

WATER USE LICENCE APPLICATION SUMMARY REPORT

NAME OF APPLICANT:

Black Mountain Mining (Pty) Ltd

Compiled by

Marli Burger



Signature:

Date : 01 February 2024

1. Applicant details

Name of applicant: *Black Mountain Mining (Pty) Ltd*
Postal address: *1 Penge Road Aggeneys, Northern Cape*
Cell phone number *+27 54 983 8520*
Office number: *+27 54 983 8520*
E-mail address: *pventer@vedantaresources.co.za*

2. Person submitting application

Marli Burger is registered with SACNASP as a Professional Natural Scientist, Reg No 115534, and is also registered with EAPASA as an Environmental Assessment Practitioner, Reg No 220/2019.

3. Background and purpose

3.1 Background

Black Mountain Mining (Pty) Ltd is proposing the construction and operation of the TSF Phase 2 with associated RWD, silt trap, pipelines and stormwater diversion channel within the Gamsberg Zinc Mine mining right area. The pre-application enquiry was lodged on E-Wulaas on 7 September 2023 and the pre-application meeting took place with the Northern Cape (Upington office) via online discussion and presentation on 9 October 2023.

Complete if the WULA is for mine/industry

Black Mountain Mining (Pty) Ltd, a subsidiary of Vedanta Zinc International (VZI), owns and operates the Gamsberg Zinc Mine. In 2010 Vedanta Resources Limited acquired Black Mountain Mining (Pty) Ltd from Anglo American as part of the acquisition of the zinc base metal mine take over. Following the acquisition of the Black Mountain Mining (Pty) Ltd properties and rights a feasibility and optimisation of technology for the Gamsberg Zinc Mine was done.

Vedanta Resources Plc is a globally diversified natural resources group with wide ranging interests in aluminium, copper, zinc, lead, silver, iron ore, oil and gas and power. Its operations in Southern Africa, Vedanta Zinc International (VZI), include Black Mountain Mining (SA) and Skorpion Zinc (Namibia). Black Mountain Mining (Pty.) Ltd. (BMM) comprises of The Black Mountain Mine (Deeps and Swartberg Operations) and the Gamsberg Project. Both zinc-lead mines are located near Pofadder in the Northern Cape Province, along the N14 National highway linking Upington to Springbok.

The Gamsberg Project is one of VZI's flagship projects in the journey of realizing their vision to produce 500 Ktpa of finished zinc metal from Gamsberg. It will exploit one of the largest, known, undeveloped zinc ore bodies in the world. The first step was Phase 1 (4 Mtpa Mines & Concentrator) which has been commissioned in September 2018 and is currently in Operation. Phase 1 is currently producing ~ 250 ktpa Zn Metal in Concentrate (MIC).

An Environmental Impact Assessment (EIA) process was completed in 2013 (and approved on 12 August 2013- Permit 43/2013) and amended on 2 December 2014 (Permit 43/2013 Amendment 2) (Ref: NC/EINNAM/KHNAGG/2012). The Smelter Complex EIA process was completed in 2021 and the latest EMPr was approved in 2017. In addition, a Waste Management Licence (WML) (Ref: 12/9/11/L.955/8) and Water Use Licence (WUL) (Ref: 14/D82C/ABCGI/2654) for their open pit mining activities and concentrator plant were approved and an amendment was issued in April 2016. No updating of the Waste Management Licence or EMPr is required for the proposed addition of the TSF Phase 2, as these activities were included in the latest authorizations.

The mining activities commenced in June 2016 when overburden stripping for the open pit commenced. The mining plan for Phase 1 consisted of three smaller open pits in the footprint of the 10 million tonne per annum (mtpa) footprint. Development of the opencast mine and concentrator plant has been done in phases. The construction of the concentrator plant commenced in 2017 with the official opening in February 2019. Phase 2 will expand the mining capacity to the approved 10 mtpa). The Gamsberg Zinc Mine is currently mining up to 4 mtpa and producing up to 250 000 tonnes per annum (tpa) of zinc concentrate for export.

Knight Piésold (Pty) Ltd was appointed in 2023 by Black Mountain Mining (Pty) Ltd to undertake the water use authorisation process as well as the compilation of the IWWMP for the proposed construction and operation of the Gamsberg Zinc Phase 2 TSF in accordance with Section 21 of the National Water Act (NWA, Act 36 of 1998).

BMM plans to mine a total of 150 000 000 tons of ore from the Gamsberg Zinc Mine over a 19-year Life of Mine (LoM). Of this expected LoM tonnage, approximately 18 000 000 tons of zinc concentrate will be extracted.

3.2 Location of water uses

The proposed additional water uses (2023 amendment application) are situated on The Remainder of Farm Aroams 57.

The Gamsberg Zinc Mine is located 14km east of the town of Aggeneys and 120km east of Springbok, within the Khâi-Ma Local Municipality and the Namakwa District Municipality in the Northern Cape Province.

The proposed TSF 2 project is situated in the D82C quaternary catchment of the Orange Water Management Area.

The geographic location of the property where the water uses will take place is 29°11'06.9"S 18°56'50.9"E.

