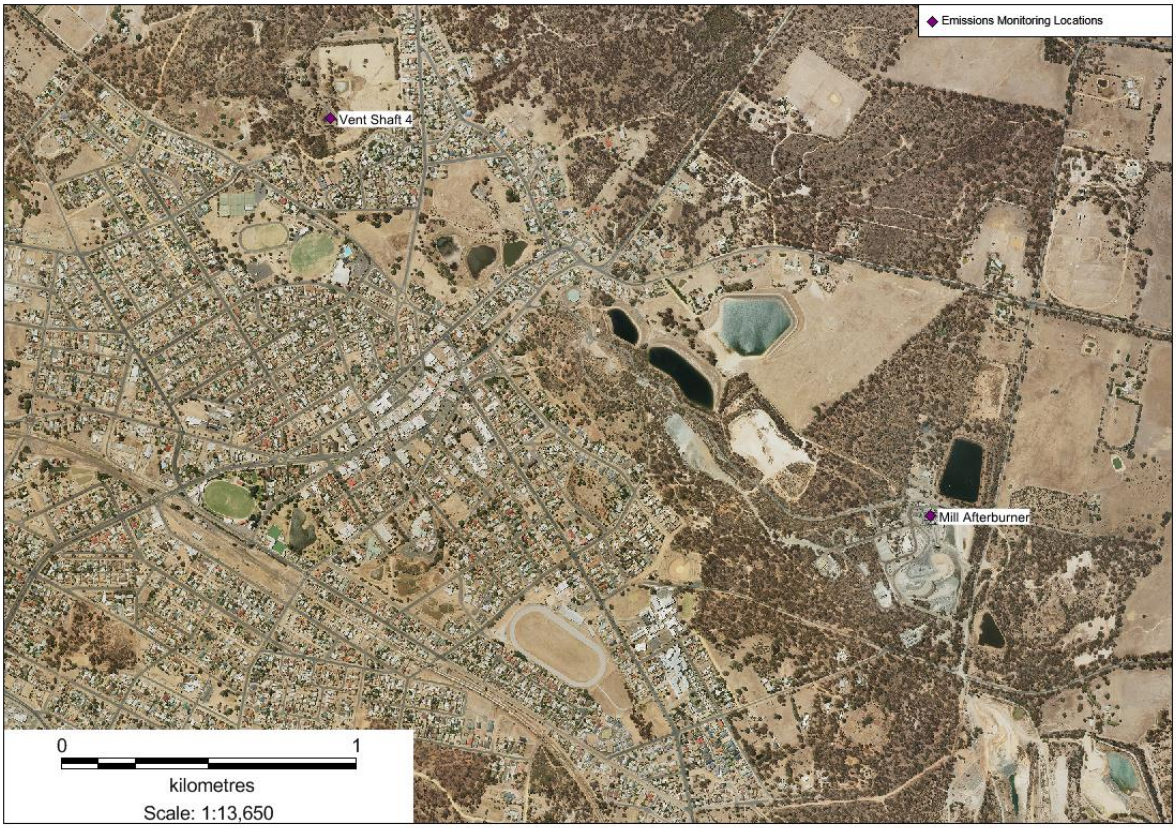

Figure 17 - SGM gaseous emission monitoring locations

4.2.4. NOISE

RISK SOURCES AND POTENTIAL IMPACTS

SGM's operations generate noise from a variety of sources. Operational activities and risk sources that may generate off-site noise disturbance can include:

- Plant and equipment operation;
- Mobile fleet movement;
- Material handling and processing operations;
- Surface and underground blasting; and
- Exploration activities.

Noise levels at sensitive receptors vary depending on the location and elevation of the noise source, intervening topography, climatic conditions, background noise levels and any engineered noise attenuation barriers present.

Potential impacts associated with noise risk sources include:

- Reduced amenity at sensitive receptors (e.g., general nuisance and discomfort);
- Potential health impacts of sensitive receptors (e.g., sleep disturbance); and
- Fauna disturbance.

