

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT AMENDMENT APPLICATION

MINING RIGHT HOLDER: DMRE Ref No.:	Afrimat CM KZN Central (Pty) Ltd FS (059) 10060 MR
OPERATION NAME:	Bethlehem Quarry
REPORT NUMBER:	AFM-BET_007-26
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REVIEW RECORD

DATE ^{!!}	VERSION	DESCRIPTION	RESPONSIBLE PERSON	ROLE / POSITION
17-Aug-26	Draft 0.0	Drafted report	Ashleigh Vorster	Author
18-Aug-26	Draft 0.1	Internal review	Lynn Jones	Supervising Author
19-Aug-26	Draft 1.0	Client review *	Violet Sheshe Thabiso Shinga Asavela Siqangwe	Mine Manager Environmental Officer Environmental Specialist
21-Aug	Draft 1.1	Report for Public Review	Ashleigh Vorster	Author
	Final	Final report for signature		

!! The report has been reviewed in sections, with the date of the most recent review included above.

* The purpose of the client review is to

- confirm technical aspects
- provide confirmation / additional information as requested by notes in the report
- provide input to the Impact Management Outcomes and Impact Management Actions that become binding upon approval of the document

ACCEPTANCE OF REPORT FOR PUBLIC REVIEW

	NAME	DATE	SIGNATURE
Author	Ashleigh Vorster	19 August 2026	
Client	Violet Sheshe	19 August 2026	

On behalf of Afrimat Aggregates (KZN) (Pty) Ltd – Bethlehem Quarry, I confirm that I have read and understood the contents of this Report.

I accept this Report to be the final version and offer signature of agreement.

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EXECUTIVE SUMMARY

Bethlehem Quarry is an opencast aggregate mine, within the Dihlabeng Local Municipality and Thabo Mofutsanyane District Municipality in the Free State province. The site is situated approximately 4km south of the Bethlehem Central Business District (CBD) and borders the R26, which connects the town of Bethlehem to Fouriesburg.

The site currently includes a quarry pit from which dolerite is mined by conventional opencast bench mining methods (including drilling and blasting), then processed through crushing and screening plants to produce aggregate and crusher sand.

Existing Authorisation: Quarrying operations at Bethlehem Quarry were already well established by 1958. A Mining License was issued the previous owners of in 1995 (12/1995) and converted to a New Order Mining Right in 2010 – FS (59) MR. An amended Environmental Management Programme (EMPr) was submitted and approved in January 2010.

Project Summary

Following a site inspection by the DMPR¹, Afrimat was instructed to amend the approved EMPr to address concerns identified. As the changes to the approved EMPr (2010) do not trigger any listed activities in terms of the NEMA² EIA³ Regulations, 2014⁴, the application is being made as an amendment to the EMPr – as confirmed with the competent authority (the DMPR). The approved EMPr report is being upgraded to address the following:

1. Pre-Compliance Notice received from the DMPR,
2. To align the contents of the approved Environmental Management Programme report (EMPr) to GN R 982 as amended,
3. To address the physical changes that have taken place since the approval of the current EMPr, and
4. Change in ownership of the Bethlehem Quarry.

Scope of the EMPr Upgrade:

- **Excluded:** BHM Bricks (the block plant within the Mining Right area) is excluded from the scope of this EMPr Amendment as the Erf 4038 has been subdivided. BHM Bricks has ownership of Portion 1 of Erf 4038. See Appendix 10.3 for the Letter from the Dihlabeng Local Municipality confirming the subdivision.
- **Included:** The stockpile area located to the north-east of the Mining Right (MR) boundary, as well as the overburden stockpile located to the west of the MR boundary, are not currently included within the approved MR boundary. As these activities are integral to the mining operation and part of the 'mining and related activities', they are included in the scope of this EMPr.

A separate Section 102 Application is being undertaken to exclude the block plant and incorporate the north-eastern stockpile area and the western overburden stockpile into the MR. This Section 102 application does not form part of the EMPr amendment process.

EMPr Amendment Process:

The upgrade of the EMPr to consider the changes described above are being undertaken in terms of Chapter 5 of the EIA Regulations, 2014⁵. The changes being documented in the upgrade of the EMPr **do not** trigger any listed activities in terms of the EIA Regulations, 2014. Furthermore, the changes do not result in any *additional* impacts not identified in the approved EMPr (2010).

Site Description:

Sources of information presented below are as follows, indicated by the corresponding letter in [], with references included in the body of the report:

- [E]: taken from the approved EMPr and Social and Labour Plan (SLP),
- [V]: based on observations during the site visit in March 2026,
- [L]: taken from literature,
- [M]: based on monitoring data, and
- [S]: taken from specialist studies undertaken since 2010.

¹ Department of Mineral and Petroleum Resources

² National Environmental Management Act, 1998 (Act No. 107 of 1998)

³ Environmental Impact Assessment

⁴ GN R 982, as amended

⁵ Environmental Impact Assessment Regulations, 2014 as amended

	<u>Distance</u>	<u>Description of key features and direction indicated in [], if applicable</u>
Neighbouring land uses [M]:	Adjacent	Undeveloped / vacant or agricultural land, Wolhuterskop Nature reserve [N & W], and the R26 [E].
	~2km	Undeveloped / vacant or agricultural land, Wolhuterskop Nature reserve and wetlands [SW, W, NW], Loch Athlone dam and associated wetlands [SE], and Residential areas (urban and small holdings).
	3-5km	Town of Bethlehem [N, NE], Undeveloped / vacant or agricultural land (including cultivation), Small holdings
Existing infrastructure [M]:	Bethlehem Quarry is an existing opencast aggregate mine and includes all infrastructure typically related to such a land use; opencast pit, haul roads, crushing and screening plant, various stockpiles, workshop, admin building, and weighbridge.	
Geology [E & S]:	The geology of the site consists of the Tarkastad Subgroup (a geological unit of the Beaufort Group of the Karoo Supergroup), which has been intruded by dolerite sills and dykes.	
Soil [L & E]:	Soils in the vicinity of the mine are classified as yellow and greyish soils with a high base status and minimal development, usually shallow (< 450 mm) and on hard or weathering rock with or without intermittent diverse soils.	
Topography [L]:	The topography of the site is steeply sloping west to east; a gradient of 1:6.6.	
Surface water [S]:	No natural watercourses occur within the MR area. Non-perennial drainage features occur west and southwest of the quarry, while mapped wetland areas occur mainly to the north, east and southeast, namely; an unchanneled valley bottom wetland, a hillslope seepage wetland, and a floodplain wetland. The latter wetlands occur in association with Loch Athlone Dam (listed as a Rank 6 wetland) and the Jordaan River floodplain.	
Ground water [S]:	The rocks in the study area are consolidated masses, and generally have very little, if any, primary porosity and permeability. Their water storage and transmission properties arise as a result of secondary processes of fracturing, faulting and weathering. Based in literature, • Groundwater recharge is likely to range from 25 to 37mm per annum. • Groundwater potential is classified as low, with an average borehole yield of less than 0.5 l/s (1.8m³/h), while higher yields are not uncommon, these are associated with major faults and fractured dolerite dyke margins. • Groundwater level in the area is around 9 to 10 metres below ground surface. The principle that the water-table mimics surface topography in hard rock environments is adopted (due to the lack of adequate groundwater level data). • Groundwater quality is generally good and suitable for human consumption, with the average Electrical Conductivity (EC) reported as 70 mS/m, and the nearest borehole (450 m north of the mine) have and EC of 47 mS/m.	
Climate [S & E]:	The area is characterised by summer rainfall, cold winters and moderate to hot summers. Seasonal fluctuations in temperature are noted with higher temperatures (maximum >24°C) being recorded between October and March and colder conditions being typical from May to August (maximum <19°C). Monthly rainfall also displays a seasonal trend with higher rainfall typically being recorded from October to January (>80mm / month) and May to August being the “dry season” (<15mm / month), with the number of rainfall days following a similar trend. The area is characterised by dominant ENE winds (blowing for more than 1160 hours per year), followed by WSW and W (blowing for more than 750 hours per year), for each direction.	
Air Quality [S]:	Sources of air pollution in the area (particulate matter and fugitive dust) include: • Cultivation and windblown dust from exposed surfaces, • Vehicle emissions, • Domestic fuel burning (fires for space heating and cooking) • Periodic veld fires, and • Emissions from the industrial areas of Bethlehem Modelling results predict the following: • <u>PM₁₀</u>: The annual average PM₁₀ limit and daily PM₁₀ concentrations are not predicted to exceed legislated thresholds at the identified sensitive receptors. • <u>Dust Fallout (DFO)</u>: No exceedances residential limit at the sensitive receptors. • Measured DFO rates on the MR boundary (during 2025 and 2026) have been below 620 mg/m²/day.	