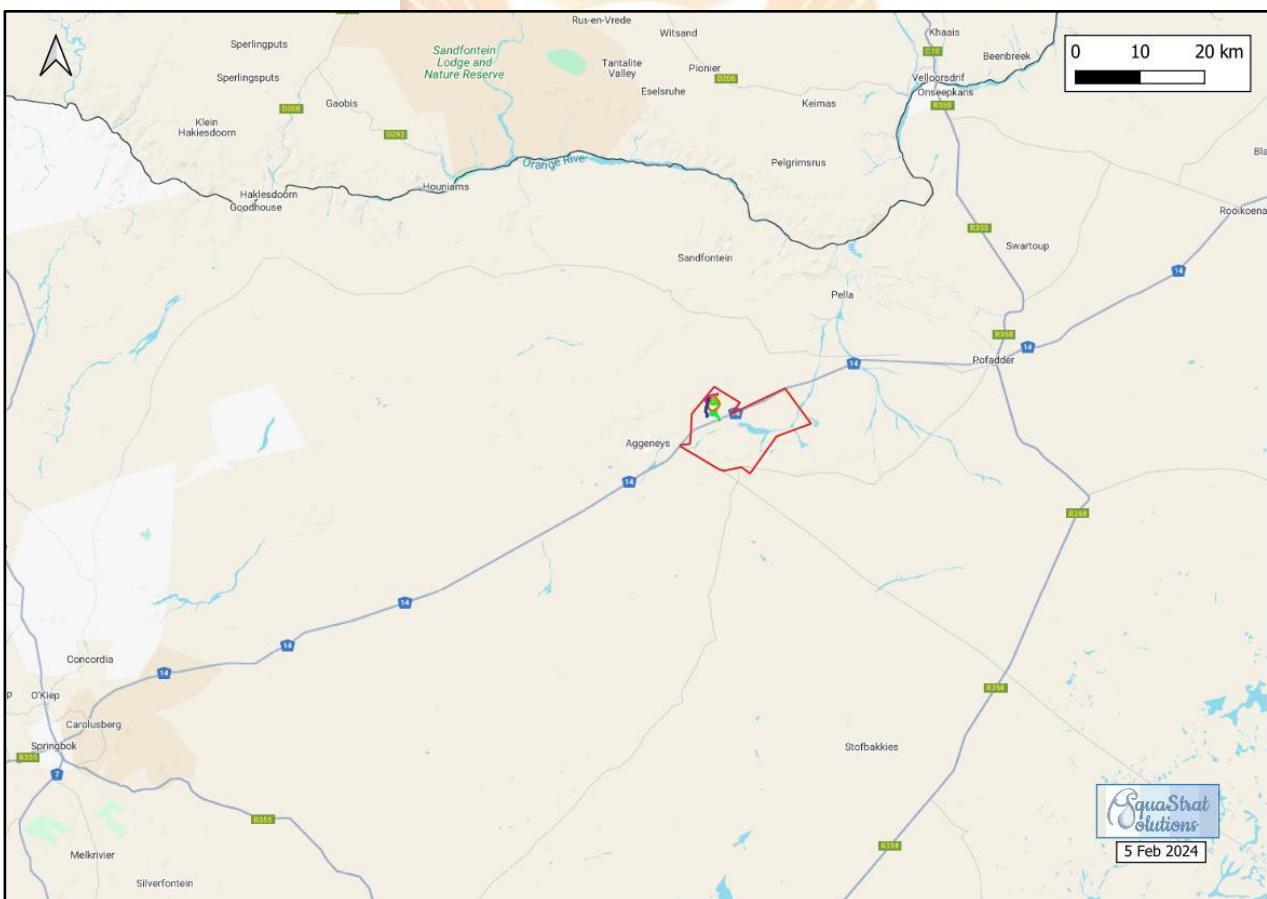


Figure 1: Locality of Gamsberg Zinc Mine.

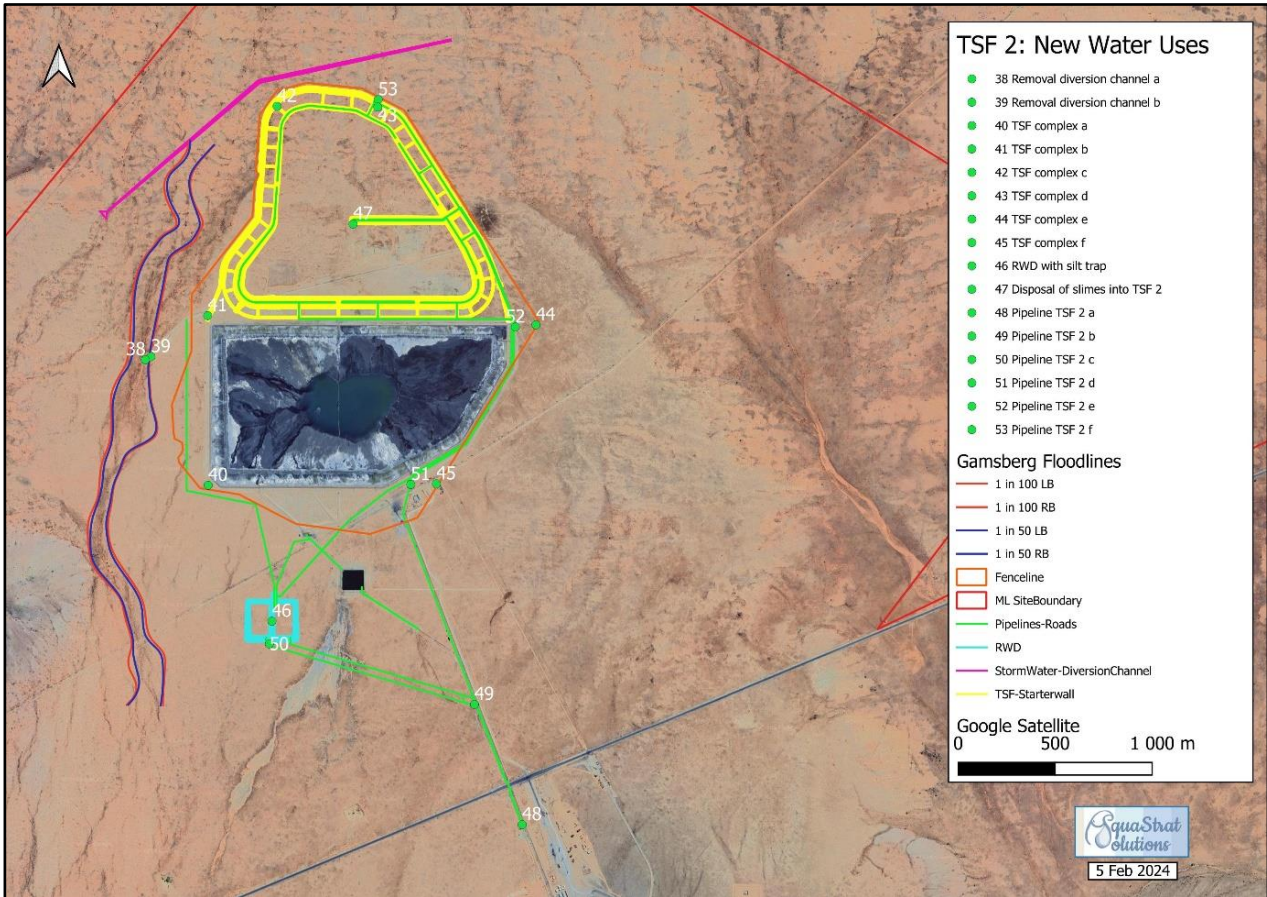


Figure 2. TSF Phase 2 layout Gamsberg Zinc Mine.

Table 1: Property details

Property description	Title Deed number	Owner
Remainder of Farm Aroams 57	T41686/2010CTN	Black Mountain Mining (Pty) Ltd

4. Administrative documents and other technical reports submitted to support the WULA

4.1 Administrative documents

- 4.1.1 Applicant ID
- 4.1.2 Company Registration Certificate
- 4.1.3 Copy of Title Deed
- 4.1.4 Consultant Appointment Letter
- 4.1.5 Proof of Payment of application fee
- 4.1.6 Copy of existing WUL
- 4.1.7 Mining Right and Mine Work Programme acceptance

4.2 Reports and other technical documents

- 4.2.1 List all Reports and other technical documents relevant to the application as per WULA regulation or any other information requested formally by the Department and indicate compilers of the documents and dates of compilation.

Table 2: List of reports and other technical documents submitted

Number	Report Content	Report Title	Compiled by	Report Date
1	Design Report	301-00541-21 Gamsberg Mine Phase 2 TSF Design	Justin Teixeira Pr.Eng. No 20190614 Knight Piésold	07/12/23
2	Geotechnical Investigation Interpretive Report	3010054121 Gamsberg TSF GIR Interpretive Rev 1 ed DJM	Bronwen Klaas, Pr.Sci.Nat. No 400515 Knight Piésold	05/11/23
3	Waste Classification Assessment	301-00541-21 Gamsberg TSF Waste Classification Assessment	Aidan Hughes Pri.Sci. No 127912 Knight Piésold	12/15/22
4	Waste Assessment	RI301-00541-12- Gamsberg Waste Assessment 2-Draft	Aidan Hughes Pri.Sci. No 127912 Knight Piésold	08/30/23
5	Technical specifications	RI301-00541-21_Technical Specification_DRAFT 20240112 LM	Francois du Toit Pr.Eng. No 202201992 Knight Piésold	1/19/24
6	Construction Quality Assurance	RI301-00541-21_CQA_DRAFT	Francois du Toit Pr.Eng. No 202201992 Knight Piésold	05/04/23
7	Silt Trap Design and Hydraulics	301-00541-21 Gamsberg Silt Trap Design and Hydraulics_LDK_20230907	Leon De Kooker Pr.Eng.Cand. No 2023205892 Knight Piésold	09/07/23
8	Slurry RWD Pipeline System	301-00541-21 Gamsberg Ph 2 - Slurry RWD Pipeline syst - Design Criteria Rev A JT	Kobus van Rooyen Pr.Eng.No 20090276 Knight Piésold	08/08/23
9	Gamsberg IWWMP 2023	Gamsberg IWWMP 2023: TSF Phase 2 Project and Annual Update	Marli Burger M.Sc. (Aquatic Health) Pr.Sci.Nat. 115534 EAPASA 220/2019 AquaStrat Solutions	In process

5. Project Description

Complete if the WULA is for mine/industry

The construction and operation of the TSF Phase 2 with associated RWD, silt trap, pipelines and stormwater diversion channel, within the Gamsberg Zine Mine mining right area, would have an extent of approximately 120 ha within the approved mining right area. The Tailings Facility Phase 2 infrastructure include:

TSF Phase 2

Liner requirements as per GN 636 is determined to be Class C, 1080 GSM geotextile, overlaid by 1.5mm HDPE geomembrane, and a minimum freeboard requirement of 2m. Drainage above and below liner.

