

Part B – Environmental Management Programme Report

22 Purpose of the EMPr

Part B of this report, presents the Environmental Management Programme (EMPr) of the Der Brochen Amendment Project which has been compiled in accordance with Appendix 4 of the NEMA 2014 EIA Regulations, as amended (GNR 982) as well as the requirements of an EMPr report template issued by the DMR for listed activities associated with mining right and/or bulk sampling activities. A summary of the requirements of an EMPr report is provided in Table 22-1, including cross-references to sections in this report where the legislated requirements have been addressed.

Table 22-1: Regulatory requirements of an EMPr Report as stipulated in Appendix 4 of the NEMA 2014 EIA Regulations and cross-references

Appendix 4	Legislated requirements	Section Reference
	An EMPr Report must include:	
	details of-	Sections 2.2 (Part A) & 23 and Appendix B
(a)	(i) the EAP who prepared the EMPr;	
	(ii) the expertise of the EAP, including a curriculum vitae;	
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 24
(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 25
	a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Sections 10 (Part A), 29 and 30
(d)	(i) planning and design;	
	(ii) pre-construction activities;	
	(iii) construction activities;	
	(iv) rehabilitation of the environment after construction and where applicable post closure; and	
	(v) where relevant, operation activities;	
	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to -	Sections 10 (Part A), 29, 30 and 31
(e)	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
	(ii) comply with any prescribed environmental management standards or practices;	
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
	(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable	
(f)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (e);	Section 32
(g)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (e);	Section 32
(h)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 32
(i)	the time periods within which the impact management actions contemplated in paragraph (e) must be implemented;	Section 32
(j)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (e);	Section 32
(k)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 32
	an environmental awareness plan describing the manner in which-	Section 33
(l)	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(m)	any specific information that may be required by the competent authority	Section 34

(2)	Where a government notice gazette by the minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Noted
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23 Details of EAP

Refer to Section 2.1 (under Part A of this report) for the details of the EAP.

24 Description of the aspects of the activity

Refer to Section 4.1, under Part A of this report, that detailed the aspects related to this activity.

25 Composite map highlighting sensitive areas

The broad placement of the surface infrastructure required for the Der Brochen Amendment Project was informed by mapping the environmental sensitivities as identified by the specialists (i.e. sensitive physical, social and environmental features) within the project related area. The environmental sensitivities identified within the project area are summarised in Table 25-1.

Table 25-1: Environmental sensitivities associated with the Der Brochen Amendment Project

Sensitive feature	Description
Cultural heritage sites	Numerous cultural heritage sites have been found located within the proposed project area. These include archaeological and heritage sites. It is important to note that some of the identified cultural heritage sites will be required to be relocated, after the necessary permits have been applied for and obtained from the relevant authorities.
Flora species of conservation concern	Various flora species of conservation concern (refer to Section 9.7.1) have been identified within and around the proposed project area, some of which will need to be removed to accommodate the development of the project related infrastructure after the necessary permits have been obtained from the relevant authorities.
Groot Dwars River and Mareesburg Stream (including associated tributaries)	The two main rivers traversing the project area are the Groot Dwars River and Mareesburg Stream, along with the various unnamed tributaries associated with these rivers. Although large sections of the main rivers located within the proposed project area will not be affected by the location of the project infrastructure, some minor sections of the river habitats may be affected. Various unnamed tributaries to the main rivers will need to be diverted around the proposed project related infrastructure, e.g. the DMS stockpile. For the purpose of determining sensitive areas, a 100 m buffer was included for all watercourses.

Following the completion of the scoping phase, input from I&APs and the findings of the specialist studies were used to refine the preferred development footprint. The specialist studies did not identify any fatal flaws associated with any of the infrastructure site layout options. Refer to Figure 25-1 for the Der Brochen Amendment Project's environmental sensitivity map.

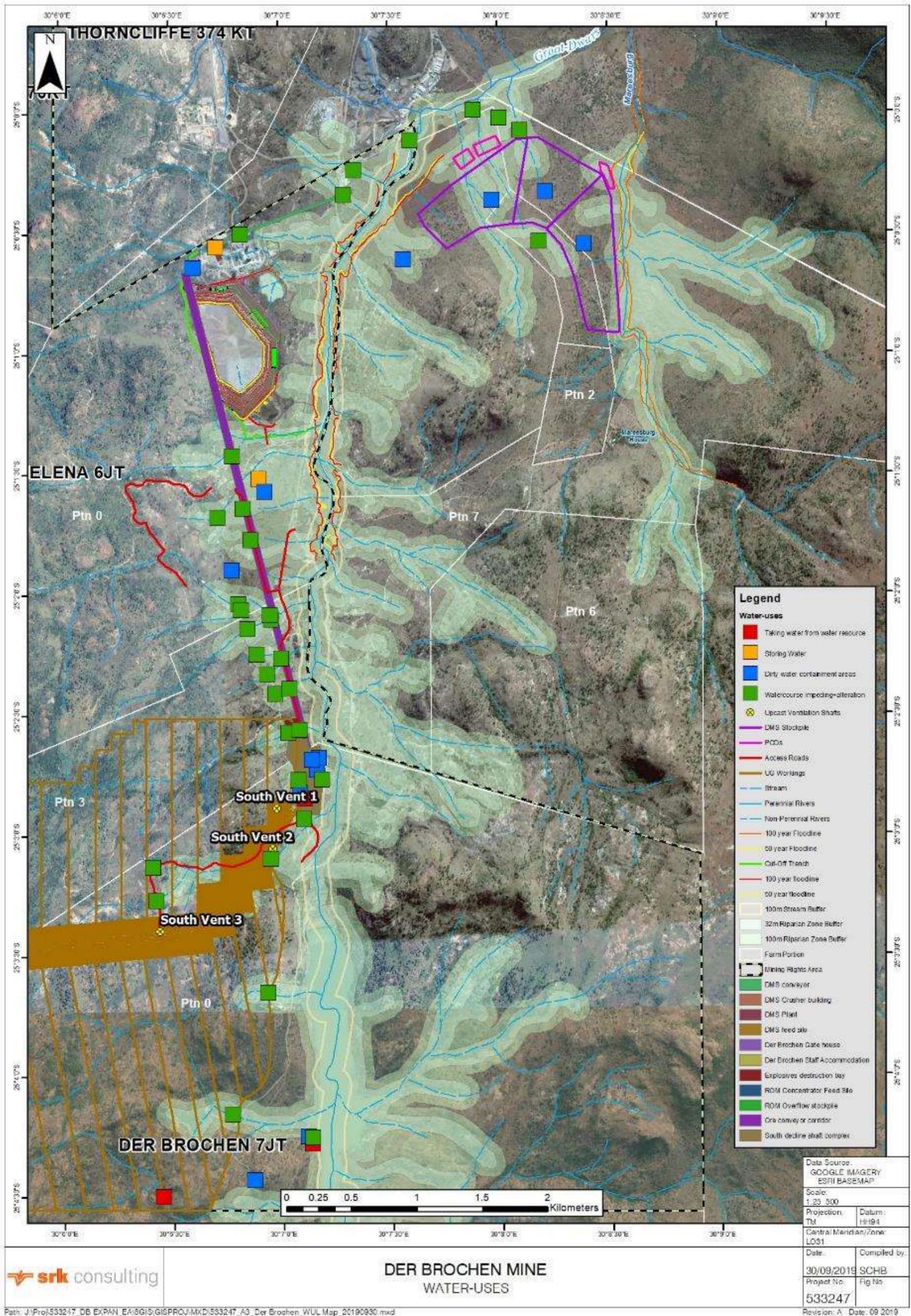


Figure 25-1: Der Brochen Amendment Project' sensitivity map

26 Description of management objectives including management statements

26.1 Determination of closure objectives

The closure objectives detailed in Section 31.1 are based on an extensive environmental database and baseline information gathered during the LoM so far, as well as the baseline studies undertaken as part of the specialist investigations, as detailed in Section 9.

The closure vision for Der Brochen is intended to inform the closure objectives. The vision for the mine is to progressively re-instate an area that is safe, stable and non-polluting with the final landform not adversely affecting water resources.

26.2 Process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

Through the implementation of the management measures by the relevant responsible persons any potential environmental impact associated with undertaking the listed activities associated with the proposed project will be managed accordingly.

27 Potential risk of acid mine drainage

27.1 Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

As part of the Der Brochen Amendment Project, geochemical characterisation including the evaluation of potential Acid Rock Drainage (ARD) and Metal Leaching (ML) of all formations foreseen to be disturbed or otherwise exposed by the mining related project was undertaken. Refer to Appendix D1 for the full geochemical assessment report appended to the hydrogeological assessment study.

The geochemical assessment focused on assessing the geochemical characteristics of the expected reef, floor and roof rocks in addition to the anticipated DMS material as part of the Der Brochen Amendment Project.

The geochemical test work was carried out by a SANAS (South African National Accreditation System) accredited laboratory and included the following:

- Acid-Base Accounting (ABA), Net Acid Generation (NAG), Sulphur (S)-speciation and Paste pH;
- Determination of total concentrations on solids;
- Determination of leachable concentrations;
- XRD mineralogy.

27.1.1 DMS material

Based on the laboratory tests results, all tested tailings and DMS material sampled were found to be non-acid generating (NAG) and actually provide acid buffer capacity, with the net neutralising (or buffer) potentials of the tested samples ranging from 4.4 to 21.4 kg/t. All roof and floor material sampled were also classified as non-acid generating based on their absent or limited sulphide sulphur content and subsequently calculated sulphide acid potential.

The reef sample is formally classified as non-acid generating based on its limited sulphide sulphur content and subsequently calculated sulphide acid potential. The ARD assessment shows limited or no potential of the tested DMS stockpile and roof and floor material samples for acid generation and a neutral to alkaline leachate quality is therefore expected.

The results of the geochemical test work was used to classify the waste in accordance to the NEM:WA's Norms and Standards as specified in the Government Notices R. 634, 635 and 636 pertaining to the Waste Classification and Management Regulations. Recent amendment to the regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits (Government Gazette No. 41920, 21/09/2018), 'allow for the pollution control measure, to be determined on a case by case basis, based on a risk analysis conducted by a competent person'.

The exceedances of total concentration thresholds (TCT0) for nickel, copper and fluoride, but not the TCT 1 thresholds alone classify (according to NEM:WA 2013) the DMS Plant samples as Type 3 Waste, regardless of their leachable concentrations being below the LCT0 threshold. The minimal exceedances of the TCT0 thresholds for total concentrations of copper, nickel, manganese and fluoride don't necessarily suggest a potential impact on the receiving environment, as they are mostly non-leachable. The concentrations of these elements in the leach test results are less than 0.1 percent of the total concentration. This indicates that these elements represent a low environmental risk.