Sound / Noise [M]:	Environmental Noise Monitoring is undertaken annually at Bethlehem Quarry and considers the following parameters; Noise survey results for daytime measurements recorded between 06:00 and 22:00 during the 2023 and 2025 surveys.		
		2023	2025
		Laeq dB (A) ⁶	Laeq dB (A)
	Test station 1	47.4	56.7
	Test station 2	53.2	58.9
	Test station 3	54.5	36.7
	Test station 4	56.3	36.6
Ecology / Terrestrial Biodiversity [S]:	According to MB Botanical Surveys (2026) Bethlehem Quarry falls within Ecological Support Area (ESA) 1 and 2, with the natural vegetation on site comprising of Eastern Free State Sandy Grassland. Additionally, Feathers ES (2021) and (2026) states that the site is located within an Important Bird Area (IBA); Rooiberge-Riemland IBA (SA048) where over 300 bird species have been recorded.		
Heritage and Palaeontology [S]:	According to Umlando (2026), several heritage features have been identified within the vicinity of the MR area, including stone walling for a kraal and sangars, two possible graves and isolated artefacts which are likely remnants from the 2 nd Anglo-Boer War (Battle of Wolhuters Kop / Battle for Bethlehem), with only “Kraal 1” being inside the MR area. No sites of Palaeontological concern have been identified.		
Socio-economic [E]:	Bethlehem Quarry is located within the Dihlabeng Local Municipality, which is a Category B municipality situated in the Thabo Mofutsanyana District Municipality in the Free State Province. Bethlehem Quarry currently employs 36 people, with the following business having established in the vicinity, due to activities at Bethlehem Quarry - BHM Bricks.		
Ecological Sensitivities [S & L]:	The <u>Ecological sensitivities</u> identified in the vicinity of the Bethlehem Quarry are listed below.		
	FEATURE	COMMENT	
	NFEPA ⁷ Rivers	Jordaan River system within 500m of the mine	
	Wetlands	Three (3) wetland features identified Within 500m of the MR: 1. Flood line wetland 2. Unchanneled valley-bottom 3. Seep	
	Critical Biodiversity Area (CBA)	None within 5km of the site	
	Ecological Support Area (ESA)	ESA 1 present within the MR and surrounds, to the South, South-east, and South-west - ESA 2 present within the MR and surrounds, to the North, and North-east	
	Protected areas (PA)	No National or Provincial PA within 5km of the site Municipal PA adjacent to the site	
	Important Bird Area (IBA)	Rooiberge-Riemland IBA (SA048)	
	Heritage Impact Assessment (HIA)	Eight (8) heritage related findings made: 1. 2 x Grave sites 2. 2 x Sagnar sites	3. 1 x Kraal 4. 1 x Stone Cairn 5. 2 x LSA features

⁶ Logarithmic Average Sound Pressure Level (Daytime)

⁷ National Freshwater Ecosystem Priority Areas

Impact Assessment

Impact Management Outcomes:

OPERATIONAL PHASE	Om-1.	No legal non-compliance notices are received in terms of environmental legislation*.
	Om-2.	Environmental management documentation required in terms of the prevailing environmental legislation are valid (not expired) and accessible on-site.
	Om-3.	New activities requiring authorisation under prevailing legislation are not undertaken prior to application for and granting of said authorisation by the competent authority.
	Om-4.	Identified sensitive areas (including buffers) outside the final footprint are not physically disturbed through mining and related activities (excluding existing disturbance).
	Om-5.	In all areas where land clearing is required, the top layer of soil / overburden is removed and stored to be available for rehabilitation.
	Om-6.	Stored soil remains viable for use in rehabilitation (i.e. is not contaminated)
	Om-7.	Mining practices do not limit closure options.
	Om-8.	Areas of the site that are visible from off-site will appear orderly.
	Om-9.	Fly-rock (from blasting) does not leave the mining right area.
	Om-10.	USBM limits are not exceeded at the sites of vibration measurement, when measuring off-site.
	Om-11.	No exceedances of the dustfall <u>standards</u> beyond permitted frequency.
	Om-12.	Sound level measurements on the mining right boundary, due to sound emissions from mining and related activities, do not increase the background sound levels* by more than 7dB above the baseline.
	Om-13.	Identified heritage sites are not disturbed without legal permission.
	Om-14.	Municipal water sources are only used as process water (such as dust suppression) for processing when no alternative water sources are available.
	Om-15.	Uncontrolled* release of 'dirty' water* from the EMPr area does not occur.
	Om-16.	Water discharged from EMPr area is "clean"
	Om-17.	Storage of waste does not result in pollution of soils, surface or ground water.
	Om-18.	Sanitation holding tanks do not cause pollution of soils, surface or ground water.
	Om-19.	Only licensed / registered service providers are used for off-site waste management activities.
	Om-20.	Storage, handling, and use of hazardous liquids does not result in pollution* of soils, surface or ground water.
	Om-21.	Water from 'hydrocarbon contamination risk areas'* does not flow over bare soils.
	Om-22.	'Dirty' water* containing hydrocarbons are collected at source and cleaned on-site.
	Om-23.	Staff and contractors are aware of their roles and responsibilities with regards to environmental management.
	Om-24.	Energy consumption will be managed according to ESG requirements.
	Om-25.	Interested and affected parties (I&AP) complaints (received by the mine) are investigated, and the identified corrective actions implemented.
	Om-26.	Stored topsoil will be protected to remain viable for use in rehabilitation.
	Om-27.	The AIS (vegetation) within the MR area is managed.
	Om-28.	Where no further mining or related activities are planned to occur on exposed surfaces outside of the pit, these will be rehabilitated.
	Om-29.	During the operational phase of the mine, rehabilitation and closure requirements, as per the prevailing legislation, are adhered to.

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ABBREVIATIONS / ACRONYMS

AIS	Alien Invasive Species
BEE	Black Economic Empowerment
B.Sc.	Bachelor of Science
BGIS	Biodiversity Geographic Information System
CAPEX	Capital Expenditure
CBA	Critical Biodiversity Area
CBD	Central Business District
CV	Curriculum Vitae
CVB	Channelled valley bottom
DFO	Dust Fallout
DMPR	Department of Mineral and Petroleum Resources
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Electrical Conductivity
EXCO	Executive Committee
EI	Ecological Importance
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EMS	Environmental Management System
ES	Ecological Sensitivity
ESA	Ecological Support Areas
FEL	Fron-end Loader
GN R	Government Notice Regulation
H&S	Health and Safety
HCR	Health Care Risk
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Parties
IAIAAsa	International Association of Impact Assessments, South Africa
IBA	Important Bird Area
IDP	Integrated Development Plan
IMA	Impact Management Actions
IMO	Impact Management Outcome
ISP	Intermediate Stockpile Product
LaRSSA	Land Rehabilitation Society of South Africa
MA	Management Action
MAE	Mean Annual Evaporation
MAP	Mean Annual Precipitation
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
MHSA	Mine Health and Safety Act, 1996 (Act No. 29 of 1996)
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MR	Mining Right
MSDS	Material Safety Data Sheet (also referred to as SDS)
M.Sc.	Master of Science
MWP	Mine Works Programme
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act, 2008 (Act No. 10 of 2004)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Areas
NPI	Australian National Pollutant Inventory
NWA	National Water Act, 1998 (Act No. 36 of 1998)
OH&S	Occupational Health and Safety
PA	Protected Areas

PM	Particulate Matter
PoS	Proof of Submission
PPP	Public Participation Process
Pr.Sci.Nat.	Professional Natural Scientist
QE	Quarry Entrance
SABAP2	South African Bird Atlas Project 2
SACNASP	South African Council of Natural Scientific Professions
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SAWQG	South African Water Quality Guidelines
SAWS	South African Weather Services
SCC	Species of Conservation Concern
SDS	Safety Data Sheet
SEI	Site Ecological Importance
SEMA	Specific Environmental Management Acts (that fall under the auspices of the overarching NEMA)
SHEQ	Safety, Health, Environment, and Quality
SHE	Safety, Health, and Environment
SLA	Service Level Agreement
SLP	Social and Labour Plan
SOG	Soap, Oil and Grease
SWM	Storm Water Management
SWMP	Storm Water Management Plan
USBM	United States Bureau of Mines
VOCMA	Vaal-Orange Catchment Management Agency
WUL	Water Use License
WULA	Water Use License Application

SYMBOLS AND UNITS

°C	Degrees Celsius
km	kilometres
m/s	metres per second
mamsl	metres above mean sea level
mg/m ² /day	milligram per metre squared per day
mS/m	Milliseconds per meter
NO _x	Nitrogen oxides
PM ₁₀	Thoracic particulate matter
PM _{2.5}	Respirable particulate matter
SO ₂	Sulphur dioxide
tpa	tons per annum
μ	microns

GLOSSARY OF TERMS

The Glossary of Terms includes those terms used in this Environmental Management Programme report that are not defined in legislation. This is provided to avoid ambiguity and facilitate use and understanding of this report. Where these words are used in the report, they are marked with an * when the definition needs to be highlighted.