Return Water Dam

Two separate compartments were designed in order to allow cleaning of an individual compartments. The final size required was 120 000 m³ with each compartment having approximately 60 000 m³ of storage capacity.

The RWD will be double lined with 1.5mm HDPE liner, a cusped layer in between the liners with act as leakage detection and drainage layer should the top liner leak. The cusped layer feeds to two sumps at the southern ends of the compartments which can be drained with a pump, this should routinely be checked for leakage. The protection layer is a concrete filled HDPE hyson cells in order to allow cleaning with light machinery such as TLB's (KP, 2023b).

RWD Transfer System

Water will be abstracted from the pool of the proposed Phase 2 RWD via new pump units and transferred via a two pipeline system (one number of duty pipeline and one number of assist pipeline in parallel) from the RWD to the tie-in point on the existing return pipeline transferring return water back to the existing Process Water Tank (PWT) at the plant. The duty and assist pipelines will alternate and hence not operate simultaneously at any given time. The Phase 2 RWD is a dual compartment dam and therefore require a duty and standby pump unit for each compartment.

The proposed Return Water Dam transfer system will consist of the following key components:

- Suction pipelines and pipe fittings abstracting water from the dam outlet structure sump constructed within the internal embankment of the RWD.
- Pump units: Dry self-priming pump units, each consisting of an electrical motor mounted on a skid.
- Delivery pipelines and connecting pipe fittings, transferring return water to the existing Process Water Tank (PWT) (KP, 2023a).

Decant system

The system will be an electrically supplied land-based pump system with a floating suction head. The system will supply water from the TSF pool to the silt trap prior to the return water dam (KP, 2023b).

Return water will be decanted from the pool of the New Phase 2 TSF and transferred to the silt trap for of the New Phase 2 Return Water Dam (RWD), using a relocatable land-based pump system connected to a floating shallow water intake device.

The decanting system will consist of the following key components:

- A shallow-water intake device which will float on the surface of the TSF pool.
- Suction pipeline and pipe fittings connecting the shallow-water intake device with the pump unit.
- Pump Unit: Dry self-priming pump with an electrical motor mounted on a skid (one duty and one standby pump unit).
- Delivery pipeline and connecting pipe fittings, transferring return water to the RWD (KP, 2023a).

Silt trap

Before the TSF decant water enters their respective RWD the water goes through a silt trap in order to allow sediment to filter out of solution. All dirty water draining to the RWD2 drains into a silt trap which is located in the middle of the two compartments. The silt trap has been designed to comfortably pass the 50-year storm event. A double silt trap measuring 25 m x 15 m x 1.5 m deep with a drying bed measuring 25 m x 4.7 m wide is located on the northern side of the return water dam. The double silt trap has been designed with sluice gates to control water flow into the relevant silt trap that is operational at the time.

Silt from dirty water runoff is captured in the silt trap, once the majority of silt is removed from the dirty water it is then directed into the return water dam. Cleaning of the silt trap is by means of a TLB. The silt trap has been designed for (8 t vehicle) or similar weight and type of vehicle.

Seepage Management

Underdrains have been provided above and below the liner. The drains above the liner will facilitate drainage and reduce the overall pore pressure regime, increasing water recovery and the stability of the facility. The drains below the liner have been designed to detect any potential leakage from the primary barrier (KP, 2023b).

Ringfeed Pipeline System

The tailings pump system consists of a duty and standby pump train, each pump train with its own transfer pipeline extending to the new Phase 2 TSF, and each of the pipelines (one duty and one standby pipeline) consisting of DN300 Std (KP, 2023a).

The Gamsberg Zinc Mine is an approved open pit zinc mine and is currently approved to mine 10 mtpa to produce zinc and lead concentrate.

Also include the process flow or any industrial process flow chart or diagram: Process flow will be submitted in Phase 3 of the application.

Motivation for an Exemption in terms of Government Notice 704 exemption (applicable to mining)

Table 3: Exemption from GN 704 motivation

Regulation	Property Description	Description of exemption application	Motivation
Regulation 4: Restrictions on locality No person in control of a mine or activity may: (a) locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100-year flood-line or within a horizontal distance of 100 metres from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked	Re Aroams 57	The TSF 2, pipelines and fence will be partially located within 100m from a drainage line.	The TSF 2 is required to allow the existing mining activities to continue, and will be located directly north of the existing TSF. The impacts on the drainage line west of the TSF footprint is expected to be minimal, as the proposed TSF, pipelines and fence minimally intersects the drainage line.

6. Methods statement (only for 21 (c) and (i) activities)

Stormwater

In Phase 2, the second TSF is located to the north of the current TSF and thus a new clean water diversion channel is required in to divert clean water runoff coming from the north around the TSFs. The design flow for the channel was calculated from the Rational Method as 4.65 m³/s which gave a trapezoidal channel size of bottom width of 2 m, with side slopes of 1:2.5 and a depth of 1 m. Since the site has a general fall from north to south the channel was given a longitudinal slope of 1:250 and the channel flows from the east to the west before turning south to follow the natural ground. Due to the topography the channel starts at a depth of 1 m at the inlet of the channel and reaches a depth of 2.88 m at the bend where the channel turns south and is sloped in order to daylight to the environment. The outlet of the channel fans at 45° and is lined with reno mattress to protect against erosion. There are sensitive areas that have been classified around the TSFs and the new clean water diversion drain bypasses this area and daylights adjacent to it.

The tailings dam breach analysis study for the Gamsberg Phase 2 Tailings Storage Facility (TSF), was completed based on a configuration corresponding to a final design crest elevation of 1 001 m. A TSF freeboard analysis indicated that the 1 in 10 000-year storm event can be contained without overtopping the TSF, assuming that the siphon decant is operational. The vertical freeboard under this case is projected to be 1.6 m (0.6m beach freeboard, 111 m dry beach length), implying that the dam would not overtop.

The main risk for underperforming of a barrier system is due to mechanical and physical damage of the barrier system during the installation. It is therefore paramount for a reputable contractor to supply and install the liner with proven track record in similar work compounded with a construction quality assurance programme.

TSF

Surface water and river channel water must be diverted to prevent seepage, ponding and excess water below the TSF. In-situ permeability of the compacted excavation floors should be carried out to determine compliance with the design barrier system.

The following earthworks are proposed:

- Excavate and stockpile the upper 300 mm (organic content) at the TSF footprint for future (topsoil) remediation.
- Should deeper foundations be required according to the design, excavate or localised rip/blast and stockpile the material for reuse.
- The excavation floor must be ripped 200 mm deep and compacted to 95% Standard Proctor Maximum Dry Density (MDD) at Optimum Moisture Content (OMC) to densify the loose in-situ soil.
- Where subsurface drains are required, localised intermediate to hard excavation is anticipated across the majority of site.
- Provision should be made for a protective layer below the barrier system.