The abundance of metal in the materials is furthermore highly variable and dependent on the geology of the processed material. Kinetic leach tests of the sampled DMS material showed a constant neutral pH during the 20-week leach period with a lower sulphate production rate compared to neutralisation potential consumption. If this relationship is maintained over the long term, the DMS stockpiled material are unlikely to become acidic. In addition, the salt load potential released from weathering of the material remained low during kinetic leaching from the DMS stockpile.

27.1.2 Underground workings

The current assessments classify the majority of waste rock and ore/reef samples as non-acid generating. All leach test assessments indicate limited leachability of elements from the waste rock (floor and roof material) and the ore/reef, suggesting a limited impact of seepage from waste rock dumps and ore stockpiles on the ambient groundwater quality.

27.2 Measures to be implemented based on geochemical and groundwater assessments

Although the geochemical assessment indicates that all materials tested (i.e. expected DMS material and reef, floor and roof rocks to be associated with the underground mining operation) are non-acid generating, the following specific management measures are recommended to be implemented:

- From a water loss point of view, it is recommended that means of containing the seepage from below the DMS be investigated during the feasibility stage. These should entail a simplified (in comparison to a class C liner) liner system, interception trenches and/or scavenger boreholes.
- Monitoring of mine effluent and seepage should be performed to assure protection of the environment. Monitoring and field testing provide early detection of potential

environmental issues, allowing evaluation and, if necessary, adaptive management interventions.

28 Water use licence requirements

The mine operates under three approved WULs issued by DWS in 2011 (WUL No. 24072959), 2016 (WUL No. 04/B41G/CI/4141) and 2017 (WUL Ref. No. 06/B41G/ABCFGIJ/5329), respectively. A WUL is being applied for as part of the integrated environmental authorisation process for the Der Brochen Amendment Project. Table 28-1 provides a breakdown of the water uses that will be triggered by the Der Brochen Amendment Project including the volumes where applicable.

Table 28-1: Der Brochen Amendment Project's associated water uses and volumes

Water Use	Description of project related water use	Volumes (m ³) / Rate of water use (per annum)
21(a)	Collecting of fissure water (groundwater seepage) from the underground workings at the South decline shaft	328 500
	Taking water from a stream to supply the existing Top House structure	1 560
	Abstracting water from a borehole to supply the proposed staff accommodation camp	1 150
21(b)	Storing of water in tank at South decline shaft for raw water supply and fire water supply	120 929
	Storage of raw water in steel panel tank at the existing Mototolo Concentrator Plant	120 929
	Storage of raw water in lined containment facility near the North open-pit area	2 776 040
21(c) & (i)	Diversion of a watercourse at the South decline shaft complex	Not applicable
	Diversion of watercourses around the proposed DMS stockpile	Not applicable
	Construction of the terrace at the South decline shaft within 100m of the Groot Dwars River	Not applicable
	Development of the staff accommodation camp and conservancy tank within 100m of existing Der Brochen Dam	Not applicable
	Underground mining within 100m vertical depth of a watercourse at the South decline shaft area	Not applicable
	Various bridge crossings over a watercourse for ore conveyor, access and maintenance roads, pipelines and powerlines	Not applicable
21(g)	Disposal of dirty water contained in the North open-pit to the proposed dirty water dam	159 493
	Disposal of excess dirty water from the North open-pit to the proposed pollution control dam located near the pit area	98 075
	Disposal of dirty water in the proposed settling pond at the South decline shaft complex	2 629 015
	Disposal of dirty water in the proposed mine service water dam at the South decline shaft complex	2 620 335
	Disposal of dirty water in the proposed pollution control dam at the South decline shaft complex	182 856
	Disposal of dirty water in a proposed tank at the South decline shaft complex to be used as service water	2 413 076
	The utilisation of the conservancy tank for storage of sewage effluent at the staff accommodation camp	920
	The utilisation of the conservancy tank for storage of sewage effluent at the existing Top House structure	1 248
	Utilisation of dirty water for dust suppression along service corridors	21 900
	The construction and utilisation of the PCDs associated with the proposed DMS Stockpile	Dam 1: 550 617 Dam 2: 189 831 Dam 3: 166 747
	Construction and utilisation of the waste rock dump area associated with the proposed waste rock embankment facility to be located adjacent to the North open-pit	Not applicable
	Utilisation of the proposed ore stockpile at DMS Plant	Not applicable

Water Use	Description of project related water use	Volumes (m ³) / Rate of water use (per annum)
21(j)	Removal of fissure water from the underground workings at the South decline shaft	328 500

29 Impacts to be mitigated in their respective phases

The impact assessment in Section 0 details the potential impacts associated with the proposed Expansion Project during the pre-construction, construction, operational, closure and rehabilitation and post closure phases.

30 Impact management outcomes

The main outcomes of the implementation of the management measures, detailed in Sections 0 in this report, are to avoid and minimise the impacts that may be associated with the Der Brochen Amendment Project as well as achieve compliance with certain applicable standards as summarised in Table 30-1.

Table 30-1: Compliance Standards to be achieved with regards to environmental aspects

Environmental aspect	Phase/Time period	Standard to be achieved	Compliance with standards
Soils, Land Use and Land Capability	Continuous during construction, operations and closure	To prevent soil contamination by implementation of: <ul style="list-style-type: none"> • Inspection and maintenance Plan; • Leak/Spill Procedure' • Emergency Preparedness Plan; • Waste Management. 	Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 37603 No 331). Anglo American Policies and Guidelines to manage and remediate spills.
	Continuous during construction, operations and closure	To demonstrate active stewardship of land and biodiversity by: <ul style="list-style-type: none"> • Identifying and removing relevant species if necessary; and • Implementing the Biodiversity Action Plan. 	Anglo American Biodiversity Performance Standards Manage soils in line with the requirements of the National Norms and Standards for the Remediation of Contaminated Land and Soil Quality (GN 37603 No 331). Anglo American Policies and Guidelines to manage and remediate spills.
Surface water	Continuous during construction, operations and closure	To avoid or where not possible, minimise and remedy pollution of water through: <ul style="list-style-type: none"> • Implementing a Leak/Spill Procedure; • Continuously implementing the surface water monitoring programme; • Compiling monitoring report; • Implementing the Stormwater Management Plan; • Responding to complaints and implementing a grievance mechanism; and • Compliance with WUL. 	Water Quality Objectives as specified in the Water Use License issued by DWS Anglo American Policies and Guidelines to manage and remediate spills.

Environmental aspect	Phase/Time period	Standard to be achieved	Compliance with standards
Groundwater	Continuous during construction, operations and closure	<p>No dirty water spillage to the catchment thereby preventing contamination of waterbodies downstream by:</p> <ul style="list-style-type: none"> Continuously implementing the groundwater monitoring programme and model; Responding to complaints and implementing a grievance mechanism with regards to groundwater; and Compliance with WUL. 	<p>Anglo American Policies and Guidelines to manage and remediate spills.</p> <p>Water Quality Objectives as specified in the Water Use License issued by DWS</p>
Air Quality	Continuous during construction, operations and closure	<p>To minimise the entrapment potential of dust.</p> <ul style="list-style-type: none"> To keep PM10 (and in the future, PM2.5) and dust fallout levels at key receptor sites around the project area within guideline levels. As the guidelines vary depending on the priority area and year, the South African Air Quality Information System (http://www.saaqis.org.za/) will be consulted for the most recent guidelines. <p>These aforementioned standards will be achieved by:</p> <ul style="list-style-type: none"> Continuously implementing the dust monitoring programme; and Appropriate dust suppression techniques. 	<p>GNR 893 Minimum Emission Standards.</p> <p>Anglo Air Quality Performance Standards.</p>
Noise	Continuous during construction, operations and closure	<p>To minimise noise impacts on sensitive receptors by:</p> <ul style="list-style-type: none"> Developing a complaints register to record complaints regarding noise. To maintain noise levels at the standards for suburban areas (SANS 10103) as far as practicable. 	<p>Compliance with SANS 10103 Acceptable Ambient Levels and SANS 10210 of 2004, the national standard for the calculating and predicting of road traffic noise</p> <p>SANS 10328 of 2008 Noise Control Regulations – General Notice R154 of 10 January 1992</p>
Heritage	Continuous during construction, operations and closure.	<p>To ensure heritage resources are not damaged during the mining process</p>	<p>Ordinance on Excavations (Ordinance no. 12 of 1980) (replacing the old Transvaal Ordinance no. 7 of 1925).</p>
Social	Continuous during construction, operations and closure	<ul style="list-style-type: none"> To enhance benefits from the development of the Project; To maximize opportunities for local residents; To facilitate employment of local labour on the Mine; and To avoid creating unrealistic expectations. <p>These standards will be achieved by the implementation of the SLP.</p>	<p>Anglo American Closure Toolbox.</p> <p>Anglo American Social Way</p> <p>Anglo American Environmental Way</p>

31 Financial Provision

The information provided in this section is sourced from the closure plan developed for the proposed Der Brochen Amendment Project (refer to Appendix D10).

The infrastructure and activities associated with the proposed project will increase the existing liability associated with the Der Brochen Mine by an amount of R 76 607 997-00. Refer to Table 15-2 in Appendix D10 for the closure quantum calculations.

RPM will provide for the closure liability associated with the project through the purchase of a Bank Guarantee as allowed by the Financial Provision for Prospecting, Exploration, Mining or Production Operations Regulations, with the Bank Guarantee provided to the DMR following authorisation of the Der Brochen Amendment Project.

31.1 Closure objectives

The closure vision for Der Brochen is intended to inform the closure objectives. The vision for the mine is to progressively re-instate an area that is safe, stable and non-polluting with the final landform not adversely affecting water resources.

The closure objectives which will drive the closure criteria, and which have been developed to support the closure vision are:

- Decommissioning all surface infrastructure that has no beneficial post-closure use;
- Identify potential post-closure uses of the land occupied by mine infrastructure in consultation with the surrounding land owners and land users. Should a suitable use for mine infrastructure not be found, it will be removed;
- Rehabilitate all disturbed land to a state that is suitable for its post-closure uses;
- Rehabilitate all disturbed land to a state that facilitates compliance with applicable environmental quality objectives (air quality objectives and water quality guidelines);
- Reduce the visual impact of the site through rehabilitation of all disturbed land and residue deposits;
- Rehabilitation that results in landforms that emulate the surroundings and would facilitate drainage and ensuring that all other remaining embankments are shaped and trimmed and that these are free draining; and
- Rehabilitate all disturbed land and residue deposits to a state where post-closure management is minimised.