Control measures are put in place to limit noise impacts. These can include:

- Placement and orientation of infrastructure, plant and equipment away from sensitive receptors and below topographic features to increase noise attenuation;

- Apply noise mitigation technologies (e.g., mufflers, acoustic screens or enclosures) to existing plant, work areas (such as the ROM pad) and equipment;
- Sourcing plant and equipment that meets specific acoustic qualities during the procurement process; and
- Limiting access or equipment use during evening and night periods.

NOISE MONITORING

SGM undertakes attended noise monitoring at four locations/sensitive receptors situated north, south, east and west of the operations area (see **Figure 19**).

Noise monitoring is conducted at each location for a period of 10 minutes or until the noise (LAeq) is characteristic of the site noise. Noise monitoring is conducted at three times: Day (07:00 to 18:00), Evening (18:00 to 22:00) and Night (22:00 to 07:00). A noise monitoring audit is undertaken annually by an acoustic consultant.

The standard adopted for noise monitoring is sourced from the:

- State Environment Protection Policy (Control of Noise from Industry, Commerce and Trade) No. N-1 (EPA, 2001).

Compliance monitoring was undertaken in March, June, September and November 2020, and the results of this monitoring are presented in **Tables 7, 8, 9 and 10**.

The dominant noise sources observed at each monitoring location in Quarter 1 were:

- **North:** SGM site noise audible – processing plant and truck on surface, wind, distant traffic and birds and crickets
- **South:** SGM site noise barely audible – truck on surface, birds, wind and highway traffic, crickets
- **East:** SGM site noise, processing plant and truck on surface, birds, wind, distant traffic, plane overhead
- **West:** SGM site noise barely audible or not audible, wind, birds and distant traffic, dog barking

During the Q1 noise monitoring period it was observed that all locations achieved site noise limits during the day and evening monitoring periods. During the night period, SGM was compliant to the south and west of site; however, exceeds the site noise limit at locations north and east of site. The cause for these elevated noise measurements during the night period was the secondary crusher at the processing plant. It was noted that crickets were audible up to 50dB throughout the night time monitoring period at the east location.

The dominant noise sources observed at each monitoring location in Quarter 2 were:

- **North:** SGM site noise audible – processing plant and truck on surface, distant traffic, crickets and dogs barking
- **South:** SGM site noise audible – processing plant, and air compressor, crickets, birds and distant traffic
- **East:** SGM site noise audible – processing plant and truck on surface, birds, crickets, distant traffic, household noise
- **West:** SGM site noise audible – truck on surface, processing plant hum, distant traffic, birds, frogs and wind

During the Q2 noise monitoring period it was observed that all locations achieved site noise limits during the evening period. During the day period SGM is compliant north, east and west of site; however, exceeds the site noise limit at the location south of site. The most likely cause for the elevated noise during the day period was birds chirping up to 72dB however the site batch plant was audible throughout the monitoring period. During the night period, a 1dB exceedance was recorded at the east location due to noise coming from the

processing plant.

The dominant noise sources observed at each monitoring location in Quarter 3 were:

- **North:** SGM site noise barely audible – truck on surface, distant traffic, crickets, wildlife noise, plane and birds
- **South:** SGM site noise audible – processing plant, batch plant, crickets, wind, household noises and distant traffic
- **East:** SGM site noise audible – processing plant and truck on surface, alarms, wind and distant traffic, dogs barking, church bells
- **West:** SGM site noise barely or not audible – truck on surface, distant traffic, dogs barking, birds, trees rustling, frogs and wind

During the Q3 noise monitoring period it was observed that all locations achieved site noise limits during day, and evening and night periods.

The dominant noise sources observed at each monitoring location in Quarter 4 were:

- **North:** SGM site noise barely audible – processing plant, distant traffic, crickets and other wildlife noise
- **South:** SGM site noise barely audible – processing plant and truck on surface, crickets, birds, and distant traffic
- **East:** SGM site noise audible – processing plant and truck on surface, crickets, dog barking, wind rustling trees and distant traffic
- **West:** SGM site noise barely audible, processing plant, truck on surface, distant traffic, dogs barking, school noise and wind

During the Q4 noise monitoring period it was observed that all locations achieved site noise limits during day, and evening and night periods.