RWD

Surface water and river channel water must be diverted to prevent seepage, ponding and excess water below the RWD. In situ permeability tests of the compacted excavation floors should be carried out to determine compliance with the design barrier system.

The following earthworks are proposed:

- Excavate and stockpile the upper 300 mm at the RWD footprint for future (topsoil) remediation.
- Found the RWD at least 3.5m below ground level.
- Excavate 300 mm below the proposed founding depth, in situ rip and recompact the excavation floor to 95% Standard Proctor Maximum Dry Density (MDD) at Optimum Moisture Content (OMC) to densify the loose in-situ soil.
- Localised in situ densification may be required should loose pockets be encountered in the excavation floor.
- Excavated material may be stockpiled based on material reuse requirements.

- The excavation side slopes should not be steeper than 1V:3H to prevent side wall collapse.
- Provision should be considered for a protective layer below the barrier system.
- Localised intermediate to hard rock excavations may be anticipated from a depth of 2.6m

7. Stormwater Management Plan

Stormwater management plans for the quarry, Tailings Storage Facility (TSF) and Waste Rock Dump (WRD), portions of the ROM stockpile as well as the Plant and roads are in place. A new clean water diversion channel is required in to divert clean water runoff coming from the north around the TSFs. The design flow for the channel was calculated from the Rational Method as 4.65 m³/s which gave a trapezoidal channel size of bottom width of 2 m, with side slopes of 1:2.5 and a depth of 1 m. Since the site has a general fall from north to south the channel was given a longitudinal slope of 1:250 and the channel flows from the east to the west before turning south to follow the natural ground. Due to the topography the channel starts at a depth of 1 m at the inlet of the channel and reaches a depth of 2.88 m at the bend where the channel turns south and is sloped in order to daylight to the environment. The outlet of the channel fans at 45° and is lined with reno mattress to protect against erosion. There are sensitive areas that have been classified around the TSFs and the new clean water diversion drain bypasses this area and daylights adjacent to it.

There are existing stormwater toe drains around TSF Phase 1. New stormwater toe drains around TSF Phase 2 have been sized, and these drains flow into the existing toe drains and terminate into the Stormwater Dam (SWD). The Storm Water Dam (SWD) is located to the south of the Phase 1 TSF and has three compartments that are interconnected. The SWD water balance model considers stormwater inflows and direct rainfall against evaporation losses and a daily abstraction rate and estimates the volume of water in the SWD for each day of the simulation. The abstraction rate from the SWD will need to be pumped out at 4 800m³/day or 200m³/hour. A freeboard of 0.8 m should be provided above full supply level

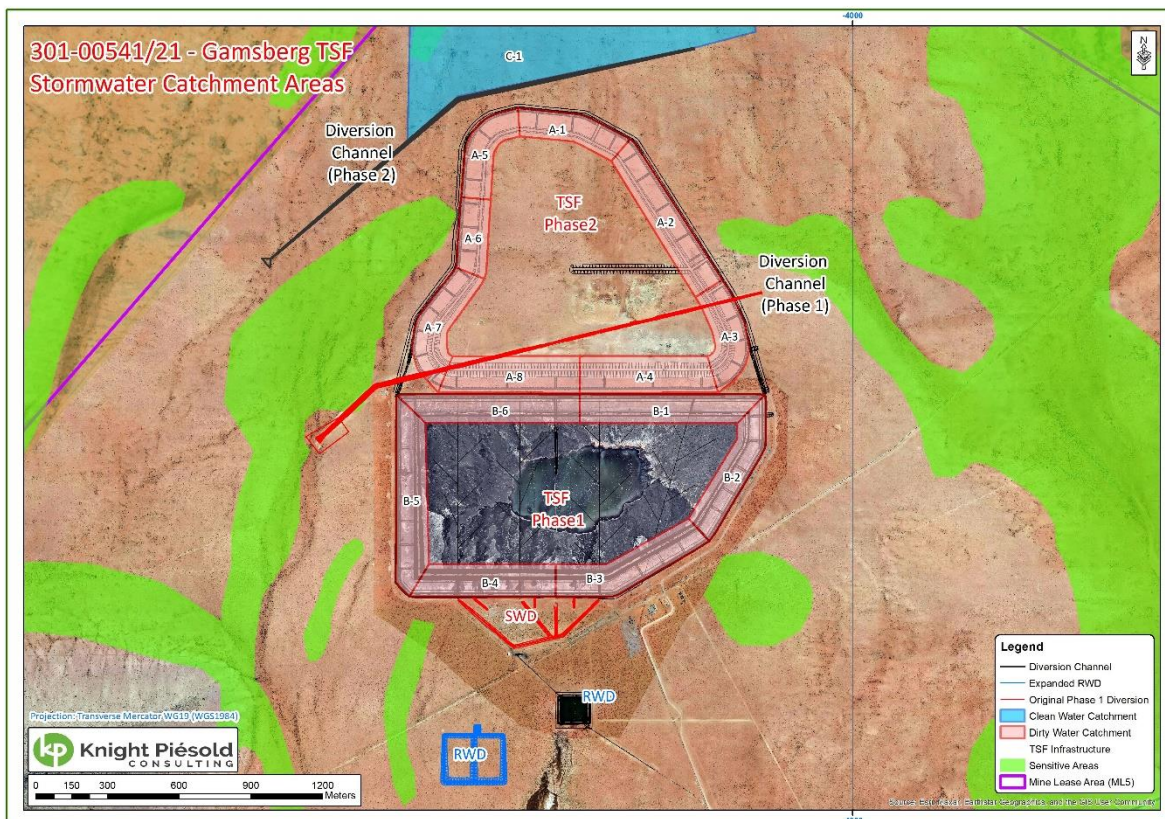


Figure 3. Stormwater management around the TSF.

8. Rehabilitation Plan

The removal of the existing stormwater diversion channel will require minimum rehabilitation, and vegetation will re-establish from the seedbank in the topsoil. At life of mine (LoM) the TSF is left in the optimum condition for post-closure rehabilitation to proceed efficiently. The closure provisions must comply with the EMP report. The objective of establishing the closure requirements during the design phase is to reduce the capital cost of closure and maintenance on cessation of operations. This can be achieved by constructing outer slopes that will support vegetation and/or rock cladding and by concurrent rehabilitation of the outer slopes during operation. For Gamsberg rock cladding has been selected due its locality and low rainfall. The overall outer slope will be 1:3 (V:H) with intermediate slopes between benches at 1:2.5 (V:H).

Aftercare and maintenance of the site is expected to comprise the repair of localised erosion gulley's and the maintenance of vegetation for a period of 3 to 5 years after completion of the rehabilitation and closure works described above. Monitoring of surface and groundwater quality in the area is likely to be required to continue for at least 5 years after closure.

9. Water Uses applied for (Only put water uses applied for)

The application includes the following water uses as detailed in Table 4.