The closure objectives listed above were based on an extensive environmental database and baseline information gathered during the LoM so far, as well as the baseline studies undertaken as part of the specialist investigations as detailed in Section 9.

Although the final closure quantum will be refined once the project is completed, commissioned and fully operational, SRK is of the opinion that the estimate of liability is a reasonable reflection of the anticipated closure costs and is of the opinion that the liability is sufficient for the operation to adhere to the closure objectives.

A baseline closure risk assessment was undertaken during 2016 using the Anglo American Plc risk assessment process, where the risk is described and then a determination is taken to assess the nature of the risk and then the risk is ranked according to predetermined criteria for probability and consequence. This baseline was subsequently updated in 2017 and 2018. For purposes of this report, the 2018 risk assessment has been updated to reflect possible closure

risks associated with the Expansion Project. These risks and the mitigation thereof informed the development of the closure objectives.

31.2 Environmental objectives relating to closure discussed with stakeholders

The objectives in relation to closure as detailed in Section 31.1 and rehabilitation will be made available for landowner and public consultation as part of the public participation process detailed in Section 8.2.3.

31.3 Rehabilitation Plan

The final rehabilitation plan will only be developed once sufficient information is collected from the monitoring of areas where rehabilitation concurrent with mining activities has been undertaken. The learnings from the areas already rehabilitated will be utilised to inform scientifically sound, safe and technically feasible solutions to achieving the rehabilitation objectives. The intention of the plan will be to achieve the objectives in Section 31.1.

31.4 Closure actions

The rehabilitation actions that the operation intends undertaking at the end of the life of the Der Brochen Amendment Project are described below. These actions are designed to comply with the requirements of the rehabilitation plan's objectives and risk mitigation closure strategies.

31.4.1 DMS Stockpile

The strategy will be to undertake closure activities that will result in a stable landform, capable of supporting a vegetation community analogous with surrounding grasslands, where the generation of contact water and sediment laden runoff is limited by the incorporation of appropriate covers in the closure design. Aesthetics associated with the dumps will be improved as a consequence of the establishment of vegetation on these facilities.

Trials will be undertaken to identify the optimal closure slope angles, with there being a possibility that different angles can be used on different positions on the dump and on different morphological aspects. It is likely that the closure angles will be between 18° to 24°.

During operations, trials will be conducted to determine whether there is a blend of tailings and soil that can be formed to sustain vegetation, without the blend being dispersive and subject to slumping and erosional influences. The cover placement strategy, after reshaping to the desired angle, is likely to include:

- Growth medium placed. This is required to limit sediment washout from higher up the slopes, migrating to the toe of the facilities. It is also required to limit sediment generation from the lower slopes. Vegetation will be established in line with the Vegetation Management Plan (VMP) that will be developed to support revegetation activities at the mine.
- The top surfaces of all facilities may require cover with growth medium and vegetation establishment to limit dust generation. Trials will be conducted to determine whether tails and soil with appropriate ameliorants will support a vegetation population on these surfaces.
- Access ramps to the top of the stockpile will remain while the top is being reclaimed. Once complete, ramps will be reshaped to a profile similar to the rest of the stockpile.

As the DMS will consist of material with a uniform grading, the material in the stockpile may be suitable for use in construction. If there are opportunities to use this material during construction, these will be explored to ensure that reuse can be undertaken without resulting in additional or cumulative impacts. Should these opportunities exist post closure, the DMS stockpiles will remain for use by third parties. In the event that all DMS is removed from the stockpile, the following measures will apply to footprint on which the stockpile was constructed:

- Any residual material in the footprint will be collected and disposed of on an adjacent TSF
- Construction materials used in the footprint below the stockpile will be characterised and disposed of in a manner consistent with the geochemical characteristics of the material;
- The area will be deep ripped to reduce compaction;
- Growth medium will be placed and vegetation established;
- AAP does not anticipate that there will be any residual groundwater contamination associated with the stockpile. However, should contamination exist, remedial measures consistent with the nature of the risk that the contamination presents will be developed.

31.4.2 South Decline Shaft & footprint associated with the concentrator upgrades

All infrastructure for which there is no approved third party post closure use will be decommissioned, and the footprints reclaimed for the establishment of grasslands. Infrastructure where there is a third party use will be legally transferred to the relevant third parties.

Material inventories will be managed near the end of operations to minimize any surplus materials at closure. Fuel, lubricants and other materials needed to support the closure activities will be utilized during the closure period. The majority of the fuel storage facility will be closed during the first year of operations, but some fuel storage capacity will be required until all equipment has been demobilized from the site at the end of the closure period.

Where practicable, equipment and materials with value not needed for post closure operations will be sold and removed from the site. All other equipment will be demolished and disposed of on-site. Equipment with scrap or salvage value will be removed from the plant and stored either in the existing salvage yard or a facility designated for this purpose during the closure period.

A soil contamination investigation will be conducted on completion of demolition activities, particularly in excavations remaining open following decommissioning. The purpose of this will be to identify areas of possible contamination and design and implement appropriate remedial measures to ensure that the soil closure criteria are obtained.

Excavations remaining following demolition, foundation and slab removal and those where contamination remediation has been undertaken will be filled with waste rock and covered with growth medium. The depth of growth medium placed and the vegetation established will be dependent on the outcomes of VMP. Sufficient growth medium will be placed to allow for the successful establishment of vegetation. Cover and growth medium placement will be undertaken to promote proper runoff drainage and prevent the formation of low points where water may pond.

Closure actions for the buildings will include the following:

- The water and power reticulation and associated infrastructure will be retained until such time as water and power are no longer needed on site. Once no longer required, all power and water services to be disconnected and certified as safe prior to commencement of any demolition works.
- All remaining inert equipment and demolition debris will be placed in the base of the nearest open-pit.
- Salvageable equipment will be removed and transported offsite prior to the commencement of demolition.
- All fittings, fixtures and equipment within buildings will be dismantled and removed to designated temporary salvage yards until removed as scrap or disposed as waste.
- All tanks, pipes and sumps containing hydrocarbons to be flushed or emptied prior to removal to ensure no hydrocarbon/chemical residues remain.
- All above ground electrical, water and other service infrastructure and equipment to be removed and placed designated temporary salvage yards until removed as scrap or disposed as waste.
- All pond liners to be removed for disposal in designated landfills.
- Electrical, water and other services that are more than 400 mm below ground surface will remain.
- All pipes and structures deeper than 400 mm need to be sealed to prevent possible ingress and ponding of water.
- Concrete slabs and footings will be removed to a depth of 500 mm below ground surface. This concrete (and metal) will be broken up and disposed of in the pit.
- All concrete below 500 mm depth will remain underground with the invert of all structures broken/sealed to prevent possible ingress and ponding of water.
- Soils associated with storage tanks and chemical storage areas will be sampled. Any contaminated soils found will be removed for disposal as per the mines Waste Management Plan.
- All subsurface cavities such as reinforced concrete tunnels under stockpiles and septic tanks will be backfilled.
- All excavations resulting from demolition of plant, buildings, roads, conveyor platforms, etc. and earth structures will be left in a safe manner.
- All telecommunication towers and dishes to be dismantled and removed.

31.4.3 WRD embankment facility

The WRD embankment facility will be required during the life of the operation to assist with the management of the operational water balance. However, once closure commences it is likely that the water management capacity provided by the WRD embankment facility will not be required and this facility can be decommissioned. The following closure activities are anticipated for closure of this of facility:

- Any residual inventory in the dams will be either pumped into remaining water management infrastructure or will be allowed to evaporate;
- Sediments collecting in the impoundments will be characterised and disposed of according to their geochemical properties;
- Geotextiles or geosynthetic material included in the containment barrier for the various waters, will be removed and disposed of at commercial landfills, with the landfill selected based on the landfills capability to handle the material;

- Rock in the impoundment walls will be backfilled into the north pit. If a material imbalance exists with the result that there is insufficient backfill to limit rainfall collecting on the backfilled pit, RPM will consider utilising some of the DMS in the stockpile to supplement the backfill. The need for this will be determined once a material balance is developed and the risk assessment is updated.
- Growth medium will be placed over the backfill and vegetation will be established.

31.4.4 Roads and conveyor servitudes

Roads and servitudes that are not needed for closure and post closure uses at the site (e.g. security and monitoring) will be closed. Closure actions for the roads, laydown and parking areas will include the following:

- Removal of all signage, fencing, shade structures, traffic barriers, etc.
- All 'hard top' surfaces to be ripped and bitumen removed along with any culverts and concrete structures.
- Where possible preserve existing vegetation – native trees and plants that may currently be incorporated in parking areas.
- All concrete lined drainage channels and sumps to be broken up and removed.
- All excavations or vertical walls resulting from removal of foundations or structures are to have sides slopes battered to 2H:1V and are to be made safe pending final reclamation work.
- All potentially contaminated soils are to be identified and demarcated for later remediation.
- All haul routes that have been treated with dust suppression water need to be sampled to determine whether they need to be treated as "sealed" roads with the upper surface ripped and removed and disposed of as per the mines Waste Management Plan.
- Any slag placed as dust suppression medium needs to be lifted and placed at the base of the nearest pit.

31.4.5 Waste management

Waste will be classified as necessary and then depending on the classification handled according to the mines Waste Management Plan. Likely activities are:

- Designated temporary salvage yards will be developed for the storage of mobile equipment, structural steel and mechanical equipment or other equipment with a potential resale or scrap value. The location of these yards will be dictated by existing permitted land clearance. Material will be stored in these salvage yards until opportunities for resale/reuse are exhausted. Residual material will be disposed of according to the Waste Management Plan.
- It may be necessary for security reasons to fence temporary salvage yards particularly where these are located close to public roads.
- Once material is removed from the yards (either through sale or disposal), temporary infrastructure will be demolished, compaction loosened by ripping and the footprint revegetated as per the vegetation management.

31.4.6 Storm water management

Prior to closure, a water management plan will be prepared to identify which structures are required at closure and which can be decommissioned. Ditches decommissioned will be closed

by backfilling the excavations with the material removed and placed adjacent to the structures. Bunds not required will be flattened by redistributing the material across the footprint used to borrow the material for construction.

31.4.7 Fencing and walling

Walls will be demolished by breaking the concrete panels or bricks and mortar and removing support posts from the ground. Rubble and scrap metal will be disposed of in the pit and the excavations for support posts will be backfilled with growth medium. The footprints of the demolished walls will then be rehabilitated as per the footprints for other infrastructure being demolished.

Security fencing around individual infrastructure will be removed once fences are redundant. Support posts will be removed by excavating to base level if necessary. Excavations will be backfilled with growth medium and vegetation established.