Table 7 – Noise monitoring results from location North during 2020

Period (North)	*Limit (dB)*	(dB)			
		Q1	Q2	Q3	Q4
Day (07:00 to 18:00)	*50*	42	43	36	39
Evening (18:00 to 22:00)	*44*	40	40	39	47
Night (22:00 to 07:00)	*39*	42	36	39	39

Table 8 – Noise monitoring results from location South during 2020

Period (South)	*Limit (dB)*	(dB)			
		Q1	Q2	Q3	Q4
Day (07:00 to 18:00)	*50*	41	55	41	47
Evening (18:00 to 22:00)	*44*	37	39	43	52
Night (22:00 to 07:00)	*39*	27	35	41	50

Table 9 – Noise monitoring results from location East during 2020

Period (East)	*Limit (dB)*	(dB)			
		Q1	Q2	Q3	Q4
Day (07:00 to 18:00)	*50*	41	39	45	40
Evening (18:00 to 22:00)	*44*	42	40	37	44
Night (22:00 to 07:00)	*39*	42	40	36	35

Table 10 – Noise monitoring results from location West during 2020

Period (West)	*Limit (dB)*	(dB)			
		Q1	Q2	Q3	Q4
Day (07:00 to 18:00)	*50*	21	38	41	34
Evening (18:00 to 22:00)	*44*	24	40	41	22
Night (22:00 to 07:00)	*39*	28	39	33	42

Figure 18 - Noise monitoring at SGM

Figure 19 - SGM noise monitoring locations

4.2.5. SURFACE VIBRATION

RISK SOURCES AND POTENTIAL IMPACTS

Operational activities that present a risk relating to surface vibration include:

- Surface and underground blasting;
- Seismic (exploration) activities; and
- Ground failure.

Potential impacts associated with surface vibration include:

- Damage to private/public property and infrastructure;
- Damage to heritage sites;
- Reduced amenity at sensitive receptors (e.g., general nuisance and discomfort); and
- Potential health impacts of sensitive receptors (e.g., anxiety and stress).

Control measures are undertaken to ensure any potential impacts are reduced and within specified licence conditions. These include:

- Engineered designs including pre-calculations of predicted surface vibration for production firings;
- Use of low impact explosives in sensitive areas; and
- Community engagement, information to public and notification system.

SURFACE VIBRATION MONITORING

Vibration from SGM's blasting is caused by the release of energy from the explosives as they are set off to fracture rock for mining purposes. SGM undertakes surface vibration monitoring at six locations within the Stawell Township (see **Figure 20**). The monitors measure peak particle velocity (PPV) in mm/s.

The standard adopted for vibration monitoring is sourced from SGM's Mining Licence MIN5260. The Mining Licence states that firings must comply with the legislative limits for surface vibration, which are:

- No firings or ground vibration to exceed 10 mm/s at any time; and
- 95% of firings must be less than 5 mm/s within a 12-month period;

These blasting limits are consistent with the criteria defined in Australian Standard Explosives – Storage and Use – Use of Explosives (AS 2187.2-2006). This standard prescribes vibration levels to ensure there is no potential for any structural damage and for the management of amenity impacts from blasting.

During the 2020 reporting period, SGM undertook a total of 1849 firings – 169 production firings and 1680 development firings. All firings were compliant with the blasting limits for surface vibration (see **Table 11**)

Table 11 – SGM Surface vibration results, 2020

PPV	Number of Firings
>10 mm/sec	0
>5 mm/sec	5
<5 mm/sec	513
<0.5 mm/sec	1331
Total firings for the period	**1849**

Figure 20 - SGM vibration monitoring locations

4.2.6. HAZARDOUS MATERIAL AND WASTE

RISK SOURCES AND POTENTIAL IMPACTS

Operational activities that present a risk relating to hazardous materials and waste management include:

- Storage and use of hazardous materials (e.g., chemicals and hydrocarbons);
- Storage and transfer of mine tailings and process water;
- Stockpiling of mineral waste overburden and associated runoff (AMD); and
- General/domestic waste management, including recycling.

Potential impacts associated with hazardous materials and waste risk sources can include:

- Contamination/pollution of land, air, surface water and groundwater systems;
- Reduced amenity at sensitive receptors (e.g., nuisance odours and/or discomfort);
- Potential health impacts of sensitive receptors;
- Loss of biodiversity and ecosystem degradation;
- Reduced productivity of surrounding lands (i.e., agricultural land); and
- Potential fire risk.