Table 4: Water Use Applied for

Water use(s) activities	Purpose	Capacity/ Volume (m ³ , tonnes and/or m ³ /annum)/ dimension (Area (ha) Length/depth, (m))	Property Description	Co-ordinates
Section 21 (c & i)				
Removal of diversion channel north of TSF 1		2022m		Start: 29°11'22.42"S 18°56'9.13"E End: 29°11'2.36"S 18°57'17.95"E
Section 21(g)				
TSF 2	Mining	6 183 412 m ³ /a slurry (333 333t/month at 1.61t/ m ³) 116 ha 32 000 000 m ³	Re of Aroams 57	a: 29°11'43.32"S 18°56'21.12"E b: 29°11'15.08"S 18°56'21.03"E c: 29°10'40.24"S 18°56'34.26"E d: 29°10'40.38"S 18°56'53.48"E e: 29°11'16.62"S 18°57'23.67"E f: 29°11'43.06"S 18°57'4.67"E
RWD with silt trap for TSF 2		Capacity below spillway invert 96 706 m ³ RWD: 120 000 m ³ Spillway: 10 x 2 x 0.8m depth Double silt trap measuring 25 m x 15 m x 1.5 m deep with a drying bed measuring 25 m x 4.7 m wide		29°12'5.93"S 18°56'33.27"E

Water use(s) activities	Purpose	Capacity/ Volume (m ³ , tonnes and/or m ³ /annum)/ dimension (Area (ha) Length/depth, (m))	Property Description	Co-ordinates
<i>Disposal of tailings slurry into TSF 2</i>		<i>770m³/hr or 548 tph</i>		<i>29°10'59.84"S 18°56'48.79"E</i>
<i>Disposal of wastewater into RWD</i>		<i>800 m³/hr</i>		<i>29°12'5.93"S 18°56'33.27"E</i>
<i>Pipelines for disposal into TSF 2 and RWD</i>		<i>7500m 3155m</i>		<i>a: 29°12'39.77"S 18°57'21.04"E b: 29°12'19.77"S 18°57'11.94"E c: 29°12'9.69"S 18°56'32.80"E d: 29°11'43.18"S 18°56'59.79"E e: 29°11'16.99"S 18°57'19.75"E f: 29°10'39.15"S 18°56'53.57"E</i>

10. Description of the Environment

Climate

The area is one of the hottest and driest areas in South Africa with desert and semi-arid conditions. The area experiences extreme climate conditions with temperature maximums exceeding 40°C in the summer months. Rainfall in the summer months is dominated by thunderstorms. Winter temperatures can drop as low as -2°C at night with localised frost and dew from June to August. During winter, however, the days can be pleasantly warm with temperatures averaging 21°C.

The actual recorded rainfall from the TORAS (Technical and Operational Risk Assessment System) shows the Mean Annual Precipitation (MAP) for the Aggeneys area varied between 72 mm and 484 mm between 1920 and 1989. The annual average used is 200.6 mm. The computed design rainfall ranged from 127.1 mm (February) to 35.1 mm (June) for the 1:100 year 24-hour storm event. The Mean Annual Evaporation (MAE) for the facility has been estimated from the records of Pofadder and Pella weather stations.

Surface water

The project area is located within the Orange Water Management Area. The major rivers associated with this water management area include the Modder, Riet, Caledon, Kraai, Ongers and Hartbees Rivers, which ultimately drain into the Orange River (SLR, 2020b).

The D82C catchment, in which the proposed TSF 2 is situated, is an interior drainage basin that does not drain into the other catchments (SLR, 2021).

The watercourses identified as habitats of conservation concern (Desmet, 2013) include drainage lines (washes), Seeps, Springs and Temporary Rock Pools. Although saline pans are a feature of the Bushmanland plains landscape none occurs in the study area.

The watercourse associated with the proposed TSF 2 is not considered to support wetland or riparian habitat, and is best described as a typically dry, highly ephemeral drainage area.

Groundwater

The Gamsberg Zinc Mine currently has an existing groundwater monitoring network and monitoring is conducted and reported by GHT Consulting Scientists on a quarterly basis. This monitoring network consists of 22 "farm" boreholes on surrounding privately-owned farm areas and 31 mine property boreholes.

GHT Consulting compared groundwater quality results to the South African National Standards (SANS241-2015 and SANS241-2006), the South African Water Quality Guidelines, Volume 5 - Agricultural Use: Livestock Watering, and the Gamsberg Mine Water Use License (WUL No.: 14/D82C/ABCGIJ/2654)- Water Resource Quality Objectives.

Groundwater monitoring results conducted between November 2017 and April 2019 indicated the pH of the groundwater samples ranged between 6.57 and 8.44 with an average value of 7.51. The EC ranged between 33 mS/m and 1141mS/m with an average value of 229 mS/m and sulphate concentrations ranged between 28.5 mg/L and 2 324 mg/L with an average concentration of 289.3 mg/L.

The current monitoring results indicate that the Gamsberg TSF is leaking towards the North-western corner based on an increase in water level that has been observed in the borehole at the NW corner. There is an increase in the concentration of dissolved salts (particularly as Cl and SO₄) in the boreholes located to the northwest of the TSF.

11. Impacts and mitigation measures

The potential impacts and mitigation measures that are expected from the proposed activities are presented in Table 5.



Table 5: Summary of impacts and mitigation measures

Water Use activity	Impacts of the activity on the water resources	Impacts of the activity to other water users	Mitigation Measures	Impact after mitigation
21(g) Disposal of waste into TSF	Seepage from TSF	Groundwater quality and level	Class C liner Monitoring: WQ and tailings properties & quantity; underdrains flow; decant hours and clarity, liner temperature	Low risk
	Failure causing discharge into environment	No permanent Potential Population at Risk (PAR) were identified; the N14 highway, the gravel road networks east and west of the Gamsberg plant and the TSF facility and the public gravel road south-east of the Aggeneys solar power plant will be inundated following a breach event.	Freeboard 2m; perimeter walls 100m; Emergency Preparedness and Response Plan	Loss of life following a breach event is not expected but cannot be excluded
	Dust during deposition		Dust control methods	Low
21 (c) & (i)	Disturbance of drainage line from removal of existing stormwater diversion channel	No other water users are expected to be impacted, as it is located in a self-draining catchment.	Footprint of impact will be limited to the smallest area possible, and vegetation regrowth from seedbank in topsoil is expected.	Low

12. Water demand and water supply Analysis

12.1 Water demand

The current water demand, with the Black Mountain Mine operation and Phase 1 concentrator plant at Gamsberg, is 28 ML/day, the existing intake water pumping system has been designed for 40.8 ML/day. Water required for the Gamsberg Smelter Project, would include water for the process plant, drinking, sanitation and other miscellaneous uses such as the canteen, safety showers, etc. The individual water demand for the various consumers, the existing Gamsberg Zinc Mine activities including the concentrator plant as well as the proposed smelter complex and all associated activities is presented in Table 6. The figures indicated for the towns of Aggeneys, Pofadder and Pella have considered the increased demand due to the existing and future developments, including the Phase 2 expansion of the Gamsberg Zinc Mine concentrator plant and the Gamsberg Zinc Smelter (SLR, 2021). No additional water is required for the TSF 2.

12.2 Water supply analysis

Water is currently supplied by Sedibeng Water via two existing pipelines from the Orange River. The existing water system has a common intake, low lift pump house and low lift pipeline. The low lift pumping system is feeding two circuits, namely the Black Mountain Mine circuit and the Gamsberg Zinc Mine circuit. Both the circuits consist of a flash mixer, clarifier, dosing system, sludge handling facility, balancing reservoir, high lift pump house, high lift pipelines and Horseshoe Reservoir with associated facilities. The current water demand, with the Black Mountain Mine operation and Phase 1 concentrator plant at Gamsberg, is 28 ML/day, the existing intake water pumping system has been designed for 40.8 ML/day.

13. Water Balance <<applicable to mining and industries>>

No additional water is required for the TSF 2 and the site water balance remains as per the latest version.