31.4.8 Vegetation and wildlife

Successful revegetation will help control erosion of soil resources, maintain soil productivity and reduce sediment loading in streams. As part of biodiversity management, revegetation will enhance the resulting biodiversity opportunities by utilizing non-invasive plants that fit the criteria of the habitat (e.g. soils, water availability, slope and other appropriate environmental factors). Invasive species will be avoided and the area will be managed to control the spread of these species.

The slopes at the mine residue facilities are likely to be susceptible to erosion, even after reshaping the facilities to a lower gradient. To counter the effects of erosion, naturally occurring grassland species will be planted on the slopes and tops of the facilities. At this time, these species will provide soil holding capacity and reduce runoff velocity. The composition of the natural species and their planting strategy will be determined through revegetation trials conducted concurrently with mining.

The flatter areas, such as those not on mine residue facilities, will be revegetated with the objective of creating a sustainable ecosystem similar to an analogues reference plot.

No specific measures will be taken to reintroduce wildlife, as the different animals still occupying the remaining habitat are expected to expand their territories into the MM area. Unless specific species are identified that should occur and could be reintroduced as part of Anglo American Biodiversity Stewardship actions.

31.5 Quantum of the Financial Provision

The closure quantum for operational aspects associated with the Der Brochen Amendment Project is assessed on an annual basis and provision is made by RPM for any shortfall, between the current quantum and existing provisions. Refer to Table 31-1 for the calculation of the closure quantum associated with the Der Brochen Project.

Aspects are assessed and provisions are made for the following operational infrastructure:

- The current infrastructure associated with the Mototolo Concentrator, with the last assessment including the filter press plant constructed to support the construction of the Mareesburg TSF;
- The existing Helena TSF and the buttress placed to stabilise the TSF;
- The existing disturbance at the Mareesburg TSF.

Table 31-1: Closure quantum

No.	DMR Description	Unit	A	B	C	D	E=A*B*C*D
	Der Brochen Amendment Project		Quantity	Master rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m ³	12 411	16.14	1.00	1.10	220 344
2(A)	Demolition of steel buildings and structures	m ²	2 922	224.79	1.00	1.10	722 520
2(B)	Demolition of reinforced concrete buildings and structures	m ²	8 067	331.21	1.00	1.10	2 939 032
3	Rehabilitation of access roads	m ²	34 440	40.25	1.00	1.10	1 524 831
4(A)	Demolition and rehabilitation of electrified railway lines	m	n/a	390.40	1.00	1.10	0
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	n/a	212.95	1.00	1.10	0
5	Demolition of housing and/or administration facilities	m ²	1 148	449.56	1.00	1.10	567 902
6	Open-pit rehabilitation including final voids and ramps	ha	31	228 795.71	1.00	1.10	7 801 934
7	Sealing of shafts, adits and inclines	m ³	60	120.66	1.00	1.10	7 964
8(A)	Rehabilitation of overburden and spoils	ha	119	157 104.79	1.00	1.10	20 637 029
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic salt-producing waste)	ha	12	195 671.17	1.00	1.10	2 671 107
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	n/a	568 321.86	0.90	1.10	0
9	Rehabilitation of subsided areas	ha	n/a	131 551.60	1.00	1.10	0
10	General surface rehabilitation	ha	22	124 453.52	1.00	1.10	2 957 016
11	River diversions	ha	n/a	124 453.52	1.00	1.10	0
12	Fencing	m	4 000	142.00	1.00	1.10	624 800
13	Water management	ha	184	47 320.72	0.67	1.10	6 431 950
14	Maintenance and aftercare	ha	184	16 562.25	1.00	1.10	3 359 973
					Sub Total 1		50 466 401
					Weighting factor 2	1.10	55 513 041
1	Preliminary and General				6.0% of Subtotal 1 > 100 000 000		6 055 968
					12.0% of Subtotal 1 < 100 000 000		
2	Contingency				10.0% of Subtotal 1		5 046 640
					Sub Total 2		66 615 649
					Add Vat (15%)		9 992 347
					GRAND TOTAL		76 607 997

32 Mechanisms for Monitoring Compliance

Internal and external environmental monitoring is undertaken on an ongoing basis at the Der Brochen Mine operation as required in the relevant authorisations, permits and licences. Details associated with the compliance monitoring in respect to the Der Brochen Amendment Project is provided in the sections below.

32.1 Monitoring of impact management actions

Internal and external audits will be conducted at the Der Brochen Mine to assess the continued appropriateness and adequacy of management actions stipulated in this EMPr.

32.2 Responsible persons for implementation of management actions

The responsible persons for the implementation of the management measures, as detailed in this EMPr, are provided in Table 2-5.

32.3 Time period for implementation of management actions

The infrastructure and activities associated with the Der Brochen Amendment Project are aligned with the current expected LoM of the Der Brochen Project (end 2077). The time period for the implementation of the management actions associated with the proposed Der Brochen Amendment Project will be aligned with the different phase of the proposed project.

32.4 Specific environmental monitoring requirements

This section details the proposed specific environmental monitoring requirements, as guided by the specialists and EAP, to be undertaken as part of the Der Brochen Amendment Project and includes monitoring in terms of the following aspects:

- Air quality
- Groundwater;
- Surface water;
- Biodiversity;
- Noise and vibrations; and
- Post Rehabilitation monitoring.

32.4.1 Air Quality

Information in this section is sourced from the air quality specialist study attached herewith as Appendix D3.

Objectives of air quality monitoring programme

The objectives of the air quality management programme are:

- Establish a regular and up-to-date monitoring programme for significant emissions (point and fugitive) arising from the operations activities, products and services;
- Monitor emissions to air and assessment of compliance with dust fallout limits within the main impact zone of the operation.
- Facilitate the measurement of progress against environmental targets within the main impact zone of the operation.
- Temporal trend analysis to determine the potential for nuisance impacts within the main impact zone of the operation.

- Tracking of progress due to pollution control measure implementation within the main impact zone of the operation.
- Informing the public of the extent of localised dust nuisance impacts occurring in the vicinity of the mine operations.

Monitoring Plan

The current air quality monitoring plan (dust fallout monitoring programme) consists of 10 single direction dust buckets and two multi-directional dust buckets. Details of the current air quality monitoring plan is provided for in Table 32-1, and the location of these points are shown in Figure 32-1. No additional air quality monitoring points will be required in terms of the Der Brochen Amendment Project. The current dust fallout monitoring programme will continue to be implemented to measure dust fallout, PM₁₀ and PM_{2.5}.

The maximum total daily dust fallout (calculated from total monthly dust fallout) of not greater than 600 mg/m²/day for residential areas. Maximum total daily dust fallout to be less than 1 200 mg/m²/day on-site (non-residential areas).

Table 32-1: Air quality monitoring plan

Dust bucket locations			Parameters	Sampling	Reporting
S1	25° 1'52.90"S	30° 6'56.52"E	Dust fallout, PM ₁₀ and PM _{2.5}	Monthly	Quarterly
S2	25° 1'30.61"S	30° 6'36.86"E			
S3	25° 2'32.21"S	30° 6'54.11"E			
S4	25° 1'41.63"S	30° 7'4.44"E			
S5	25° 0'28.40"S	30° 9'1.76"E			
S6	25° 1'52.21"S	30° 7'30.14"E			
S7	24°58'49.80"S	30° 5'14.96"E			
S8	24°59'58.49"S	30° 4'26.08"E			
S9	25° 1'13.04"S	30° 8'36.71"E			
S10	25° 0'42.80"S	30° 8'30.12"E			
D1	25° 4'16.21"S	30° 7'8.76"E			
D2	25° 0'17.46"S	30° 7'15.60"E			

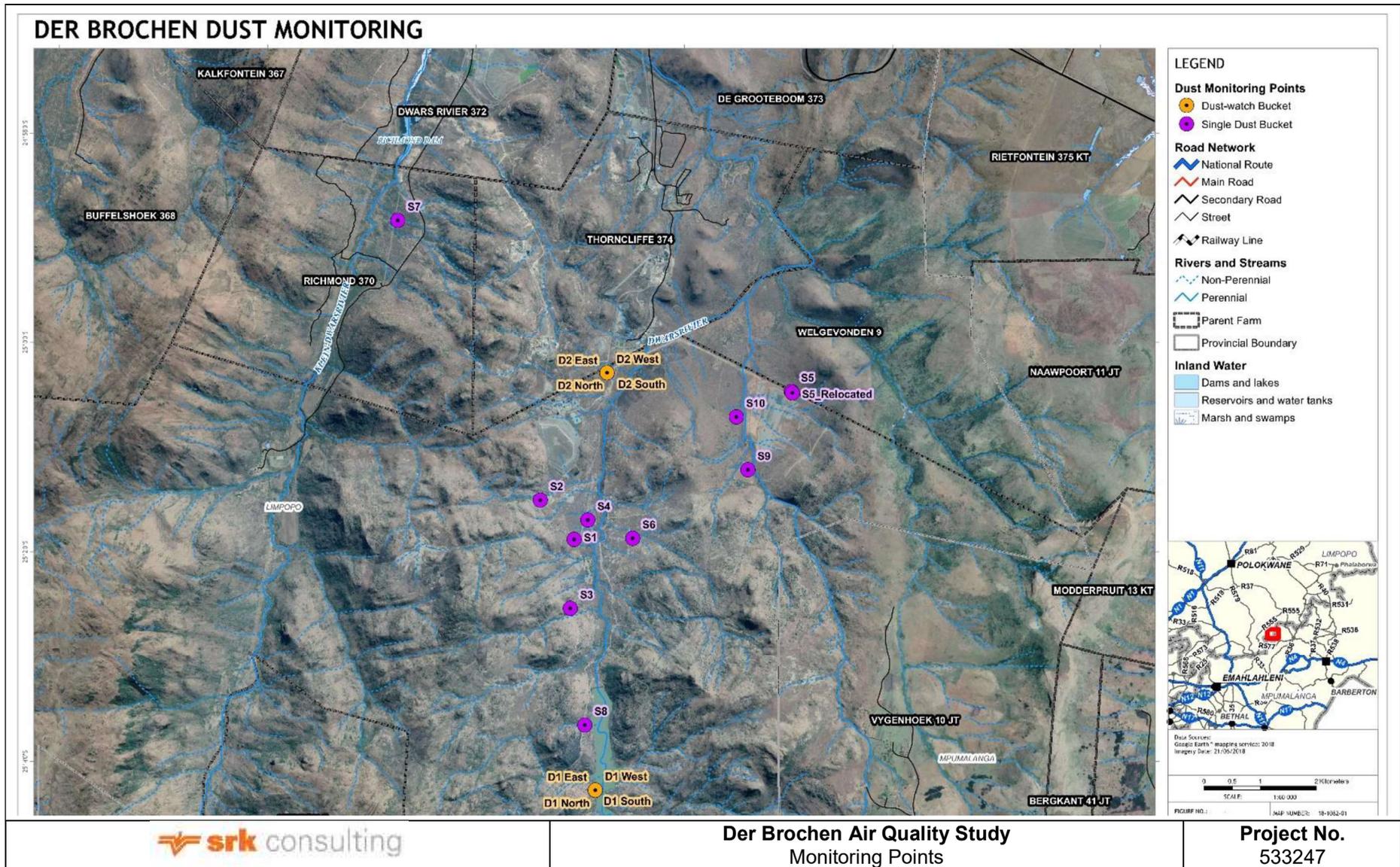


Figure 32-1: Air Quality Monitoring (GCS, 2019)

32.4.2 Groundwater

Information in this section is sourced from the hydrogeological study attached herewith as Appendix D1.