Control measures are included in the operational management of hazardous materials and waste and include actions such as:

- All hazardous materials stored onsite will be contained in bunded areas and meet Australian Standard transport and storage requirements;
- Use of EPA licenced contractors to transport, recycle and dispose of regulated wastes; and
- Having a process to access new chemical use on site and investigate if alternative chemicals which may be less hazardous will be used where appropriate.

HAZARDOUS MATERIALS AND WASTE MONITORING

Stawell Gold Mines had no reportable incidents to ERRV regarding hazardous material spills and/or waste management during the 2020 reporting period.

4.2.7. LAND

RISK SOURCES AND POTENTIAL IMPACTS

Operational activities that present a risk to land can include:

- Vegetation clearance and surface disturbance;
- Stockpiling of mineral waste overburden and associated runoff (AMD);
- Landform construction and earthworks;
- Operating water storage dams associated with the site water management system; and
- Works involving ignition sources.

Potential impacts associated with land risk sources could include:

- Loss of biodiversity and ecosystem degradation, through direct flora/fauna disturbance and habitat destruction;
- Increased pest activity from artificial habitat and food sources;
- Increased invasive weed species spread by soil movement, surface water runoff or vehicle access;
- Oxidisation of exposed rock generating acid runoff;

- Sedimentation of surface water systems from exposed areas and stockpiles;
- Increased erosion;
- Reduced productivity of surrounding lands (i.e., agricultural land);
- Damage to heritage sites; and
- Potential fire risk.

Mitigation measures are installed to ensure any potential risks are mitigated or reduced. For Land risks these can include:

- Stockpiles will be profiled and battered to minimise the potential for erosion;
- All removal of vegetation is approved and offset where required;
- Undertaking progressive rehabilitation; and
- Fencing of areas to limit access to sites with ecological or heritage value.

VEGETATION MONITORING

Stawell Gold Mines undertakes vegetation monitoring annually, during Spring. In September 2020, SGM engaged an independent ecologist to assess the condition of the vegetation around TSF2. The vegetation survey was undertaken in accordance with the vegetation management strategy presented in SGM's TSF2 Groundwater Management Plan and the EPA approved TSF2 Clean Up Plan. Due to COVID-19 restrictions, the 2020 survey was completed by SGM staff photographing and filming all locations for the independent ecologist to examine and comment on remotely. Restrictions allowing, SGM's intention is to revert back to engaging the ecologist on site for the 2021 reporting period.

The aim of vegetation monitoring is to determine whether any impact(s) (i.e., stressed vegetation) is observed, where it is observed and whether the extent of any impact is increasing or decreasing.

Monitoring was undertaken at nominated locations, including a quadrant within the area of known vegetation stress immediately north of TSF2. Twelve nominated locations were described to represent the whole spectrum of vegetation growing on the perimeter of the dam and on the dam wall. Two belt transects were also positioned in order to systematically monitor the condition of trees and perennial shrubs at the toe of TSF2.

In September 2020 all the monitoring sites as well as the general reconnaissance of the TSF2 area did not show vegetation decline or degradation, therefore the current management procedures indicate that the health of the plant cover is satisfactory to maintain an adequate vegetation community which is necessary to maintain surface stability and control of erosion.

4.2.8. Visual Amenity / Aesthetics

Risk Sources and Potential Impacts

SGM's operations have resulted in changes to the landscape and visual amenity/aesthetics. Aspects of the operation and risk sources that may affect visual amenity/aesthetics include but are not limited to:

- Storage and transfer of mine tailings and process water (e.g., TSF's);
- Siting of overburden dumps and stockpiles;
- Landform construction and earthworks;
- Siting of surface infrastructure;
- Vegetation clearance and surface disturbance;
- Emissions from underground mine ventilation;
- Light from surface plant and equipment during night operations; and
- Exploration activities.

Visual amenity/aesthetic impacts at sensitive receptors vary depending in the location and the nature of the activity/risk source and the sensitivity of the receptor.