- Activity:** This is a specific deed, action or function, that takes place at the operation, such as (but not limited to); All mining and related activities.
- Aspect:** “A particular part or feature of something” – definition from the Oxford Dictionary. Considered to be a direct effect / consequence of an *activity*, which has an influence on the *environment* (and is neither categorised as positive or negative), such as; Stockpiling of product results in noise, the noise being the *aspect* of the *activity*.
- Avoid:** The potential impacts identified will not occur if the Impact Management Actions are implemented.
- ‘Clean’ (in term of surface water run-off / flow):** Water carrying only sediment from bare areas such as roads, and stockpiles.
- Contamination risk areas:** Areas where routine activities are undertaken that have the potential to result in a large scale, or repeated small scale, spillages of hydrocarbons or hazardous chemical. Examples include; , a hydrocarbon and / or hazardous chemical storage area, a vehicle service area, a refuelling area, a waste storage area where hydrocarbon contaminated waste and / or hazardous chemical waste is stored.
- ‘Dirty’ water:** Water, where the quality has been altered as a result of mining and related activities to such an extent that this water would cause pollution of off-site water bodies if released.
- Disposal:** The burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land.
- Domestic water:** Water used for the toilets, showers, and hand basins.
- EMPr area:** Currently includes NEMA and the SEMAs.
- Environment:** (as defined in NEMA): The surroundings within which humans exist and that are made up of; the land, water and atmosphere of the earth; micro-organisms, plant and animal life; any part or combination of the above, and the interrelationships among and between them; and the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing;
- Environmental legislation:** Currently includes NEMA and the SEMAs. The definition can be expanded to include other environmentally related legislation, if legislation pertaining to environmental management is promulgated after the approval of this EMPr.
- Final Waste Management:** Where waste is handled for the last time at a “waste management facility”.
- Hydrocarbon contaminated risk areas:** Areas where hydrocarbons are stored or handled on a regular basis, such as (but not limited to) the workshop, oil store, wash-bay.
- Impact:** The end-result of an *aspect* that occurred due to an *activity*, resulting in an influence on the *environment*, which is either categorised as positive or negative (a subjective categorisation), such as; Stockpiling of product results in noise (*aspect*) which can be a nuisance to surrounding I&AP (the *impact*).
- Incident:** An unintended event that results in pollution / an undesirable off-site impact or a transgression of environmental legislation*.
- Manage:** The severity of the potential impact will be reduced (for negative impacts) / enhance (for positive impacts) as a result of the implementation of the Impact Management Actions.
- Mining:** The process of extracting mineral resources from the quarry pit.
- Mining and related activities:** All activities undertaken within the EMPr area that are necessary for ‘Mining’ and ‘Processing’ to be undertaken. This includes ‘Supporting Services’ as described in this report.

- Mitigate:** Impacts cannot be avoided or managed; however, the severity will be reduced by post impact actions. After an impact has occurred, the implementation of the Impact Management Actions will reduce the significance of the negative impact.
- Municipal water:** Water provided by the Municipality - suitable for human consumption.
- New activities:** Activities that are not being undertaken at the time of drafting this EMPr and will result in a change in the impacts identified and described in this EMPr.
- Non-compliance:** Where requirements in terms of environmental legislation* are not implemented / an offence is committed in terms of environmental legislation*.
- Non-conformance:** Where requirements in terms of Afrimat environmental Policies and Procedures are not implemented.
- Objectives:** A thing aimed at or sought; a goal. (Oxford Dictionary definition)
- Outcomes:** The way a thing turns out; a consequence. (Oxford Dictionary definition)
- Spoilt material / Overburden:** A combination of sand and decomposed rock that is not currently viable to process into aggregate and / or sand products. If a demand for such material becomes available, this overburden may be sold.
- Pollution:** When used in the context of pollution resulting from – “storage, handling, and use of hazardous liquids” and “waste management”. A change in the nature or chemical composition of the ‘receiving environment’ in such a manner that the functioning of the ‘receiving environment’ is impaired and / or causes irreversible harm to living organisms.
- Processing:** The crushing and screening of rock that this extracted from the quarry pit during mining.
- Process water:** Water used in the production of aggregate.
- Potable water:** Water used for human consumption.
- Recycling:** The action or process of converting waste into reusable material. (Oxford Dictionary definition)
- A process where waste is reclaimed for further use, which process involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material. (NEM:WA)
- Reportable incident:** An incident reported in terms of Section 30 of NEMA and / or Section 20 of the NWA.
- Re-use:** The action of using something again. (Oxford Dictionary definition)
- To utilise the whole, a portion of or a specific part of any substance, material or object from the waste stream for a similar or different purpose without changing the form or properties of such substance, material or object. (NEM:WA)
- SEMAAs:** Specific Environmental Management Acts that fall under the auspices of the overarching National Environmental Management Act (NEMA), viz.:
- NEM:PAA - National Environmental Management: Protected Areas Act (57 of 2003)
- NEM:BA - National Environmental Management: Biodiversity Act (10 of 2004)
- NEM:AQA - National Environmental Management: Air Quality Act (39 of 2004)
- NEM:ICM - National Environmental Management: Integrated Coastal Management Act (24 of 2008)
- NEM:WA - National Environmental Management: Waste Act (59 of 2008)
- Sensitive areas / species⁸:** An ecological area (an area of natural resources) or species that is capable of registering or being affected by small changes which will adversely impact the ecology of the area or specific species within the area.
- Settlement dam:** Earth walled settlement area located in the south-eastern corner of the Mining Right area, where sediment-rich water is pumped to allow sediments to settle, and water to evaporate. There is no return flow from this facility to the plant.
- Supporting Services:** Activities that are undertaken in support of ‘Mining’ and ‘Processing’, such as (but not limited to) maintenance, workshop activities, fuel storage, and water use.
- Topsoil:** Surface soils on which vegetation is growing; soils removed may include boulders that can be removed by FEL.

⁸ Although the term “sensitive” is used throughout the Environmental legislation, no definition is provided in NEMA or NEM:BA. This definition has been developed from dictionary definitions to best explain its use in this report.

Uncontrolled release: The release of 'dirty' water from bare surfaces within the EMPr area without filtration or a period of settlement. This excludes storm water run-off over vegetated surfaces.

Waste Management Facility: "means a place, infrastructure, structure or containment of any kind, wherein, upon or at, a waste management activity takes place and includes a waste transfer station, container yard, landfill site, incinerator, a lagoon, recycling or a composting facility" [as per GNR 634].

DECLARATION BY THE ENVIRONMENTAL PRACTITIONER

Umhlaba Environmental Consulting CC has been appointed by Afrimat Aggregates (KZN) (Pty) Ltd (the 'client') to compile the amendment application report (in terms of Regulation 32 of GN R 326) and amend the Environmental Management Programme report (EMPr) in response to the Pre-Compliance Notice received by the Department of Mineral and Petroleum Resources (DMPR) on 12th December 2026.

I, Ashleigh Vorster representing, Umhlaba Environmental Consulting CC declare that:

- I have been appointed as an independent consultant to undertake the work described above.
- I am an independent consultant and do not have and will not have any vested interest (either business, financial, personal or other), other than remuneration for work performed in terms of the legislation being implemented here.
- I undertake to disclose to the Mining Right holder and / or client (if not the Mining Right holder) and / or competent authority any material information that may have relevance to the work being undertaken.
- This report correctly reflects the proposed activities based on information provided by the representatives for the Mining Right holder and / or client.
- Although representatives for the Mining Right holder and / or client are asked to review the report, the information is presented objectively and input from the Mining Right holder and / or client is requested to confirm technical details and to confirm their ability and willingness to achieve the Outcomes through the implementation of the proposed management actions.