Objectives of groundwater quality monitoring programme

The objectives of the groundwater management programme are:

- To ensure that the water management systems perform according to specifications;
- To act as an early warning system for pollution; and
- To check compliance with license requirements and for reporting purposes;
- To inform effective water management and closure planning.

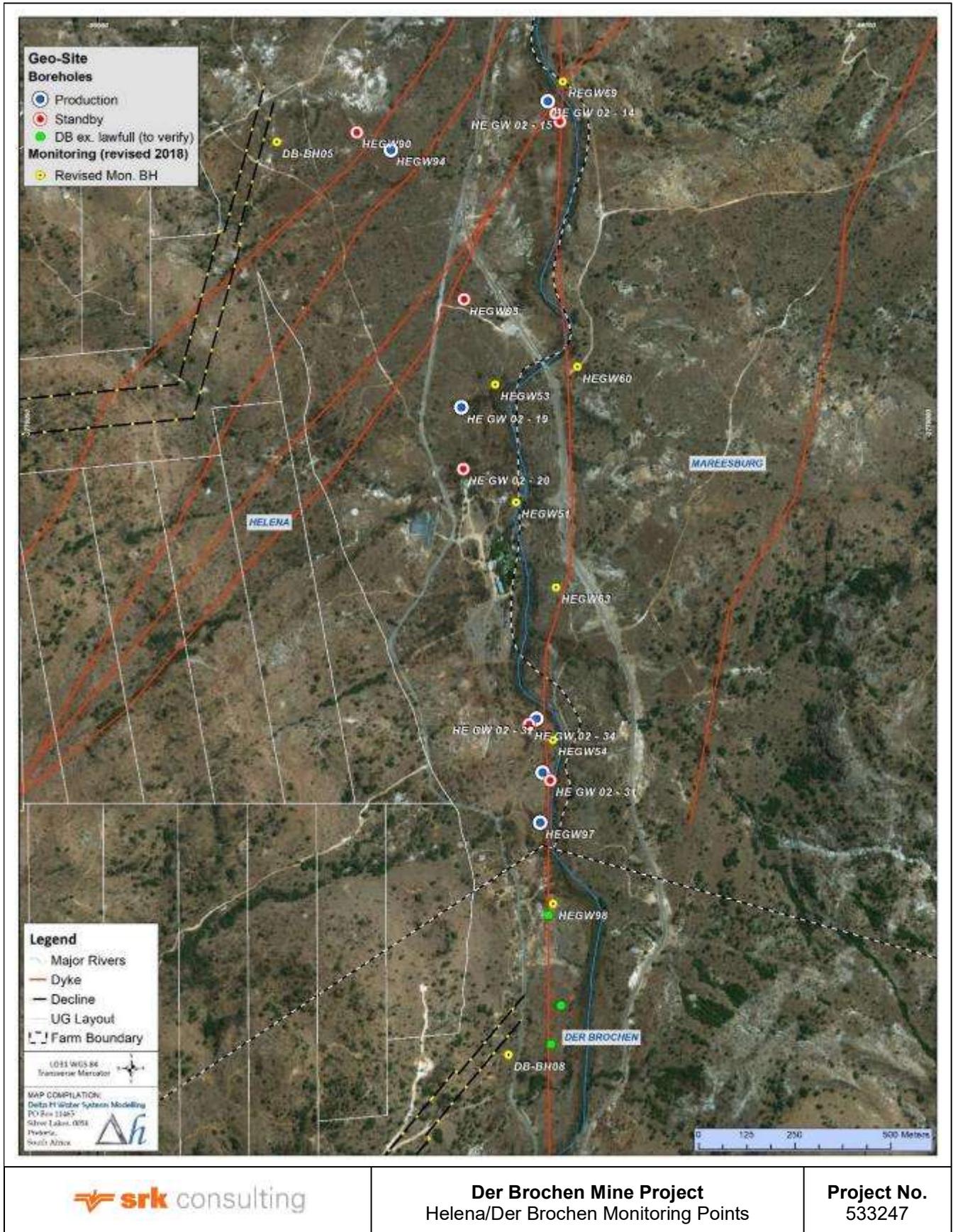
Monitoring Plan – Helena/Der Brochen Wellfield

The recently revised production boreholes for the Helena wellfield are shown in Figure 32-2. The proposed Der Brochen Project underground workings will be developed west of the wellfield area. Two existing boreholes (names) should therefore be added to monitor the potential impact from the proposed mining activities and associated dewatering on the wellfield (Table 32-2), while 3 boreholes can be discontinued due to their proximity to other monitoring boreholes. A detailed wellfield management plan must be developed.

Table 32-2: Groundwater quality monitoring plan – Helena/Der Brochen Wellfield

SITE ID	Longitude	Latitude	Reasoning	Monthly water level	Quarterly water quality
HEGW02-01	30.11547	-25.02470	Discontinue monitoring		
HEGW02-14	30.11994	-25.02537	Production BH	Yes	Yes
HEGW02-15	30.12014	-25.02566	Observation for HEGW02-14 (Standby Production BH)	Yes	Yes
HEGW02-19	30.11766	-25.03261	Production BH	Yes	
HEGW02-20	30.11769	-25.03407	Observation for HEGW02-19 (Standby Production BH)	Yes	
HEGW02-21	30.11969	-25.04128	Production BH	Yes	Yes
HEGW02-31	30.11989	-25.04146	Observation for HEGW02-21 (Standby Production BH)	Yes	
HEGW02-32	30.11954	-25.04000	Production BH	Yes	Yes
HEGW02-34	30.11935	-25.04013	Observation for HEGW02-32 (Standby Production BH)	Yes	
HEGW51	30.11905	-25.03487	Wellfield Monitoring	Yes	
HEGW53	30.11853	-25.03207	Observation for HEGW02-19	Yes	Yes
HEGW54	30.11996	-25.04051	Wellfield Monitoring	Yes	Yes
HEGW60	30.12066	-25.03167	Wellfield Monitoring (Baseline)	Yes	
HEGW61	30.12041	-25.03017	Discontinue monitoring (Dupl.)		
HEGW63	30.12007	-25.03689	Wellfield Monitoring (Baseline)	Yes	
HEGW66	30.12073	-25.02434	Discontinue monitoring (Dupl.)		
HEGW69	30.12033	-25.02490	Observation for HEGW02-14	Yes	
HEGW90	30.11500	-25.02608	Observation for HEGW94 (Standby Production BH)	Yes	
HEGW93	30.11775	-25.03005	Wellfield Monitoring (Standby Production BH)	Yes	

SITE ID	Longitude	Latitude	Reasoning	Monthly water level	Quarterly water quality
HEGW94	30.11588	-25.02650	Production BH	Yes	
HEGW97	30.11962	-25.04246	Production BH	Yes	Yes
HEGW98	30.11994	-25.04439	Wellfield Monitoring	Yes	Yes
DB-BH05	30.11294	-25.02630	North Portal (Monitoring)	Yes	Yes
DB-BH08	30.11875	-25.04803	South Portal (Monitoring)	Yes	Yes



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Der Brochen Mine Project
Helena/Der Brochen Monitoring Points

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Figure 32-2: Groundwater Monitoring – Helena/Der Brochen Wellfield

Monitoring Plan – Helena TSF

The distribution of active (and proposed) monitoring boreholes is shown in Figure 32-3. Recently a number of additional boreholes were drilled as part of the hydraulic containment system (scavenger wells HW-BH1, HW-BH2, HW-BH3, HW-BH4 and HW-BH6), while MBH12, MBH13, MBH14, MBH15, MBH16, MBH17 and MBH18 were drilled to ensure complete spatial coverage of the monitoring programme. As a result, there are two components of monitoring required at the Helena TSF: firstly, to monitor the migration of the contamination plume, and secondly, to determine the effectiveness of the hydraulic containment system. Based on the understanding of the plume development, the revised monitoring boreholes for the Helena TSF are listed in Table 32-3. Quarterly monitoring of groundwater quality and levels is proposed.

Table 32-3: Groundwater quality monitoring plan – Helena TSF

SITE ID	Longitude	Latitude	Revised	Comment
MBH1R	30.11689	-25.01089	Plume Monitoring	
MBH2	30.11692	-25.01120	Discontinue monitoring (Dupl.)	
MBH3	30.11663	-25.02144	Plume Monitoring	
MBH4	30.11851	-25.01103		
MBH5	30.11804	-25.02170		
MBH6	30.11700	-25.00933		
MBH7R	30.11069	-25.01147		
MBH8	30.11547	-25.01344		Discontinue monitoring, covered by Buttress
MBH9	30.11669	-25.01800	Plume Monitoring	
MBH10	30.11919	-25.01936		Baseline
MBH11	30.11212	-25.01999		
MBH12	30.11846	-25.01487	Plume Monitoring	
MBH13	30.11859	-25.01156		
MBH14	30.11457	-25.02218	Telemetry (level and EC logger) (Mon. HWELL-B1)	
MBH15	30.11746	-25.02051	Plume Monitoring	RWD B (overspill)
MBH16	30.11380	-25.01171	Discontinue monitoring, covered by Buttress	
MBH17	30.11800	-25.01313	Dry	To be re-drilled as MBH17R (see end of table)
MBH18	30.11766	-25.02219	Telemetry (level and EC logger)	
HEGW78	30.11996	-25.01628	Plume Monitoring	Baseline
HEGW81	30.11990	-25.01751	Discontinue monitoring (Dupl.)	
HEGW82	30.11979	-25.01793	Plume Monitoring	Baseline
HEGW88	30.11947	-25.02287	Monitoring	Up-stream
HW-BH1	30.11766	-25.01154	Plume Monitoring	
HW-BH3	30.11388	-25.02175	Scavenger Monitoring (Mon. HWELL-B1)	
HW-BH4	30.11430	-25.02172	Telemetry (level logger) (Mon. HWELL-B1)	Future scavenger well (Section 19)
HW-BH6	30.11699	-25.02184	Telemetry (level logger) (Mon. HWELL-B2)	Future scavenger well (Section 19)
MBH8R	T.B.D.		Re-Drill (Plume Monitoring)	Design to use as Scavenger BHs
MBH17R	T.B.D.		Re-Drill (Plume Monitoring)	