Potential impacts associated with visual amenity/aesthetics risk sources include:

- Reduced amenity at sensitive receptors;
- Potential health impacts of sensitive receptors (e.g., sleep disturbance from lights at night);
- Reduced value of private/public property and infrastructure; and
- Fauna disturbance.

Control measures included in site works to reduce amenity impacts include actions such as:

- Pre-planning assessments of amenity impacts;
- Vegetation screens maintained around worksites;
- Use of natural colours on building; and
- Ensuring light spill from site is limited.

Visual Amenity/Aesthetics Monitoring

Stawell Gold Mines received no complaints or enquiries regarding visual amenity/aesthetics during the 2020 reporting period.

4.2.9. Heritage

Risk Sources and Potential Impacts

Operational activities that present a risk to historical and cultural heritage include:

- Vegetation clearance and surface disturbance;
- Landform construction and earthworks;
- Storage and transfer of mine tailings and process water;
- Drilling and blasting; and
- Exploration activities.

Potential impacts associated with heritage risk sources include:

- Damage or destruction of a historical or cultural heritage feature.

Control measures implemented to reduce heritage impacts include actions such as:

- Pre-works surveys of the land.
- Development of Cultural Heritage Management Plans when appropriate.

HERITAGE MONITORING

Stawell Gold Mines did not identify or disturb any features of historical or cultural heritage during the 2020 reporting period.

5. COMPLIANCE RECORD

5.1. Regulatory Notices

SGM acted upon two compliance notices from EPA Victoria during 2020. Both these notices were in relation to the operation of the TSF2 Groundwater Clean Up Plan.

PAN90010497 - Continue Implementation of TSF2 Groundwater Clean Up Plan

On 25 October 2020, EPA issued SGM with Pollution Abatement Notice (PAN) 90010497 continue on-going management and clean-up of contamination on and from the premises in accordance with EPA approved 'Clean Up Plan (CUP) Tailings Storage Facility No.2', 'TSF2 Groundwater Management Plan Revision 7', and 'TSF2 HCS Operation and Maintenance Plan Revision 3'.

On 16 September 2020, EPA acknowledged SGM's compliance with the notice requirements and revoked PAN90010497.

PAN 90011650 - Continue Implementation of TSF2 Groundwater Clean Up Plan

SGM is currently progressing though the requirements of this notice and actions. SGM reports against the requirements of this notice at each quarterly Environmental Review Committee meeting.

5.2. Reportable Events

Reportable events under Section 41AC of the Mineral Resources (Sustainable Development) Act 1990 are incidents arising out of mining, quarrying or exploration activities that are any of the following:

- Abnormal to what is expected;
- What is expected but *has* resulted in significant impacts to infrastructure, the environment or public safety; and
- What is expected but *may* result in significant impacts to infrastructure, the environment or public safety.

Stawell Gold Mines had no reportable events during the 2020 reporting period.

5.3. Enquires and Complaints

Stawell Gold Mines received 1 enquiry and 46 complaints during the 2020 reporting period. All complaints received are responded to in line with the site Community Engagement Plan. A summary of SGM's community complaints and enquiries received for 2020 by issue is provided in **Table 12**.

Table 12 - SGM complaints for 2020

Source/Aspect	Number of Enquiries	Number of Complaints
Vibration / Blasting	1	29
Dust	0	3
Odour	0	5
Noise	0	7
Miscellaneous	0	2
Total	**1**	**46**

6. REHABILITATION

SGM undertakes progressive rehabilitation in accordance with MIN5260 mining licence conditions and its approved work plan. Current mine closure concepts and rehabilitation outcomes are detailed within SGM's Conceptual Mine Closure Plan[2]. Progressive rehabilitation activities undertaken during operations are aligned with the overarching site closure strategy and conceptual end-land uses.

6.1. Rehabilitation Objectives

The objectives of SGM's rehabilitation activities are to:

- Ensure that appropriate and sustainable beneficial end land use(s) for disturbed land are identified during the operations planning phase and are established post-closure.
- Ensure that progressive rehabilitation is undertaken to minimise the area of disturbed land and manage potential environmental and social risks during operations and closure;
- Achieve compliance with all regulatory requirements; and
- Satisfy stakeholder expectations with respect to rehabilitation.