Table 6: Overall Water Balance (as calculated in 2021 (SLR, 2021))

Facility Name	Water In		Water Out		Balance	Comment
	Water Stream	Quantity (m ³)	Water Stream	Quantity (m ³)		
New Fresh Water Dam	Water River	48 000	Processing Plant	33 600		
			Recovery Plant	4 800		
			Dust Suppression	4 800		
			Domestic Use	2 400		
			Wash Bay	2 400		
	Total	48 000		48 000	-	Adequate
Processing Plant	Water from Fresh Water Dam	33 600	Fine Tailings	26 880		
			Evaporation	6 720		
			Total	33 600	Total	33 600
Final Recovery Plant	Water from Fresh Water Dam	4 800	Dust Suppression	3 840		
			Plant	960		
			Total	4 800	Total	4 800
Office and Workshop	Water from Fresh Water Dam	4 800	Waste water form Wash Bay and Sewage	4 800		
			Total	4 800	Total	4 800
Fine Tailing Facility	Fine Tailings	26 880	Evaporation	6 144		
			Seepage	9 216		
			Total	26 880	Total	15 360

14. Water quality

Surface water resources are not expected to be impacted on and baseline assessment of surface water quality in 2010 showed the water emerging as springs from the Gamsberg Inselberg was fit for domestic use and livestock watering. However, it must be noted that although the barium values comply on average over the monitoring period the RE were instances where certain samples did not comply with the WHO guideline concentration level for drinking water. These exceedances could be due to historical barite mining activities north of the site. Elevated nitrate concentrations in July and August 2010 were considered likely to be related to fertilizer, livestock or sanitation impacts.

Groundwater baseline assessment of 2013 showed that:

- pH varied from 5.8 to 8.7 and all but one sample were within the TWQR for domestic use (DWAF, 1996).
- Electrical conductivities ranged from 24 mS/m to 1626 mS/m and the majority of the EC values exceeded the domestic water target of 70 mS/m.
- The majority of the groundwater samples exceeded the DWAF domestic and target value (and some samples exceeded the DWAF livestock watering limits) for Cl, TDS, Sulphate, Ni, F, Ca, Mg, Na, Fe, Mn, Pb, U, Zn.

Groundwater assessment of 2019 found that:

Regional monitoring boreholes:

The pH of the groundwater samples ranged between 7.10 and 8.44 with an average value of 7.60. The EC ranged between 33 mS/m and 523 mS/m with an average value of 224 mS/m. The S04 concentrations ranged between 28.5 mg/L and 509.6 mg/L with an average concentration of 253.8 mg/l. The farm production boreholes and associated regional monitoring boreholes had elevated concentrations of As, Fe, Pb, U, EC, TDS, Na, Ca, Mg, Cl, S04, F, N03-N, and Mn above the relevant guideline limits. GHT Consulting found that the background groundwater qualities, of the naturally occurring aquifer waters of the farm areas, in general exceeded drinking water standards.

Mine Boreholes:

The pH of the groundwater samples ranged between 6.57 and 7.66 with an average value of 7.42. The EC ranged between 37 mS/m and 1141mS/m with an average value of 234 mS/m. The S04 concentrations ranged between 35.0 mg/al nd 2 324.0 mg/L with an average concentration of 324.7 mg/l.

The mine monitoring boreholes had elevated concentrations of EC, TDS, Na, Ca, Mg, Cl, F, As, Fe, N03-N, Pb, Mn, and U above the relevant guideline limits. GHT Consulting concluded that between November 2017 and April 2019 the RE were no groundwater quality impacts observed in the receiving local aquifer of the Gamsberg Zinc Mine

15. Public participation

The public participation process must be done in terms of Section 41 (4) of the National Water Act, Act no 36 of 1998. Provide details on how communication was done. The outcome of the process is summarised in Table 8.

Table 8: Outcome of the public participation

Person who commented	Comments (support/object/ concerns)	Reasons for objections/ concerns	Applicant's response to the objection/concerns
<i>To be included in Public Participation Report when completed</i>			

16. Inputs/Authorisations from other Departments /Stakeholders

- 16.1 *Environmental Authorisation
NC/EIA/NAM/KHA/AGG/2012
NCP/EIA/0000155/2012*
- 16.2 *NHRA Approval Ref. 9/2/066/0001
Case No. 2215*
- 16.3 *EMPr 2000: NC-S 5/3/2/782
EMPr 2003 Addendums: NCS 5/3/2/782
NCS 5/3/2/762
NCS 6/2/2/138
NCS 6/2/2/153
EMPr Amendment: (NCS) 30/5/1/2/3/2/1/518 EM
EMPr Section 102 Amendment: (NCS) 30/5/1/2/3/2/1/518 EM*
- 16.4 *NEM:AQA AEL*
- 16.5 *Mining Licence JM/FF 15/5/2000 ML5-2000*
- 16.6 *Biodiversity Permit: ODB 3513/2014 and ODB 3514/2014*
- 16.7 *Waste Licence, No 12/9/11/L955/8*

17. Section 27 (1)

The requirements contained in Section 27(1) of the National Water Act, 1998 (Act 36 of 1998) have been considered and are discussed further below.

a) Existing lawful water uses:

Type	Title & Reference	Description	Authorised Water Uses	Authority	Date Issued	Relevant Area
Licenses						
License	Gamsberg Zinc Mine WUL 14/D28C/ABCGIJ/2654	Water Use License (WUL)	Section 21(b), (c) (i), (g) and (j)	DWS	30 September 2014	Gamsberg
License	Gamsberg Zinc Mine WUL Amendment 14/D28C/ABCGIJ/2654	Water Use License (WUL) Amendment	Section 21(b), (c), (i), (g) and (j)	DWS	14 April 2016	Gamsberg
Regulations						
Registration	Registration for road upgrade and widening of existing road 27/2/2/D382/3/3	Water Use Registration	Section 21(c) and (i)	DWS	27 April 2019	Gamsberg
Registration	Gamsberg clean runoff attenuation system	Water Use Registration	Section 21(c) and (i)	DWS	26 September 2022	Portion 1 of the farm Gams 60 and Portion 0 of farm Aroams 57

Gamsberg Zinc Mine has an existing WUL in place, Licence No.14/D82C/ABCGIJ/2654, dated 30/09/2014 and its subsequent amendment dated 14/04/2016.

b) Need to redress the results of past racial and gender discrimination

Black Mountain Mining (Pty) Ltd's current contribution to the local service delivery and infrastructure in the area includes:

- *Residential accommodation to the majority of employees. Aggeneys currently houses the existing Black Mountain Mine and Gamsberg Zinc Mine workforce of approximately 837 permanent employees and approximately 830 sub-contractor staff. Additional accommodation is provided and secured in Pofadder and Springbok.*
- *Basic service delivery to the town of Aggeneys. This includes monitoring of resources such as water, energy as well as waste and waste recycling takes place continually to enable sustainable management of resources by all the users.*
- *Water infrastructure developed to provide potable water to Pofadder, Pella, Aggeneys and surrounding farmers (approximately 1 200 people).*
- *Directly and indirectly supporting businesses and clubs by providing additional employment and non-mine skills development and economic benefit to the area.*

In addition to the above, the Black Mountain Mine Social and Labour Plan (SLP) currently implement four projects, affecting approximately 9 000 persons positively with a total spend of approximately R 16.5 million over five years. This SLP will shortly reach the end of its 5-year period. BMM intends to implement another SLP, similar to the current, which will also include a total spend on R 19.5 million over a 5-year period. This SLP will continue to focus on primary health care, education and small, medium and micro enterprise (SMME) development (Golder, 2022b).