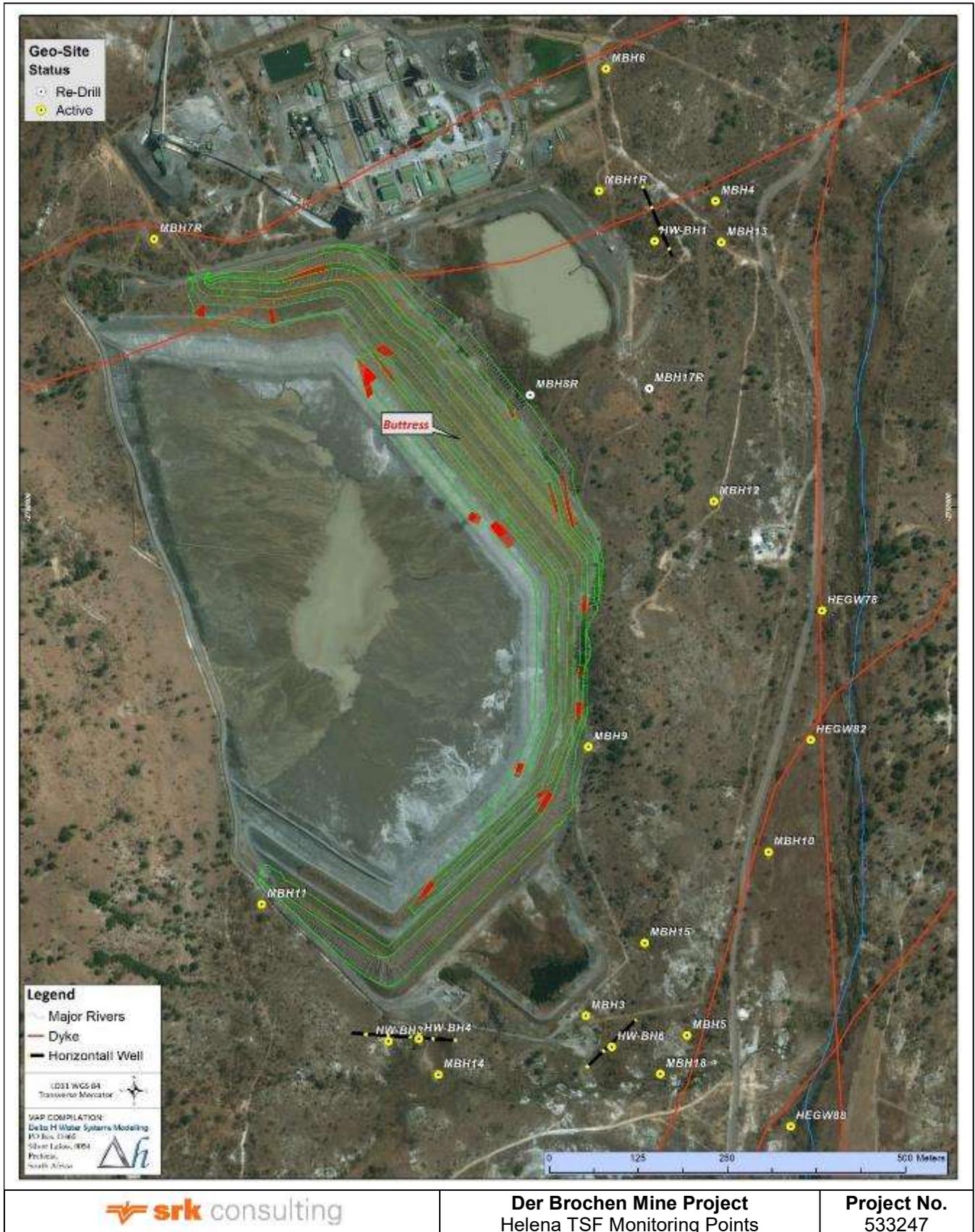


Figure 32-3: Groundwater Monitoring – Helena TSF

32.4.3 Surface Water

The Information in this section is sourced from the surface water specialist study attached herewith as Appendix D2.

Objectives of surface water monitoring programme

The objectives of the surface water management programme are:

- To ensure that the water management systems perform according to specifications;
- To act as an early warning system for pollution; and
- To check compliance with license requirements and for reporting purposes;
- To inform effective water management and closure planning.

Monitoring Plan

Routine water quality monitoring is proposed up and down stream of construction activities. Baseline data can be sourced from data gained from previous water quality, hydrological, aquatic ecological and hydrogeological investigations as available.

The field water quality monitoring should include pH, EC and turbidity data collection. In addition, weekly water quality samples should be collected for laboratory analysis of pH, EC, total dissolved solids and suspended solids as a minimum as per condition 3.1 of Appendix IV of the WUL.

Thereafter monthly monitoring should be implemented. The existing routine monitoring points are sufficient to monitor upstream of the Mareesburg TSF in the Mareesburg Stream (M3 and M1) and in the Groot-Dwars River immediately downstream of the Mareesburg confluence (G_Drs 3) although consideration should be given to moving G_Drs 3 about 300 m downstream on completion of Phase 2 of the DMS Stockpile as this will better represent the area of impact.

During the construction phase a weather station should be installed on site to be a permanent fixture that will continue to operate during the operational phase. As a minimum the parameters measured should include temperature, humidity, rainfall, wind speed and wind direction. Meteorological data will be used in the interpretation of other monitoring results.

The surface water monitoring plan is provided for in Table 32-4.

Table 32-4: Surface Water Monitoring Plan

Site Name	River	Latitude	Longitude	Site description
Groot-Dwars Catchment				
G_Drs2	Groot-Dwars River	-25.04964	30.12057	Groot Dwars upstream at weir HW1 (but downstream of the Der Brochen Dam). Located Upstream of the Proposed Southern Portal.
Dwars upstream		-25.02360	30.11963	Surface water upstream of current operations and Helena TSF drainage line. (West of North Open Pit and downstream of HW2)
TSF Drainage Line 1	TSF Drainage line	-25.02206	30.11835	Downstream (south) of the Helena TSF along the Der Brochen access road; initiated June 2015. Drainage line is located to the north of the planned North Open Pit.
Dwars upstream TSF BC	Groot-Dwars River	-25.02192	30.12013	Surface water upstream of TSF drainage line; initiated October 2016
Dwars downstream TSF AC		-25.02137	30.12029	Surface water downstream of TSF drainage line; initiated October 2016
Dwars downstream		-25.01064	30.12122	Surface water downstream of existing operations (Helena TSF etc) but upstream of PCD drainage line at the Mototolo Concentrator
PCD Drainage Line 1	PCD Drainage Line	-25.00864	30.11565	Surface water drainage line downgradient of the existing PCD at the Mototolo Concentrator; initiated June 2015
PCD Drainage Line 2		-25.00888	30.12093	Surface water drainage line downgradient of the existing PCD at the Mototolo Concentrator; initiated June 2015.
Dwars upstream PCD	Groot-Dwars River	-25.00998	30.12193	Surface water upstream of PCD drainage line; initiated October 2016. (Upstream of the Mototolo Concentrator activities)
Dwars downstream PCD AC		-25.00907	30.12201	Surface water downstream of PCD drainage line; initiated October 2016. (Downstream of the Mototolo Concentrator activities)
G_Drs5		-25.00608	30.12488	Groot Dwars River downstream of the Mototolo Concentrator. (Immediately downstream of proposed Topsoil stockpile but pstream of proposed DMS stockpile and the proposed PCD's)
G_Drs3		-24.99895	30.13244	Downstream of G_Drs5 before the confluence of the Groot Dwars River and the Mareesburg Stream. (Located adjacent to the proposed DMS stockpile)
G_Drs4		-24.96257	30.13767	Groot Dwars about 5.2 km downstream of confluence with the Mareesburg Stream
Mareesburg Catchment				
M1	Mareesburg Stream	-24.99450	30.14362	Mareesburg Stream before the confluence with the Groot Dwars River. Downstream of the Mareesburg TSF.
M3		-25.00446	30.14262	Immediately downstream of the Mareesburg TSF and RWD, within the Mareesburg Stream. (Adjacent to the proposed PCD2 for Phase 3 of the DMS Stockpile)
M2		-25.02252	30.14583	Upstream of the Mareesburg TSF and RWD, within the Mareesburg Stream. (Also located upstream of the proposed DMS Stockpile)
Dwars River (DWS monitoring station)				
B4H009	Dwars River	-24.91205	30.10327	DWS Monitoring Station located after the confluence of the Groot-Dwars and Klein Dwars Rivers

32.4.4 Biodiversity

The information in this section is sourced from the biodiversity specialist study (covering flora, fauna and aquatic fauna aspects) attached herewith as Appendix D5.

Objectives of biodiversity monitoring programme

The objectives of the biodiversity management programme are:

- To ensure that there is a continual flow of data, enabling all parties involved to accurately assess and manage biodiversity related progress and issues.
- To evaluate the effectiveness of mitigation actions (including offsets, if applicable and or voluntary) on reducing impacts to biodiversity and track progress towards achieving NP.
- To inform management responses to non-project pressures that may threaten an operation’s ability to successfully implement NPI goals or may increase biodiversity and reputational risks.
- To ensure the alignment of indicators and metrics determining progress towards achieving NPI and the monitoring of implementation of activities designed for this purpose.

Monitoring Plan

The biodiversity monitoring plan is provided for in Table 32-5.

❖ Operational and decommissioning phases:

Implement the calculation of discharge dilution factors by means of the Direct Estimation of Ecological Effect Potential (DEEEP) protocol if it becomes evident that discharge will take place.) All reports from construction phase onwards must include mitigation and management recommendations as well as an assessment of pre-post construction changes in the water quality.