Ashleigh Vorster

Ashleigh Vorster
B.Sc. Honours & M.Sc.

Date: 19 August 2026

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1 INTRODUCTION

Bethlehem Quarry is an opencast aggregate mine, within the Dihlabeng Local Municipality and Thabo Mofutsanyane District Municipality in the Free State province. The site is situated approximately 4km south of the Bethlehem Central Business District (CBD) and borders the R26, which connects the town of Bethlehem to Fouriesburg (Figure 1-1). (Details of the applicable authorisations, contact details, and the history of the operation are included in Section 1.2).

The site currently includes a quarry pit from which dolerite is mined by conventional opencast bench mining methods (including drilling and blasting), then processed through crushing and screening plants to produce aggregate and crusher sand.

1.1 REASON FOR THIS AMENDMENT APPLICATION

The reasons for the EMPr Amendment application include the following (explained below):

1. To address the Pre-Compliance Notice received from the Department of Minerals and Petroleum Resources (DMPR),
2. To align the contents of the approved Environmental Management Programme report (EMPr) with the requirements of GN R 982 as amended,
3. To address the physical changes that have taken place since the approval of the previous EMPr in January 2010 (hereafter referred to as the 2010 EMPr), and
4. Acknowledge the change in ownership of the Bethlehem Quarry.

Pre-Compliance Notice:

Bethlehem Quarry received a Pre-Compliance Notice in terms of Section 31L of the NEMA⁹ dated 12th December 2025. In the notice, the DMPR instructed that Bethlehem Quarry is to:

- Compile and submit an updated EMPr in terms of the NEMA EIA¹⁰ Regulations, 2014¹¹.
- Improve Stormwater Management on site.
- Improve Waste Management practices on site.
- Improve dust control / emission emitting from the plant.

Alignment to GN R 982:

The amendment of the approved EMPr report will reflect the following changes:

- A. Update the Impact Assessment to reflect the outcomes of the specialist studies undertaken after the approval of the 2010 EMPr.
- B. Align the format of the EMPr to comply with the requirements in terms of the NEMA EIA Regulations, 2014. This will include, but is not limited to:
 - setting Impact Management Outcomes (not in the current EMPr), and
 - expanding on the monitoring requirements in order to achieve the Outcomes.
- C. Establish Closure objectives for the mine.

Physical changes:

After the approval of the 2010 EMPr, various activities are no longer being undertaken. These include:

- Concrete Batch Plant
- Bitumen Batch Plant
- Washing Plant

Change in ownership:

When the 2010 EMPr was approved, Bethlehem Quarry was under management of W.G Wearn Limited. In 2016, Afrimat Aggregates (KZN) (Pty) Ltd took over ownership of the Bethlehem Quarry.

⁹ National Environmental Management Act, 1998 (Act No. 107 of 1998)

¹⁰ Environmental Impact Assessment

¹¹ GN R 982, as amended

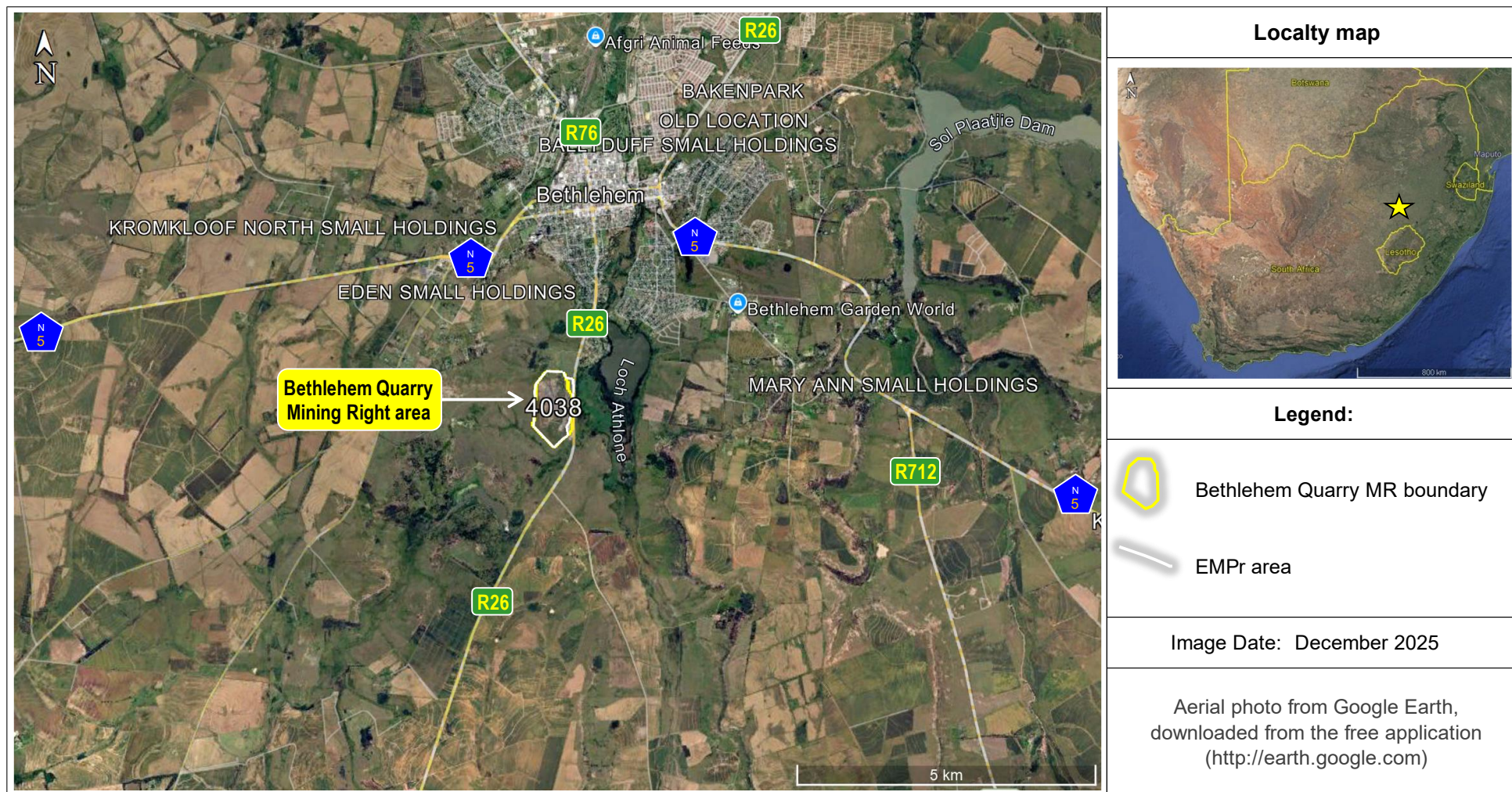


Figure 1-1: Aerial image¹² showing the location of Bethlehem Quarry in relation to major roads and surrounding areas.

¹² Aerial photo and map from Google Maps - application can be downloaded free from <http://earth.google.com>

1.2 EMPR AMENDMENT PROCESS

When considering the EMPr Amendment Process to follow, it must be noted that mining activities authorised in terms of the MPRDA¹³ prior to 2014 do not have a separate Environmental Authorisation (EA) document. The EMPr is generally considered the EA.

The upgrade of the EMPr to consider the changes described above (in Section 1.1) are being undertaken in terms of Chapter 5 of the EIA Regulations, 2014. The changes being documented in the upgrade of the EMPr **do not** trigger any listed activities in terms of the EIA Regulations, 2014. Furthermore, the proposed changes do not result in any *additional* impacts not identified in the approved 2010 EMPr.

The amendment application triggers a Part 4 amendment (Regulation 37) in terms of the EIA Regulations, 2014.

The process to follow for a Part 4 amendment requires a Public Participation Process (PPP) of which the competent authority (the DMPr) is required to give input during the PPP.