One objective of the NWA is to address past racial and gender discrimination and to alleviate poverty in South Africa; therefore, it is of utmost importance to support and stimulate economic development in order to realise the upliftment of Historically Disadvantaged South Africans (HDSAs). Black Mountain Mining (Pty) Ltd aims to achieve this through the following:

Social and Labour Plan

The current Social and Labour Plan (SLP) was submitted by Black Mountain Mining (Pty) Ltd in terms of the requirements of the Mineral and Petroleum Resources Development Act No.28 of 2002 (MPRDA). The objectives of this SLP are to:

- *Promote economic growth and mineral and petroleum resources development in the Republic (Section 2 (e) of the (MPRDA).*
- *Promote employment and advance the social and economic welfare of all South Africans (Section 2 (f) of the (MPRDA).*
- *Ensure that holders of mining rights contribute towards the socio-economic development of the areas in which they are operating as well as the areas from which the majority of the workforce is sourced (Section 2 (i) of the MPRDA, and the Charter); and*
- *To utilize and expand the existing skills base for the empowerment of HDSAs and to serve the community.*

In line with the objectives of the MPRDA, Black Mountain Mining (Pty) Ltd has created a pre-emptive document:

"The Life-After-Mine Vision and Transformation Strategy (March 2013)". This document provides a vision of the legacy Black Mountain Mining (Pty) Ltd endeavours to leave at completion of mining operations. This Vision is underpinned by a set of Transformation Management Strategies of which the Short Term, Medium- and Long-Term Strategies underpin the current SLP. The Human Resources Development and Local Economic Development Programmes of this SLP are in support of the Short-Term Strategies and objectives contained within the Life After

Mine Vision and Transformation Strategy. This ensures that all efforts are aligned to achieve a sustainable environment at end of life of Mine.

Black Economic Empowerment (BEE)

Black Mountain Operation and the Gamsberg Operation are held in the corporate entity Black Mountain (Pty) Ltd which is majority owned by Vedanta through THL-Zinc Limited (69.6%) with Black Economic Empowerment ownership through Exxaro Resources (24.4%) and 6% is owned by the employees through an employee share ownership programme called the "Voorspoed Trust".

Employment Equity

In line with the intentions of the Employment Equity Act, Black Mountain Mining (Pty) Ltd is committed to the strategic objectives that include having individuals from historically disadvantaged groups (including women) represented in all positions of skill and responsibility and at all levels within the next five (5) year period. Black Mountain Mining (Pty) Ltd accepts that this can only be achieved with pro-active interventions including the creation of a culture of equity and building upon the strengths that diversity brings. To this end, the company's Employment Equity Plans aim to achieve the following objectives:

- To promote diversity within the company, in order to reflect a truly South African company that is world class;
- To eliminate unfair discrimination.
- To ensure that Black Mountain Mining (Pty) Ltd is recognised as an equal opportunity employer.
- To establish and exceed the required degree of representation of designated groups in all occupational categories and levels of the company.
- To integrate the company's employment equity initiatives with the Skills Development Act (Act No. 97 of 1998) of 1998, as far as is practically possible; and
- To increase the number of women as well as HDSAs in management positions, over time and in line with the targets.

The implementation of the Employment Equity principles at Black Mountain Mining (Pty) Ltd can be guided by the following implementation principles as listed in below:

- Focus to be placed on attracting and retaining HDSAs including women.
- Creating opportunities for the focused development of historically disadvantaged South Africans to ensure that they are able to progress in their careers, thereby ensuring a representative workforce at all levels.
- Mining-related occupations to be specifically identified in the workforce plan and strategies and targets identified to support the inclusion of women into these occupations.
- Skills assessments to focus on the identification of employees with the potential to be developed into management positions, and career development plans will drive the growth and advancement of these employees.
- Appropriate skills training in line with the career path structure to be provided for HDSAs and women to ensure that they acquire the appropriate skills and competencies.
- HDSAs identified for Accelerated Development Programs to be mentored and to provide them with support and assistance to ensure that they can assume their roles with success.
- Policies directed at the facilitating the retention of HDSAs and women; and
- The progress made in recruiting (both internal and external) HDSAs into management positions and the inclusion of women in mining-related positions across all occupational levels will be reported in the Annual SLP Report.

Human Resource Development Programme

The primary objective of the Black Mountain Mining (Pty) Ltd Human Resource Development (HRD) Programme is the development of requisite skills for Black Mountain Mining (Pty) Ltd's mining operations in respect of skills development, learnerships, bursaries (for developing core and critical skills), artisans, ABET training (level I, II, III, IV and NQF 1), and other training initiatives reflective of demographics as defined in the amended Mining Charter (2018). Black Mountain Mining (Pty) Ltd will focus on developing HDSAs, with a special focus on women and youth, within its labour force through talent and career development, and within the communities through talent development and establishment of a pipeline into Black Mountain Mining (Pty) Ltd.

Black Mountain Mining (Pty) Ltd will align its HRD Programme and business strategies to ensure:

- *The business possesses the skills needed to operate optimally, over the next 5, 10, 15 years and beyond.*
- *Where skills gaps exist, HRD programmes are implemented to generate the required skills and close the gaps internally, before recruiting externally.*
- *Investment into the local and labour-sending communities to deepen and widen the talent pool from which to meet its current and future business expansion skills needs.*
- *Career Progression of the local workforce through empowerment and development programmes; and*
- *Greater access to income earning opportunities for the local communities, either through skills development for employment into the mining sector, skills development for the non-mining sector and self-employment / entrepreneurship opportunities.*

Black Mountain Mining (Pty) Ltd is committed to the development and transformation of the affected communities of operation (i.e. the Khai-Ma Local Municipality) and the major labour-sending Municipality of Nama Khoi. In order to achieve the transformation and development objectives contained within the MPRDA, the Mining Charter (2018), and VZI's commitment, Black Mountain Mining (Pty) Ltd has a strong focus on the recruitment and development of local community members as well as employees from relevant labour sending.

Black Mountain Mining (Pty) Ltd is committed to implement the required HRD Programmes in the new SLP (2019- 2023), namely ABET, Core Business Skills Training, Career Progression, Portable Skills, Learnerships, Bursaries, Internships, Developmental programmes to build a talent pool, Mentorships and Employment Equity targets (SLR, 2021).

c) Efficient and beneficial use of water in the public interest

The Gamsberg Zinc Mine is situated in the Khâi-Ma Local Municipality, which is one of six local municipalities within the Namakwa District Municipality in the Northern Cape Province.

The Khâi-Ma Municipality had a population of ~12 000 people in 2016. Population density is around one person per square kilometre, with the majority of the population living in the rural areas.

More than 92% of households live in formal dwellings, while 6.4% live in informal dwellings. The language most spoken at home is Afrikaans (95%).

Close to 45% of the working age population are unemployed. Around 80% of Black Mountain Mining (Pty) Ltd employees are from the Northern Cape, including 60% from the Namakwa district (mainly Khâi-Ma and Nama Khoi municipal areas). The main economic sectors in the Municipality are agriculture, mining, tourism and community services, with renewable energy projects now also coming online (SLR, 2021).