6.2. Conceptual Final Landforms

Conceptual post-closure landforms and end-land use outcomes for the entire site are detailed within SGM's Conceptual Mine Closure Plan. The plan was prepared to provide a conceptual model for mine closure and to guide the execution of closure and rehabilitation activities at SGM's site.

Specifically, the Conceptual Mine Closure Plan aims to:

- Define closure objectives and commitments, and provide a clear outline of how these will be achieved;
- Identify, eliminate and/or mitigate key environmental, social and geotechnical risks associated with closure;
- Outline stakeholder engagement activities relating to mine closure;
- Guide closure activities to achieve long term physical, chemical and biological stability; and protect public health and safety;
- Provide a framework for ongoing review of closure concepts and cost provisions;
- Achieve compliance with all legislative requirements, licence conditions and commitments;

[2] Last updated October 2016.

- Establish clear, measurable closure criteria that must be achieved in order to facilitate tenement relinquishment and rehabilitation bond return; and
- Satisfy regulatory and stakeholder expectations with respect to mine closure.

Prior to mine closure, or the closure of particular zones identified in the Conceptual Mine Closure Plan, detailed design plans must be prepared for key closure aspects, including landform design and drainage. Landforms will be designed and constructed to form safe and self-sustaining stable landforms. Plans will detail proposed earthworks and final landform design considerations, such as:

- Materials balance for all material types, including topsoil and spoil;
- Slope angle and length;
- Surface drainage, including the installation of berms, embankments and culverts;
- Erosion and sediment controls; and
- Geotechnical stability requirements.

Final landform designs must also consider how the above features are influenced by the progressive revegetation of the site.

Several post-closure concepts and end-land uses have already been identified and realised at SGM's site. These include:

- The Stawell Clay Target Complex (SCTC), located on SGM's rehabilitated Reserve Tailings Dam and TSF1; and
- Land used to accommodate the Stawell Pony Club and Riding for the Disabled.

The objectives and land use requirements of these sites will be considered in the planning of further closure strategies to ensure compatibility with existing land uses. This is particularly relevant to land access and vegetation establishment within and surrounding the SCTC.

Other than the post-closure land uses detailed above, SGM's existing approved conceptual closure strategy for the site is to rehabilitate the land to its pre-existing land use, which includes a mixture of productive agricultural land and community space comprising both native bushland and landscaped landforms.

6.3. Progressive Rehabilitation

SGM undertakes progressive rehabilitation of disturbed areas to stabilise and enhance end-land use outcomes for the site. Progressive rehabilitation also assists with ongoing site management and the realisation of closure concepts by stabilising landforms, establishing vegetation, minimising erosion, and preventing sedimentation of surface water features.

4.1.1 Davis Pit

SGM begun progressive rehabilitation activities for backfilling the unused Davis Pit during 2018 and continued to backfill throughout 2020 using the waste rock from underground. During 2020 this site completed waste rock back fill and has been landscaped to final design. The next step will be to provide capping materials (clay and soil) to prepare for revegetation. This will eventually see the site returned to a landscape similar to pre-mining.

4.1.2 Bioremediation Project

The bioremediation project was initiated in 2015 in partnership with The University of Melbourne, where the overarching aim of the project was to develop a bioremediation system for the treatment of thiocyanate (SCN) in groundwater at SGM. The process requires the addition of the limiting factor – phosphorous – into the system to activate the degradation process from naturally occurring SCN consuming bacteria, with the addition of aeration to assist in the process.

SGM's Pilot scale bioreactor has been fully functional since December 2017. In July 2019, SGM took over the operation of the facility after a hand over from the University of Melbourne, with ongoing assistance being provided. Design and options studies were progressed and a modified pilot plant is being constructed that will incorporate mechanical agitators (as opposed to compressed air currently used) to promote greater movement of the bacteria and a more efficient process. Plans are to upscale the pilot plant for post closure, where the purpose of the bioreactor will be to treat tailings storage facility water and groundwater immediate to the facility until desaturation has occurred. The reactor is currently treating captured seepage from the TSF2 hydraulic containment system and is able to achieve full destruction of SCN at a rate of ~1,850L/day.

Figure 21 – Sample preparation at the bioreactor plant