For reference purposes, a description of the process is given below, with reference to the relevant sections of the EIA Regulations, 2014 (the EMPr report outline is included in Section 1.5):

1. Consultation with DMPr to confirm / agree on the following: - Which amendment process to follow in terms of Chapter 5 of G NR982 (Section 29 to Section 38). - Requirement to undertake the Public Participation Process (PPP).	Regulation 37(2)
2. This application will include the Impact Management Outcomes proposed for inclusion in the amended EMPr, as a means of allowing an opportunity for the competent authority to highlight any major concerns before submitting the amended EMPr. [It is recognised that the competent authority reserves the right for further comment upon submission of the final Amended EMPr.]	Regulation 37(4)
3. Subject the report to a PPP and invite comments from Interested and / or Affected Parties (I&AP), as agreed to by the competent authority. This process must be appropriate to "bring the proposed change to the attention of potential and registered interested and affected parties, including organs of state, which have jurisdiction in respect of any aspect of the relevant activity, and the competent authority". The consultation / review period must be at least 30 days.	Regulation 37(2) Regulation 37(4)
4. A decision on the application will be made, in writing, within 107 days of receipt of the report. Although a Part 4 amendment process requires a decision within 30 days (with written approval given within 5 days of decision), it is acknowledged that the longer time period is required for review of the EA Amendment Application component of this application.	Regulation 37(8) Regulation 37(9)
5. Within 14 days of the date of the DMPr decision, the applicant must inform the parties who submitted comments of the decision, to the fact that an appeal may be lodged against the decision in terms of the National Appeals Regulations (if such appeal is available in the circumstances of the decision).	Regulation 37(9)(c)

1.3 DETAILS OF THE MINING OPERATION

Details of the authorisations applicable to Bethlehem Quarry are given below (Table 1-1), following by the relevant contact details applicable at the time of drafting this EMPr (Table 1-2) and the history of the operation (Table 1-3), included for ongoing record purposes.

Table 1-1: Authorisation details.

MINING RIGHT NUMBER:	FS (059) 10060 MR		
DATE OF ISSUE:	24 th February 2022	EXPIRY DATE:	23 rd February 2052

¹³ Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)

MINING RIGHT HOLDER:	Afrimat Aggregates (KZN) (Pty) Ltd
OPERATION NAME:	Bethlehem Quarry
AUTHORISED MINERALS:	Dolerite
MINING RIGHT AREA:	65,8862 ha ¹⁴
ADMINISTRATIVE DISTRICT:	Bethlehem Magisterial ¹⁴
PROPERTY DESCRIPTION:	PORTIONS & FARMS
	The Farm Erf 4038 ¹⁵
PREVIOUS APPROVED EMPR & ADDENDUMS:	See Section 10.1
EMPR:	Environmental Impact Assessment and Environmental Management Programme, January 2010. Approved 27 th January 2010
OTHER ENVIRONMENTAL AUTHORISATIONS:	
	None.
HISTORIC MINING AUTHORISATIONS:	
	Old order Mining Right - 12/1995

Table 1-2: Mining Right holder / Mine Operator contact information.

	MINE MANGER	ENVIRONMENTAL PERSONNEL	HEAD OFFICE SUPPORT
JOB TITLE:	Mine Manager	Regional Environmental Officer	Area Manager KZN Central
CONTACT: *	Violet Sheshe	Thabiso Shinga	Anton Marnewick
TEL NO.:	058 303 5665	067 416 5966	058 623 2891
E-MAIL:	violet.sheshe @afrimat.co.za	thabiso.shinga @afrimat.co.za	anton.marnewick @afrimat.co.za

Note: * The names of personnel included above are applicable to these roles at the time of drafting the EMP. These may change from time to time.

¹⁴ As per the approved Mining Right

¹⁵ As per Chief Surveyor-General Map (<https://csggis.drdlr.gov.za/psv/>) last updated 09 March 2026

1.3.1 History of the Mine

The history of activities and authorisation is provided in Table 1-3, for record purposes. (All dates - day, month and year - of relevant authorisations - are included in Table 1-1, and only the year is indicated below.)

Table 1-3: History of the mine.

YEAR	DESCRIPTION
1958	The date that mining activities started is not confirmed – earliest images of the mine available (Limosella, 2026).
1968-1986	Bethlehem Quarry operated by the Local Municipality.
1986	W.G Wearn (Pty) Ltd acquired Bethlehem Quarry.
1995	Mining License acquired - 12/1995
2005	EMPr approved - in terms of the requirements of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA), as amended.
2009	Drafting of mining right conversion
2010	New Order Mining Right acquired – FS (59) MR
2010	EMPr Amendment approved – in terms of the requirements of the Minerals and Petroleum Resources Development Act, Act No. 28 of 2002 (MPRDA), as amended.
2016	Afrimat Aggregates (KZN) (Pty) Ltd acquires Bethlehem Quarry.
2022	Mining Right renewal – FS (059) 10060 MR
2052	Expiry of Mining Right

The progression of the Bethlehem Quarry since the approval of the 2010 EMPr, is depicted in Figure 1-2, showing the changes to the quarry pit and site layout.

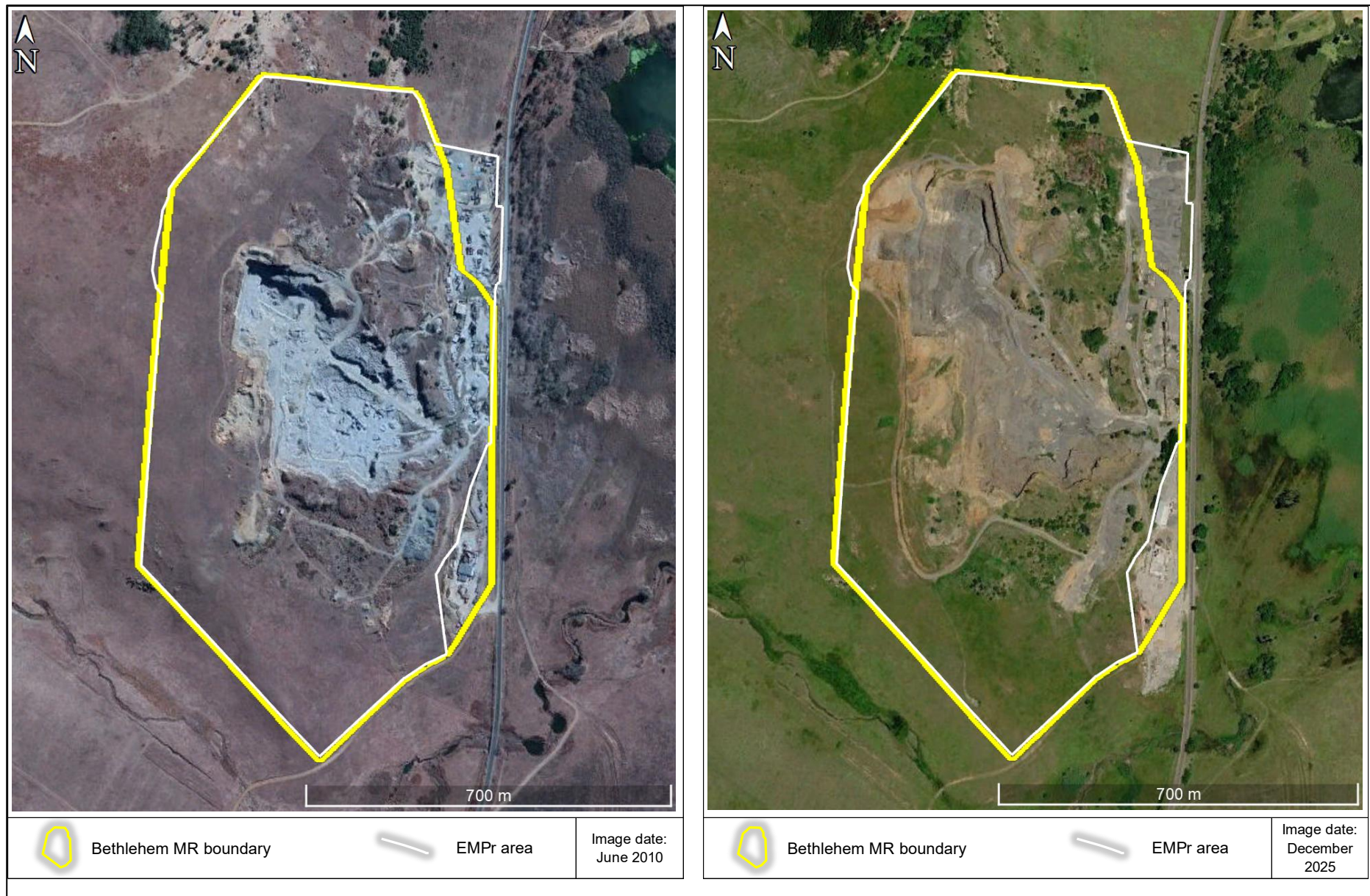


Figure 1-2: Progression of the Bethlehem Quarry since the approval of the 2010 EMPr .