Table 32-5: Biodiversity Monitoring Plan

Monitoring Points	Parameters	Sampling	Reporting
Biomonitoring			
<p><u>Biomonitoring points</u> GD2: 25°05'12.5"S, 30°07'29.9"E GD3: 25°02'26.6"S, 30°07'12.8"E GD4: 25°00'21.6"S, 30°07'28.3"E GD5: 24°59'26.3 S, 30°08'42.5"E T0: 25°01'19.70"S, 30°08'44.4"E T1: 24°59'35.30"S, 30°08'37.7"E</p>	<p>Aquatic ecosystems:</p> <ul style="list-style-type: none"> • pH; • Conductivity; • Dissolved oxygen; • Temperature; • Index of Habitat Integrity (IHI) • Present Ecological State (PES); • Aquatic macro invertebrates (SASS5); • Macro-invertebrate Response Assessment Index (MIRAI); • Habitat Cover Rating (HCR) and Fish Habitat Assessment (FHA); • Fish Response Assessment Index (FRAI) • Toxicological testing on three trophic levels (Vibrio fischeri (representing bacteria), Daphnia pulex (representing aquatic macro-invertebrates) and Poecilia reticulata (representing fish). • Implement the calculation of discharge dilution factors by means of the Direct Estimation of Ecological Effect Potential 	<p>Every six months, once in Spring and once in Autumn.</p>	<p>Bi-annually</p>

Monitoring Points	Parameters	Sampling	Reporting
	(DEEEP) protocol if it becomes evident that discharge will take place		
Fauna			
Site wide	As per the Biodiversity Action Plan	Annually in the summer growing season.	Annually
Flora			
<p>Flora: Permanent monitoring plots must be established in areas surrounding the surface infrastructure and rehabilitated areas. These plots must be designed to accurately monitor the following parameters:</p>	<ul style="list-style-type: none"> • Measurements of crown and basal cover; • Species diversity; • Species abundance; • Impact of dust on flora; • Recruitment of indigenous species; • Alien vs. Indigenous plant ratio; • Recruitment of alien and invasive plant species; • Erosion levels and the efficacy of erosion control measures; • Vegetation community structure including species composition and diversity which should be compared to pre-development conditions; and • Presence, abundance and condition of floral SCC communities. 	Annually	Annually
Freshwater resources			
All ephemeral drainage lines within 100m of the activities, two points on each system (one upgradient and one downgradient of impacted areas).	<ul style="list-style-type: none"> • Wetland Ecoservices (Kotze et al, 2009); • PES according to either the Wetland Index of Habitat Integrity (DWAf 2007) or the WET-Health method (Macfarlane et. al, 2009); • Riparian zonation monitoring to determine whether impacts on base flow levels are occurring; • Water quality monitoring as part of the mine's water quality monitoring program; and • Monitoring of the riparian vegetation assemblage using the VEGRAI Ecstatus tool. • Results of follow up assessments to be compared to baseline conditions and any changes in Ecstatus (PES/EIS) to be noted). • Results to be used to proactively manage modifiers such as alien vegetation establishment and erosion. 	Bi-annual status quo reporting.	Bi-annual status quo reporting.
Erosion			
All freshwater resources falling within the focus area, and especially on the Groot Dwars River	<ul style="list-style-type: none"> • Photos and GPS point locations taken of existing erosion in the freshwater features and adjacent banks must be incorporated into the report. 	Weekly	Monthly & After major rainstorm/ event

Monitoring Points	Parameters	Sampling	Reporting
	<ul style="list-style-type: none"> Any erosion observed must be discussed in detail and management recommendations made; and Map indicating where erosion is present. 		
Alien Invasive Vegetation			
Regrowth of alien vegetation should be monitored monthly during the first growing season.	<p>All freshwater resources falling within the focus area, and especially on the Groot Dwars River.</p> <p>All other areas identified by the land manager as being important</p>	Monthly	-

32.4.5 Noise and vibration

The Information in this section is sourced from the noise and vibration specialist study attached herewith as Appendix D6.

Objectives of noise and vibration monitoring programme

The objectives of the noise and vibration management programme are:

- To ensure that there is a continual flow of data, enabling all parties involved to accurately assess and manage noise and vibration related progress and issues.
- To ensure that the legislated noise and ground vibration levels will be adhered to at all times.

Monitoring Plan

The noise and vibration surveys will have to be conducted in terms of the recommendations of SANS 10103 of 2008 and vibration standards. Calibrated equipment must be used at all times and at the measuring points. The environmental noise monitoring must take place with a calibrated Class 1 noise monitoring equipment.

Ground vibration and over-air pressure noise levels must be monitored with calibrated ground vibration and air-over pressure equipment. The noise monitoring plan is provided for in Table 32-6 and illustrated in Figure 32-4.

Table 32-6: Noise and vibration monitoring plan

Noise monitoring locations	Parameters	Sampling	Reporting
DBBN01: -25°0'16.32"S, 30°7'19.14"E DBBN02: -25°0'33.48"S, 30°6'39.40"E DBBN03: -25°1'31.69"S, 30°6'51.48"E DBBN04: -25°2'0.84"S, 30°7'0.26"E DBBN05: -25°2'35.31"S, 30°7'8.63"E At the boundaries of the identified residential areas V & W as well as at the Der Brochen dam wall.	<ul style="list-style-type: none"> L_{AeqT}: The Equivalent A-weighted noise level (dBA), similar to an average noise level noise level during the measurement period (T); L_{A90}: The noise level exceeded for 90% of the time, general representative of the steady background noise at a location. L_{Amax}: the instantaneous maximum sound level (dBA) measured during the sample period; L_{Amin}: the minimum sound pressure (dBA) measured during the sample period; Average wind speed (m/s); and Max wind speed (m/s). 	Quarterly (for a period of 2 years, thereafter annually)	Quarterly (for a year, thereafter annually)

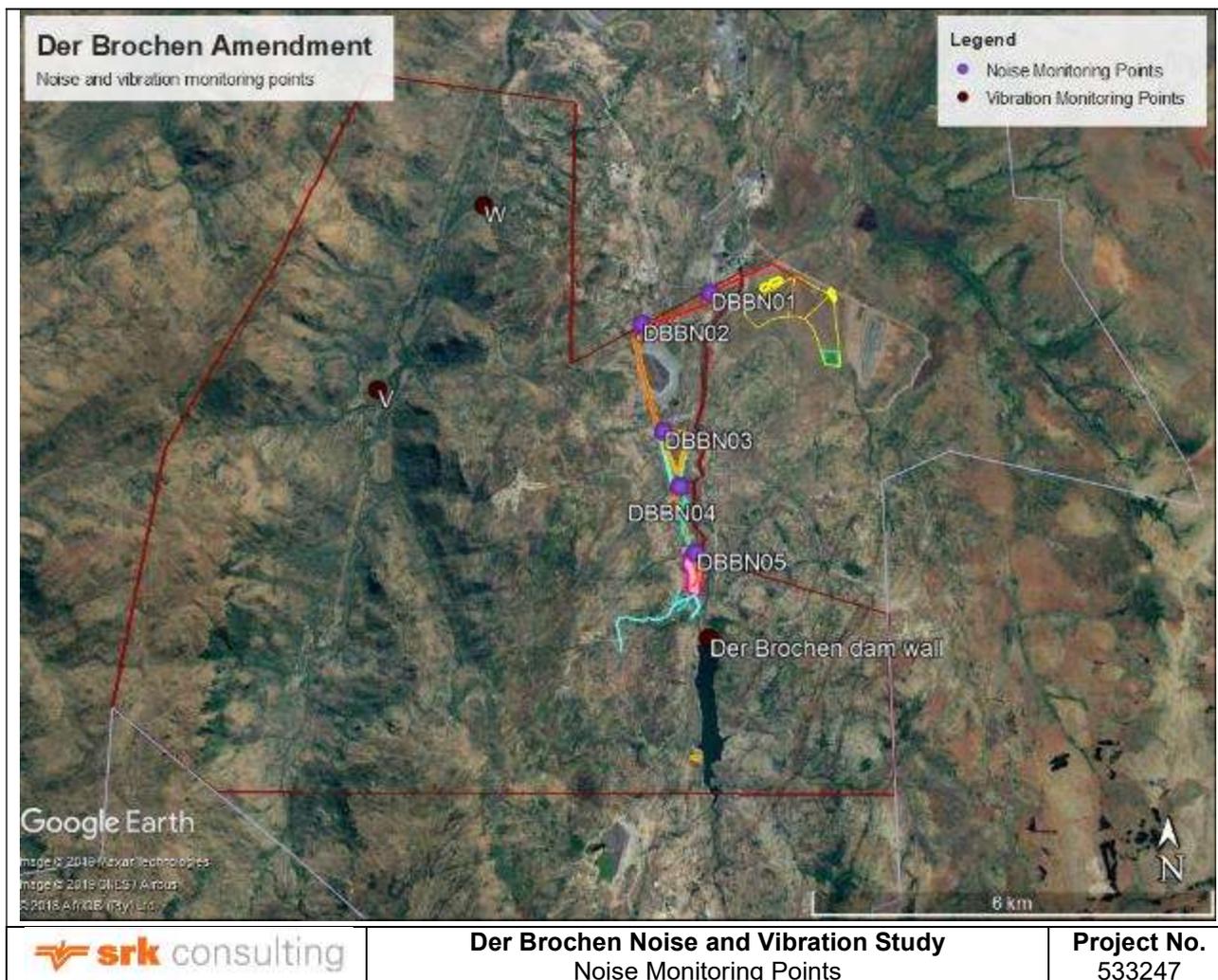


Figure 32-4: Noise and vibration monitoring points

32.4.6 Post Closure Monitoring Plan

Once the closure activities have been completed, the Der Brochen Amendment Project aspects will enter a ten-year post closure period. During this time, erosion repair and vegetation establishment will be undertaken, if monitoring activities indicate that it is required.

A post closure period of ten years is considered by AAP to be sufficient time, as biological process can be demonstrated to be occurring, leading to vegetation covers being stable and sustainable within this timeframe. Furthermore, sufficient data can be collected to demonstrate that the achievement of the specific relinquishment criteria comply with the trend for the biophysical category under consideration.

Objectives of post closure monitoring programme

The objective of the monitoring programme will be to track the recovery of the site towards the long-term post closure land capability goals and NPI commitments, in accordance with the overall closure objectives. The monitoring programme will be designed to collect information to demonstrate that the relinquishment criteria have been achieved. The anticipated monitoring will required post closure is summarised in Table 32-7.