Gamsberg Zinc Mine employs in excess of 1479 persons, operating as the largest private employer in the Namakwa region, and Black Mountain Mining (Pty) Ltd has been stable employer for the last 30 years. Approximately 80% of the employees are from the local area, with 62% from the Namakwa, Khai-Ma and Nama Khoi municipal areas

Black Mountain Mining (Pty) Ltd is committed to best practice in terms of water use, and further endeavours to implement the strategies outlined in the IWWMP which broadly, include the following: implement the strategies outlined in the IWWMP which broadly, include the following:

- *Implementation of water conservation and water demand management resulting in the reduction of the intake of raw water into the process.*
- *Effective separation of clean and dirty water.*
- *Preferential reuse and recycling of contaminated storm water as process water; and*
- *Implementation of comprehensive monitoring programs to collect data to inform effective water management on-site (SLR, 2021).*

d) Socio-economic impact –

Evaluate the impact of the water use to be authorised in the local, regional and national perspective.

i) Of water use or uses if authorised:

The approval of the application will result in significant socio- economic impact for the local district. The anticipated socio-economic values associated with the proposed project at construction and operational phases are summarized in the table below:

Socio Economic Indicator		Construction Phase	Operational Phase
Total number of new employment opportunities to be created in the phases of this activity		760	1800
Of the opportunities above, how many are:	Women	90	450
	Women with disabilities	1	15
	Men with disabilities	1	15
	Women youth (<35)	30	70
	Men youth (<35)	215	500
Expected current value of the employment opportunities during the first 10 years: ZAR		729,6 million	8 640 million
Percentage of the above that will accrue to previously disadvantaged individuals: %		90%	90%
How many new skilled employment opportunities created in the phases of the project?		290	314
How many new un-skilled employment opportunities created in the phases of the project?		60	

The socio-economic benefits of the Gamsberg Smelter Project are assessed to have a high positive impact on the local community and local towns. This is primarily as a result of the spend of the project during both the construction and operational phases, together with the job and skills development opportunities that would be created for local communities. These opportunities would, however, only be realised if appropriate mechanisms are put in place to enhance the opportunities for local businesses to participate and to allocate a maximum number of jobs possible for local community members.

These benefits combined with similar benefits related to the Phase 2 expansion of the Gamsberg Zinc Mine, the potential creation of a SEZ around the mine and the development of numerous renewable energy projects in the area could result in significant economic benefits for the Northern Cape as a whole and the surrounding local municipalities and towns specifically. However, special effort would need to focus on upskilling the local communities (in accordance with the SLP) to allow them to be able to take advantage of the job opportunities that would become available. Furthermore, contracting and tendering strategies would need to be structured in a way that allows for smaller local companies to take advantage of the opportunities. If managed appropriately, the positive cumulative impact on the Northern Cape economy could be significant.

The 'no-go' option would not result in additional direct jobs being created during the construction phase, as well as more long-term employment opportunities for the operational phase, nor would the additional spin-off opportunities that would be generated as a result of increased spending power in the area and outside procurement of goods and services. The economic contribution of the smelter, both nationally and regionally, would not be realised due to the revenue difference between selling concentrate and final special high grade zinc metal.

A by-product of the zinc smelting (R-L-E) process is large quantities of sulphuric acid which can be sold as a raw material to other companies for use in their processing/ activities. With the 'no-go' alternative this would not be possible and attracting downstream industries to take advantage of this would not happen. And finally, should the Gamsberg Smelter Project not go ahead there would not be associated employment opportunities and project spend in the local municipality and surrounding areas as well as increased potential to implement SLP programmes and invest in the communities in terms of training and other social projects.

ii) Of the failure to authorise water use or uses:

Should the licence not be granted, the jobs referred to in d (i) will not be created.

- *Negative outcome of job opportunity loss affects the potential employees and their families for whom they may be the sole provider.*
- *Negative outcome of loss of community commitments included in the SLP.*

e) Any catchment management strategy applicable to the relevant water resource

No catchment management strategy for the Orange WMA.

f) Likely effect of the water use to be authorized on the water resource and on other water users

Water Supply from the Orange River

No additional water is required for the TSF 2.

Water required for the Gamsberg Smelter Project, would include water for the process plant, drinking, sanitation and other miscellaneous uses such as the canteen, safety showers, etc. The individual water demand for the various consumers, the existing Gamsberg Zinc Mine activities including the concentrator plant as well as the proposed smelter complex and all associated activities is presented in Table 6. The figures indicated for the towns of Aggeneys, Pofadder and Pella have considered the increased demand due to the existing and future developments, including the Phase 2 expansion of the Gamsberg Zinc Mine concentrator plant and the Gamsberg Zinc Smelter (this project). All water uses proposed fall within the 44 ML approved in the existing WUL (SLR, 2021).

Impacts to Ground and Surface Water Resources and Users in the Vicinity

Groundwater modelling was undertaken by SLR in 2020 to understand the extent of potential impacts on local groundwater and the various users thereof. Water seepage and associated contamination to groundwater from the smelter complex is not expected to contribute as potential spillages from water and/or chemical storage facilities is only expected to occur in extreme events.

A deterioration in groundwater quality was the most significant risk associated with the proposed secured landfill facility (SLF) as during the operational phase of the SLF, concentrations of sulphate, sodium, lead, and antimony are expected to increase above current background levels. The numerical groundwater flow model was setup to predict the potential impact from contaminants of concern identified by the geochemical modelling with various seepage rates. Seepage rates were estimated for operational and closure phases for unconsolidated and consolidated material as well as the installation of a Class A liner. Potential contaminant plumes of sulphate, sodium, lead, and antimony are expected to emanate from the proposed SLF in event of liner failure or leaks. The maximum operational and closure phase plume extent is expected to be a maximum of ~700 m and ~1 000 m from the SLF, respectively, predominantly in a south-westerly direction. No sensitive receptors' boreholes are located within this potential plume development area.

Due to the highly irregular surface water flow experienced in this area of the Northern Cape, water users would not be dependent on surface water resources and no impacts are considered (SLR, 2021).

g) Class and the resource quality objectives of the water resource

RQO's are currently being developed for the Orange Water Management Area.

h) Investments already made and to be made by the water user in respect of the water use in question

The following table summarizes the Capex indicators of the project:

Capex Indicator	Value ZAR
<i>Anticipated CAPEX of the project on completion:</i>	<i>882 000 000</i>
<i>Expected capital value of the activity on completion:</i>	<i>8 856 000 000</i>
<i>Expected yearly income that will be generated by or as a result of the activity:</i>	<i>8 208 000 000</i>

i) Strategic importance of the water use to be authorised

DWS should take the National Water Resource Strategy (NWRS, June 2013) into account when evaluating a WULA to ensure that the principles of the NWA and the National Water Policy are taken into consideration in this project. The objectives of the NWRS are as follows (NWRS, June 2013):

- o To achieve that water supports development and the elimination of poverty and inequality.*
- o To ensure that water contributes to the economy and job creation; and*
- o To ensure that water is protected, used, developed, conserved, managed and controlled in an equitable and sustainable manner. Further, as indicated above, authorising the proposed water uses will result in economic benefits for the region and country as a whole as well as increasing the numbers of employment positions available for skilled and unskilled workers.*

In addition, water use for power generation has been declared a strategic water use in the NWRS. The Gamsberg Smelter Project is not considering power generation at this stage, however, at a later stage the potential for renewable power for the Gamsberg Smelter Project is being considered (SLR, 2021).

j) The quality of water in the water resource which may be required for the Reserve and for meeting international obligations

No RQOs have been published for D82C.

k) Probable duration of any undertaking for which a water use is to be authorised

The Life of Mine is expected to be 19 years, therefore the WUL should be issued for 20 years.

18. Declaration by the applicant with signature confirming that the information submitted is correct.

Pieter David Venter

Signature: Applicant

28 February 2024

Date

Designation: Environmental Manager

[END OF WULA SUMMARY REPORT]