1.3.2 Scope of the EMPr

Note: The physical area considered in this EMPr Amendment (hereafter referred to as the EMPr area) is depicted by the white boundary on all applicable maps (the current approved Mining Right boundary is depicted by the yellow boundary). The EMPr area is defined as there are non-mining related activities taking place within the MR area (see excluded below) and stockpile areas located outside of the MR area (see included below).

- **Excluded:** The block plant is excluded from the scope of this EMPr Amendment

BHM Bricks are excluded from the scope of the EMPr as the Erf 4038 has been subdivided. BHM Bricks has ownership of Portion 1 of Erf 4038. See Appendix 10.3 for the Letter from the Dihlabeng Local Municipality confirming the subdivision.

- **Included:** The stockpile area located to the north-east of the MR area, as well as the overburden stockpile located to the west of the MR area, are not currently included within the approved MR boundary.

A separate Section 102 Application is being undertaken to exclude the block plant and incorporate the north-eastern stockpile area and the western overburden stockpile into the Mining Right.

1.4 DETAILS OF THE EAP¹⁶ PREPARING THE EMPr

GN R982 of NEMA: **Appendix 4 (1)(1)(a)**

Table 1-4: Details of the Environmental Assessment Practitioner (EAP)

	LEAD CONSULTANT	ASSISTING CONSULTANT
COMPANY:	Umhlaba Environmental Consulting CC	Umhlaba Environmental Consulting CC
NAME:	Ashleigh Vorster	Lynn Whittington-Jones
PROFESSIONAL REGISTRATIONS:		
Organisation:		South African Council of Natural Scientific Professions (SACNASP) ¹⁷ - Environmental Science - Zoological Science
Membership No.		400076/05
Date of Registration:		March 2005
AFFILIATIONS / MEMBERSHIPS:		
Organisation:	Institute of Waste Management of Southern Africa (IWMSA)	International Association of Impact Assessments, South Africa (IAIAsa)
Membership No.	202205646	1454
Date of Registration:	May 2022	April 2005
Organisation:		Land Rehabilitation Society of South Africa (LaRSSA)
Membership No.		44800
Date of Registration:		October 2019
CONTACT DETAILS:		
TEL NO.:	011 791 3389	011 791 3389 084 626 1704
E-MAIL:	ashleigh@umhlaba.co.za	lynn@umhlaba.co.za

1.4.1 Lead Consultant

Ashleigh Vorster holds a B.Sc. Honors and M.Sc. in Environmental Management from the North-West University. She has four years of experience within the mining industry, coming from a mid-tier aggregate mining company. Ashleigh has experience with the compilation of Environmental Management Programmes,

¹⁶ Environmental Assessment Practitioner

¹⁷ It is mandatory for all practicing natural scientists to be registered in terms of the Natural Scientific Professions Act, 2003 (Act No. 27 of 2003) (Sections 18 (1) and 20(2)(a)).

Environmental Audit Reports and Rehabilitation Reports. Ashleigh has been involved with a variety of Water Use License applications from initiation to final submission of Phase 3. She also holds knowledge on Financial Guarantees and Provisions. Ashleigh has successfully completed three rounds of the ASPASA About Face Audit protocols (both online and physical). She has assisted and lead 30 different audits over three years, with 27 out of 30 operations awarded Showplace recognition. Ashleigh has been recognised for her commitment to environmental management in 2023 and 2024 during the annual Institute of Quarrying Conference, with three sites under her responsibility earning top performing awards within the About Face Audit division. She was recently awarded the “Young Professional of the Year” Award by the IQSA.

A full curriculum vitae (CV) is included in Section 10.2.1

1.4.2 Assisting Consultant

Lynn Whittington-Jones has a B.Sc. Honours in Geology and a M.Sc. in Zoology, which has been followed by various courses, concentrating on environmental monitoring and environmental legal requirements. Lynn has been working in the field of Environmental Consulting since 2000 and is a registered Professional Natural Scientist (Pr.Sci.Nat.) in the fields of Environmental Management and Zoology. She started her career in air quality management and dustfall monitoring, progressing into more general consulting primarily in the mining and related industries. Lynn’s professional career has concentrated on project management of EA, environmental auditing (as lead or assistant auditor), and environmental monitoring. Her auditing experience is both legally required audits of EA and auditing as part of a SHEQ¹⁸ team for international companies. In the monitoring arena, Lynn has designed and managed long-term dustfall and water quality monitoring networks and specialised in the interpretation of the results in order that they serve as a constructive tool for environmental management.

A full curriculum vitae (CV) is included in Section 10.2.2

1.5 STRUCTURE OF THE REPORT

The structure of the amended EMPr follows the requirements of Section 24N of NEM and Appendix 4 of GN R 982.

The outline of the document is described in Table 1-5.

Note: Although there are on substantial changes to the EMPr (as outlined in Section 1.1), additional information has been included based on specialist studies undertaken and monitoring data that has been recorded since 2010. Where there are notable changes to information from the 2010 EMPr are included, these are noted with a ► either at the applicable text / map / table, or in the section heading.

¹⁸ Safety, Health, Environment, and Quality

Table 1-5: Structure of the EMPr document

SECTION NO.	HEADING / TABLE CAPTION / FIGURE CAPTION	LEGAL REQUIREMENT FOR EMPr	
		NEMA SEC 24N	GRN 982 APPENDIX 4
1	Introduction		
1.1	Reason for this Amendment		
1.2	EMPr Amendment Process		
1.3	Details of the Mining Operation		
1.4	Details of the EAP Preparing the EMPr	2(b)(i)	1(1)(a)(i)
2	Description of the Site		1(1)(b)
2.1	Neighbouring Land Uses		
2.2	Existing Infrastructure		
2.3	Geology		
2.4	Soils		
2.5	Wetlands		
2.6	Water Resources		
2.7	► Sound / Noise Water		
2.8	Climate		
2.9	Air Quality		
2.10	Sound / Noise		
2.11	Ecology / terrestrial Biodiversity		
2.12	► Heritage and Palaeontology		
2.13	Socio-economic Setting		
2.14	Ecological Sensitivities		
3	Public Participation Process		
3.1	Description of the Public Participation Process		
3.2	Comments and Response Report		
4	Description of Activities Covered in the EMPr	2(c)	1(1)(b)
4.1	Construction Phase Activities		
4.2	Operational Phase Activities		

SECTION NO.	HEADING / TABLE CAPTION / FIGURE CAPTION	LEGAL REQUIREMENT FOR EMPR	
		NEMA SEC 24N	GRN 982 APPENDIX 4
4.3	Potential Environmental Incidents / Emergencies		
4.4	Concurrent Rehabilitation and Alien Vegetation Control		
4.5	Decommissioning and Closure Phase		
5	Impacts / Risks Associated with the Mining Activities		
5.1	► Infrastructure in Relation to Environmental Sensitivities		
5.2	Impact and Risk Identification		
5.3	Impact Management Outcomes and Statements		
6	Impact Management and Reporting on Compliance	2(a) & (g)	
6.1	Impact Management and Monitoring		
	The following are included in Table 6-2		
	- Impact Management Outcomes (taken from Section 5)		1(1)(d)
	- Impact Management Actions (IMA)		1(1) (f)
	- Method of Monitoring the implementation of the IMA		1(1) (g)
	- Frequency of Monitoring the implementation of the IMA		1(1) (h)
	- Person Responsible for the implementation of the IMA	2(d), 3(b)	1(1) (i)
	- Time frame for implementation of the implementation of the IMA	3(a)	1(1) (j)
	- Mechanism for Monitoring compliance with the IMA	2(e)	1(1) (k)
	Concurrent rehabilitation measures	2(f)	
6.2	Programme for Reporting on Compliance		1(1)(d)
7	Environmental Awareness Plan	3(c)	1(1)(m)
8	Specific Information Requested by Competent Authority		
9	References		
10	Appendices		
10.1	Previous Approvals of the EMPr		
10.2	Experience and Expertise of EAP	2(b)(ii)	1(1)(a)(ii)

SECTION NO.	HEADING / TABLE CAPTION / FIGURE CAPTION	LEGAL REQUIREMENT FOR EMPR	
		NEMA SEC 24N	GRN 982 APPENDIX 4
10.3	Confirmation of the subdivision of Portion 1 of Erf 4038 Bethlehem		
10.5 to 10.12	Specialist Studies applicable to this EMPr		
10.13	Environmental Impact Assessment Methodology		

2 DESCRIPTION OF THE SITE AND SURROUNDS

The information presented in this Section is summarised from the “Description of the Affected Environment” in the 2010 EMPr and updated with more recent information, if relevant (with references included). A detailed Baseline Description of pre-mining conditions is not included as this is an existing operation.