Table 32-7: Post Closure monitoring plan

Parameters	Location	Frequency	
		Sampling	Reporting
Surface water: <ul style="list-style-type: none"> Quality monitoring against parameters as required by the WUL. 	To be determined upon Closure of the Der Brochen Project	Sampled monthly for a minimum ten-year post closure period and thereafter until relinquishment criteria have been achieved.	Annually (to be updated based on the final closure plan)
Groundwater: <ul style="list-style-type: none"> Quality monitoring of both the shallow and deep aquifers against the parameters required by the WUL 		Sampled quarterly for a minimum ten-year post closure period and thereafter until relinquishment criteria have been achieved	Annually (to be updated based on the final closure plan)
Erosion: <ul style="list-style-type: none"> This will take the form of developing a representative reference site on the disturbed footprint and undertaking visual and topographic assessments to determine erosion rate, using standard erosion monitoring techniques. 		This will be undertaken once a year at the end of the wet season for a ten-year post closure period.	Annually (to be updated based on the final closure plan)
Vegetation establishment: <ul style="list-style-type: none"> Vegetation condition will be monitored using standard field techniques to determine whether the vegetation has been established with a species composition and density similar to that of a reference analogue site established in a similar ecotype, or self-defined biodiversity and vegetation success criteria. 		Annually for a ten-year post closure period.	Annually (to be updated based on the final closure plan)
Biomonitoring: <ul style="list-style-type: none"> Upstream and downstream of the mining activities. A long-term operational bio-monitoring programme will be implemented to monitor physico-chemical and biological components of the aquatic ecosystems within the mining area, which will be extended into the closure period. Appropriate biological index will be included in order to quantify and classify the longer-term changes in biotic integrity, with monitoring being undertaken annually. 		For a three year post-closure period	Annually (to be updated based on the final closure plan)

32.5 Performance assessment requirements

A formal audit to assess the continued appropriateness and adequacy of this EMPr will take place every 2 years.

33 Environmental Awareness Plan

RPM is committed to identifying training needs and ensuring that all personnel whose work may create a significant impact upon the environment receive appropriate training. RPM has developed an Environmental Awareness Plan, as summarised in Table 33-1, that describes the training available and the manner in which environmental training needs are identified and continually reassessed. The Plan does not provide details on the actual training initiatives, but rather serves to ensure that a responsible person is appointed to deal with and increase environmental awareness on the mine.

The purpose of RPM's Environmental Awareness Plan is as follow:

- To ensure that staff are competent through environmental training. Competence will only be proven through assessments;
- Training is essential to ensure that the responsibilities in the Environmental Management System (EMS) can be fulfilled at each relevant function and level, and to meet the challenge of continual improvement. It is essential that key personnel whose work may create a significant impact on the environment be trained;
- Resources for training should ensure that adequate competent personnel are available to cover any eventuality;
- To explain and aid personnel involved in training with regards to the EMS; and
- To clarify the EMS training and ensure that all employees are correctly instructed with regards to the environment.

Table 33-1: RPM's Environmental Awareness Plan

Activity/Procedure		Roles and responsibility
1	GENERAL	
1.1	Awareness training must include the potential consequences of departure from specified operating procedures as well as significant environmental impacts, actual or potential, of their work activities.	<i>Environmental Officer & Training Manager</i>
1.2	Training will be appropriate to the activity of individual employees.	
2	INDUCTION PROGRAMME	
2.1	Training programmes shall, be established and maintained for mine personnel, contractors and visitors. Training shall include the following: <ul style="list-style-type: none"> • Administrative requirements and procedures which will include the Emergency Procedures. • Resource conservation and environmental reporting and general environmental awareness for mine related environmental issues. 	<i>Environmental Officer & Training Manager</i>
2.2	Contractors that are employed must, prior to any starting of working activities, complete the contractor's pack. This package requires the contractor to perform Safety, Health and Environment (SHE) Risk assessments on the activities to be undertaken. The entire risk assessment process and the applicable EMS procedures are referenced within the contractor's package.	<i>Environmental Officer & Training Manager</i>
2.3	Environmental Induction slides/presentation shall be revised annually. Induction is valid for the period of one year hence refresher shall be done after 365 days or following annual leave.	<i>All employees and contractors</i>
2.4	Reporting of oil spills and incidents shall form part of induction program.	<i>Environmental Officer</i>
3	TRAINING NEEDS	
3.1	Training and awareness needs shall be identified as per the significant impact per job category. Training needs shall be identified through: <ul style="list-style-type: none"> • Performance appraisal; • Analysis of non-conformances and incidents; • Audit findings and recommendations; • At time of recruitment (in the work place); • Training needs analysis; • Impact/Aspect Register; • Additions to scope in services provided; • The updating of procedures (quality, technical and administrative). Training needs will also be identified through work performance, request by employee and work area review.	<i>Training Manager and Section Heads</i>
3.2	Once training needs have been established it is up to the supervisor to notify the Training Department of the requirements. The Training Department will then identify pertinent and relevant courses (if not already done so by employee/supervisor) and schedule training accordingly.	<i>Training Manager and Section Heads</i>
3.3	A training matrix will be generated from Training needs analysis. Monthly Environmental Theme will be distributed to all in the mine including contractors.	<i>Environmental Officer, Section Heads & SHE Document Controller</i>

Activity/Procedure	Roles and responsibility
3.4 Environmental Days celebrations are done to enhance awareness to employees and local communities (Water week, environmental Week, Arbour week etc.). Daily Safety, Health and Environmental Report bulletin is used to communicate environmental tips to all employees.	<i>Environmental Officer</i>
4 TRAINING PLANNING	
4.1 Identified and agreed training needs shall be included in budgets and processed as described below. Course attendance (other than at the internal induction courses) shall be scheduled on the basis of the importance of task contribution to the maintenance, effectiveness and improvement of the objectives.	<i>Section Heads</i>
4.2 Training expenses, including conferences and symposia would be checked and approved by the Head of Department. The Training Department shall complete a course authorisation form and ensure that the procedures are followed regarding course bookings, confirmations and payments.	<i>Section Heads & Training Department</i>
4.3 The Trainee shall: <ul style="list-style-type: none"> • Obtain approval from the Head of Department; • Request Training Department to make official booking. 	<i>Head of Departments</i>
4.4 External training courses shall be assessed through: <ul style="list-style-type: none"> • Attendance by, and the formal reports and recommendations of, staff; • Recommendation by known competent external personnel; • Review of course content, presenters, location and facilities by knowledgeable personnel. 	<i>Training Manager And Section Heads</i>
5 EMS TRAINING	
5.1 Mine Personnel: All employees, current or new, and contractors will undergo induction, a part of which is environmental awareness training and includes the Safety, Health and Environmental policy. Depending on a person's job category training will be performed on significant aspects pertinent to his/her area of work. All personnel performing tasks which can cause significant or major environmental impacts shall be competent on the basis of training, education and/or experience.	<i>Training Manager</i>
5.2 Visitors: All visitors to any controlled access areas of the mine will undertake a short "visitors' induction", which highlights the main safety and environmental aspects relevant to short term visitors at the mine.	<i>Training Instructor</i>
5.3 EMS Representatives: The EMS Representatives shall have additional EMS knowledge requirements. The EMS Representatives shall receive the training required to manage the EMS efficiently in their areas of responsibility. Such skills include the operation of the SHE legal register and the electronic database, as well as thorough knowledge of the environmental procedures.	<i>Section Heads</i>
5.4 Standard Procedures: Employees and contractors shall be made aware of Environmental Standard Operating procedure related to their activities which might have environmental impacts e.g. waste management, oil management etc.	<i>Environmental Officer</i>
5.5 Evaluation and Competence: Definition: The Training Department and Line Management's role is to ensure that all mine regulations and procedures required by the various indicated legislation are such that theoretical knowledge and operational skills all pivot around competency. A competent person means a person who: <ol style="list-style-type: none"> 1.a) is qualified by virtue of his/her knowledge, training, skills and experience to organise the work and its performance; 1.b) is familiar with the provisions of legislation applicable to his/her work; 1.c) has been trained to recognise any potential or actual danger (significant aspects) to the environment, but also safety and health, in the performance of the work; and/or 2. is in the possession of the appropriate certificates of competency where such certificate is required by these regulations or legislations. Competency does not merely mean showing or training an employee on a task so that he knows how to do it. Proving competency, the employee must know the <i>Who, What, When, How</i> and <i>Why</i> pertaining to the task as well as the hazards and risks associated with performing the task. Capacity and awareness training will be carried out by Environmental Coordinator and Training Manager and evaluation of awareness and competency training	<i>Section Heads</i>

Activity/Procedure	Roles and responsibility
(implementation of training in the work place) will be carried out by the Line Managers through Professional Training Officers (PTOs) or through approved accredited training providers. Awareness and competence will also be reviewed during audits, events of an emergency, and incident. Typical competence assessments include training programmes both formal and informal, PTOs, questioning employees, experience, checklists, qualifications and ability to do the work. Gaps identified shall be referred to Training department.	
5.6 This awareness plan shall be kept up to date.	<i>Training Manager and Environmental Coordinator</i>

34 Specific information required by the Competent Authority

The DMR issued a letter of acceptance of the Der Brochen Amendment Project’s Final Scoping Report on 31 May 2019. The letter also listed additional requirements to be addressed during the impact assessment phase and to be included into the EIA/EMPr report. Refer to Appendix A2 for a copy of the DMR’s Scoping Report acceptance letter.

Please refer to Table 1-2, under Section 1.4 of this report, that provides details of the DMR requirements as well as references to sections in this report where the DMR’s additional requirements were addressed.

35 Undertaking

I Selma Nel herewith confirm:

- The correctness of the information provided in the reports;
- The inclusion of comments and inputs from stakeholders and Interested and Affected parties;
- The inclusion of inputs and recommendations from the specialist reports where relevant; and
- The acceptability of the project in relation to the finding of the assessment and level of mitigation proposed.



Signature of the EAP
 DATE: 01 October 2019

Prepared by



Selma Nel

Principal Scientist

Peer Reviewed by



Franciska Lake

Partner

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

36 References

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Appendices

Appendix A: Authorities Correspondence

Appendix A1: DMR Letter confirming Helena TSF emergency situation

Appendix A2: DMR Letter accepting the Scoping Report

Appendix A3: Proof of WULA submission

Appendix B: EAP CV's and Qualifications

Appendix C: Proof of Public Participation

Appendix C1: Letters of Consent

Appendix C2: DMR Pre-application meeting

Appendix C3: DWS Pre-application meeting

Appendix C4: Background Information Document (English & Sepedi)

Appendix C5: Project Announcement Stakeholder Letter (English & Sepedi)

Appendix C6: Project Announcement Advertisements (English & Sepedi)

Appendix C7: Proof of Site Notices (English & Sepedi)

Appendix C8: Written comments received during Scoping Phase

Appendix D: Specialist Studies

Appendix D1: Hydrogeological Study

Appendix D2: Surface Water Study

Appendix D3: Air Quality Study

Appendix D4: Soil, Land Use and Land Capability Study

Appendix D5: Biodiversity Study

Appendix D6: Noise and Vibration Study

Appendix D7: Traffic Study

Appendix D8: Heritage Study

Appendix D9: Social Study

Appendix D10: Closure and Rehabilitation Report

Appendix E: Windeed Records

SRK Report Distribution Record

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