Bethlehem Quarry was established in the 1950s, with the quarry being evident in the 1958 aerial images (Limosella, 2021). Historic aerial images¹⁹ show that the area had been highly transformed through mining and related activities by 1974 (Figure 2-1). Hence the description included in this EMPr is a representation of the transformed state of the site (not the pre-mining environment).



Figure 2-1: Aerial images²⁰ showing the existence of the mine in 1974. (MR area indicated by the yellow line.)

As the “Baseline Description” of the previously approved EMPr (also referred to as the 2010 EMPr) included limited information and a number of specialist studies have been undertaken since the 2010 EMPr was drafted (see list below), the bulk of the information presented in the section is updated. Hence the update symbol ‘►’ is applied to the Section heading and not to each sub-section or image.

Specialist studies undertaken since 2020 and reference in this Section of the report include:

- Aquatic Biodiversity Assessment (Limosella Consulting, 2021) – revised in 2026
- Avifaunal Impact Assessment (Feathers Environmental Services, 2021)
- Avifaunal Impact Assessment Confirming Statement (Feathers Environmental Services, 2026)
- Air Quality Impact Assessment (Waste Aside, 2021) – revised in 2026
- Botanical Impact Assessment (MB Botanical Surveys, 2021) – revised in 2026
- Geohydrological Impact Assessment (Water without Frontiers, 2021) - revised in 2026
- Heritage Impact Assessment (Umlando, 2026)
- Stormwater Management Plan (ZTD Group, 2026)

¹⁹ Available on the CDNGI Geospatial Portal (see address below), accessed 7th May 2026

²⁰ Aerial photo obtained from <http://cdngiportal.co.za/CDNGIPortal/>

2.1 ► NEIGHBOURING LAND USES

Bethlehem Quarry is surrounded by local authority nature reserves / protected areas; the Wolhuterskop Nature Reserve to the north, west and south, and the Loch Athlone Bird Sanctuary to the east (Limnosella, 2026 and MB Botanical Survey, 2026).

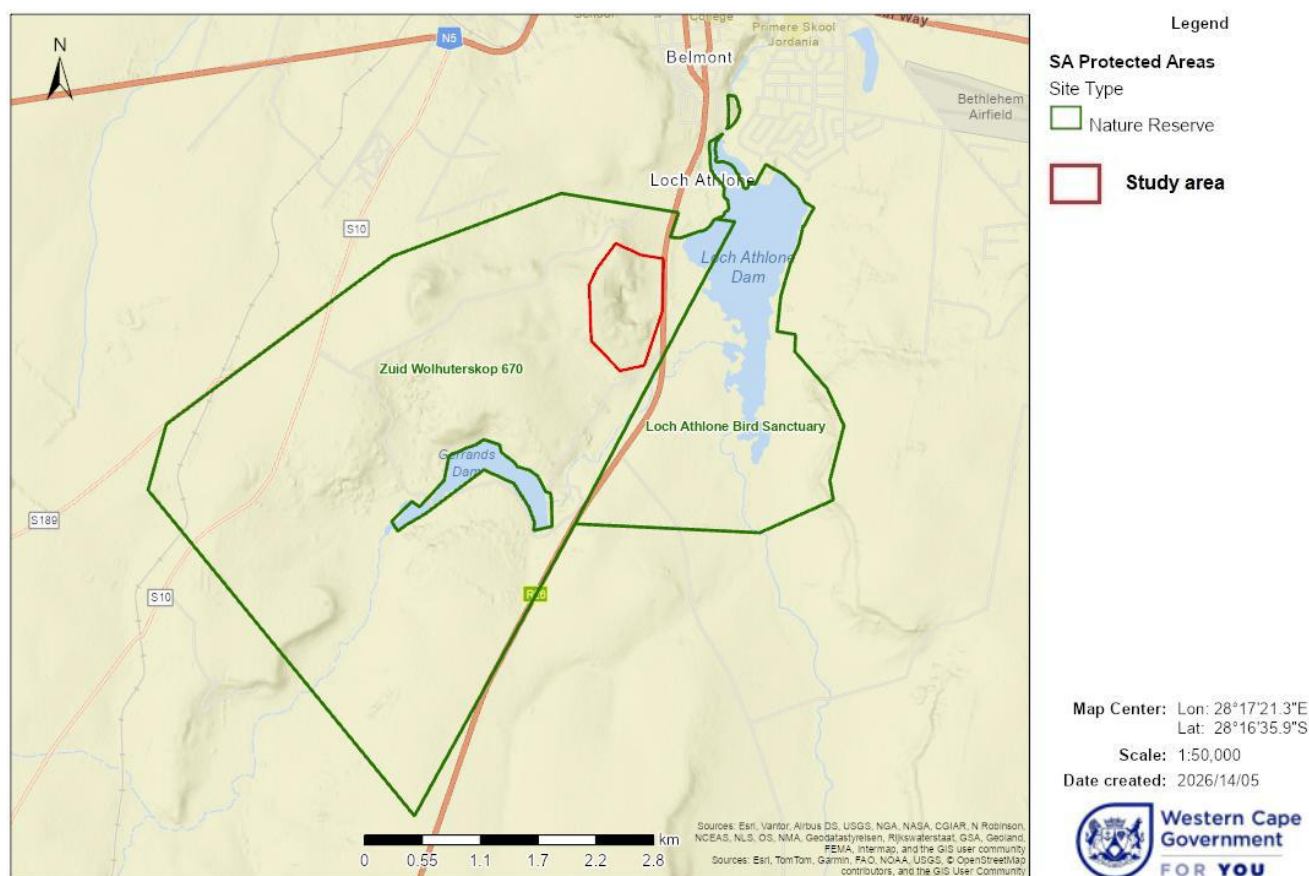


Figure 2-2: Bethlehem Quarry in relation to surrounding protected areas (MB Botanical Surveys, 2026)

Current neighbouring land uses within a 5km radius of the centre point of the EMPr area, are depicted in Figure 2-3 and described in Table 2-1, with direction and approximate distance from the EMPr area given. The town of Bethlehem is located to the north of the mine and land-use activities within the town are marked with a *.

Table 2-1: Direction, distance (from the EMPr area), and description of neighbouring land uses.

DIRECTION	DISTANCE	DESCRIPTION
North	Adjacent	Agriculture & Wolhuterskop Nature Reserve
	~5km	* Education – primary, secondary and tertiary institutions
		* Residential
North-east	Adjacent	Wolhuterskop Nature Reserve & Loch Athlone Dam
	~560m	Provincial road (R26)
		* Recreational – Bethlehem Bowls club
	~5km	* Education – various primary and secondary institutions
		* Light industrial and Commercial activities
		Small-scale airport / landing strip
East	Adjacent	National road (N5)
		Loch Athlone Bird Sanctuary & Loch Athlone Dam
	~5km	Provincial road (R26)
South-east	Adjacent	Light industrial and Commercial activities
		National road (N5)
	~5km	Loch Athlone Bird Sanctuary & Loch Athlone Dam
South	Adjacent	Provincial road (R26)
		Light industrial and Commercial activities
	~5km	Agriculture
South-west	Adjacent	BHM Bricks & Wolhuterskop Nature Reserve
		Agriculture
	~5km	Wolhuterskop Nature reserve
West	Adjacent	Agriculture
		Education – Mont Reve Primary School
	~5km	Wolhuterskop Nature reserve
North-west	Adjacent	Light industrial and Commercial activities
		Agriculture
	~5km	Wolhuterskop Nature reserve
		* Education – New Horizon College
		Agriculture
	~5km	* Residential
		National road (N5)

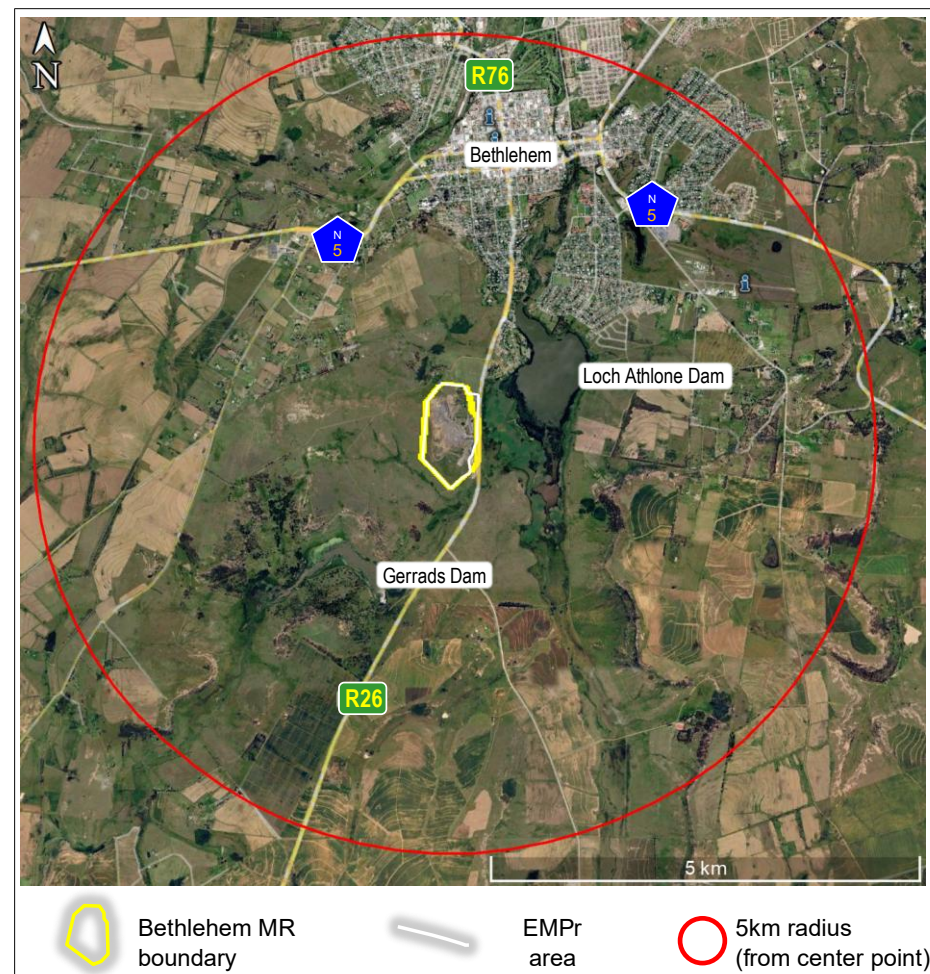


Figure 2-3: Aerial images showing the neighbouring land uses within a 5km radius of the centre point of the Bethlehem EMPr area.

2.2 EXISTING INFRASTRUCTURE

The following infrastructure and features are present on-site, as illustrated in Figure 2-4 (more detail provided in Figure 4-1, page 4.5)

- Entrance gate (next to Admin buildings)
- Admin buildings, and associated infrastructure (such as, but not limited to car park, offices, ablutions, etc.)
- Topsoil stockpile area
- Overburden stockpiles, east and west of the pit
- Quarry pit and haul roads
- Reservoir (storage of municipal water)
- Primary jaw crusher
- Plant, including secondary crushing plant, screens, and product bins
- Product stockpile areas
- Weighbridge
- Workshop, including
 - Oil stores
 - Wash-bay
- Change house
- Electrical infrastructure (supply for the admin building and plant)
- Water reticulation infrastructure

Note: As the block plant is not part of the Bethlehem quarry, it is not included in this description – refer to Section 1.1.

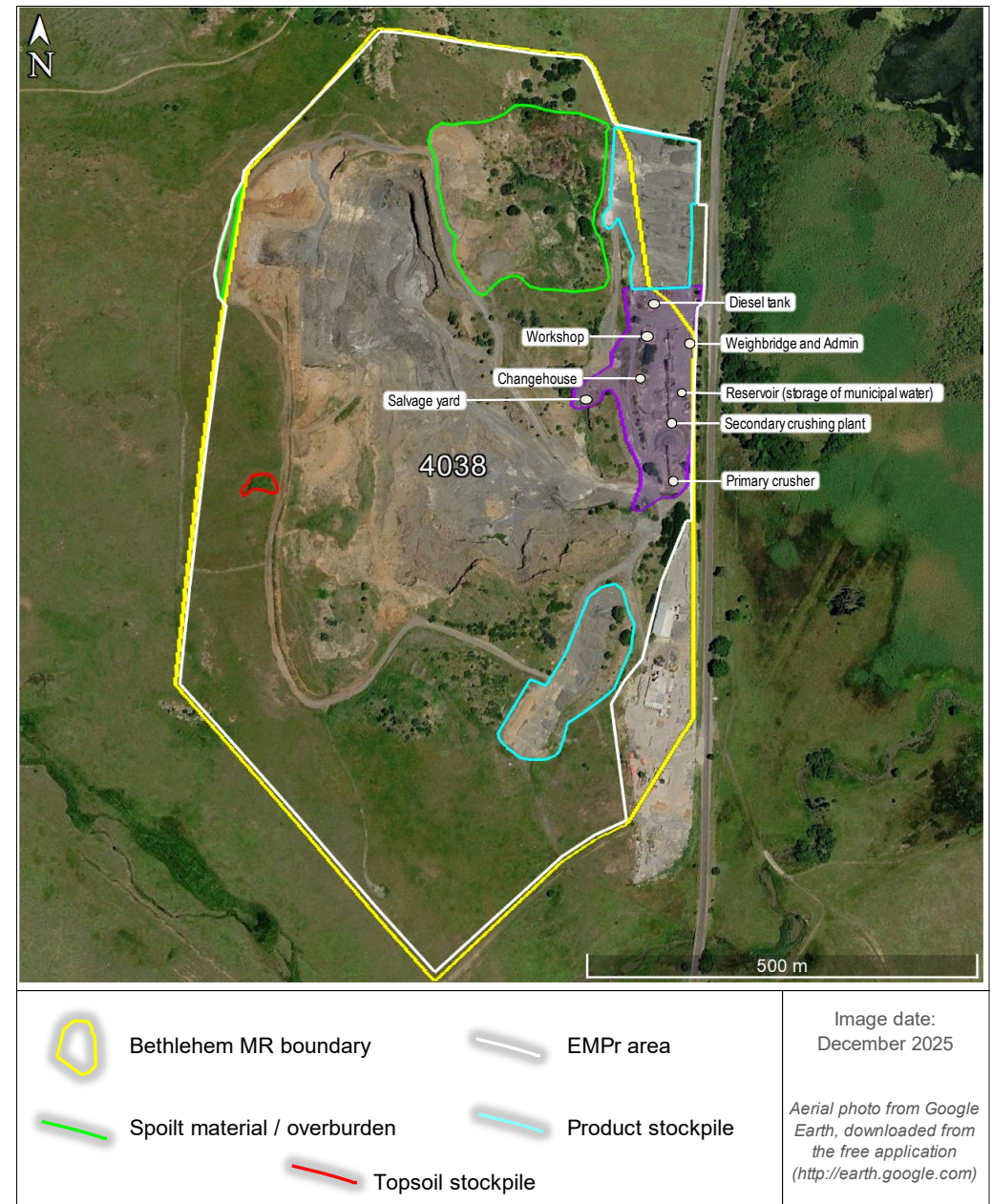


Figure 2-4: Aerial images showing the existing infrastructure within the Bethlehem EMPr area.

2.3 ► GEOLOGY

*The following information is taken from the approved EMP, 2010 and the Geohydrological Impact Assessment completed by Water Without Frontiers, 2021 and reviewed during 2026
The full Geohydrological report (2026 version) is included in Section 10.5*

Regional Geology

The geology of the area includes the Karoo Supergroup (which consists of a broad spectrum of Carboniferous to Jurassic strata) capped by an outpouring basaltic lava. Some of the magma did not reach the surface but solidified at depth to form dolerite dykes and sills that have been exposed by erosion. See Figure 2-5 below.

Site Specific Description

The area in which the mine is located is dominated by the middle to the upper layers of the Karoo Super-group. These layers include the Beaufort Group, represented by the Tarkastad Subgroup at the site, consisting predominantly of mudstone interbedded with subordinate sandstone. The sedimentary units have been intruded by dolerite dykes and sills which are abundant in the study. Due to their superior resistance to weathering and erosion the dolerite intrusions form hills that are widespread in the area. Bethlehem quarry is extracting dolerite from one of these hills.

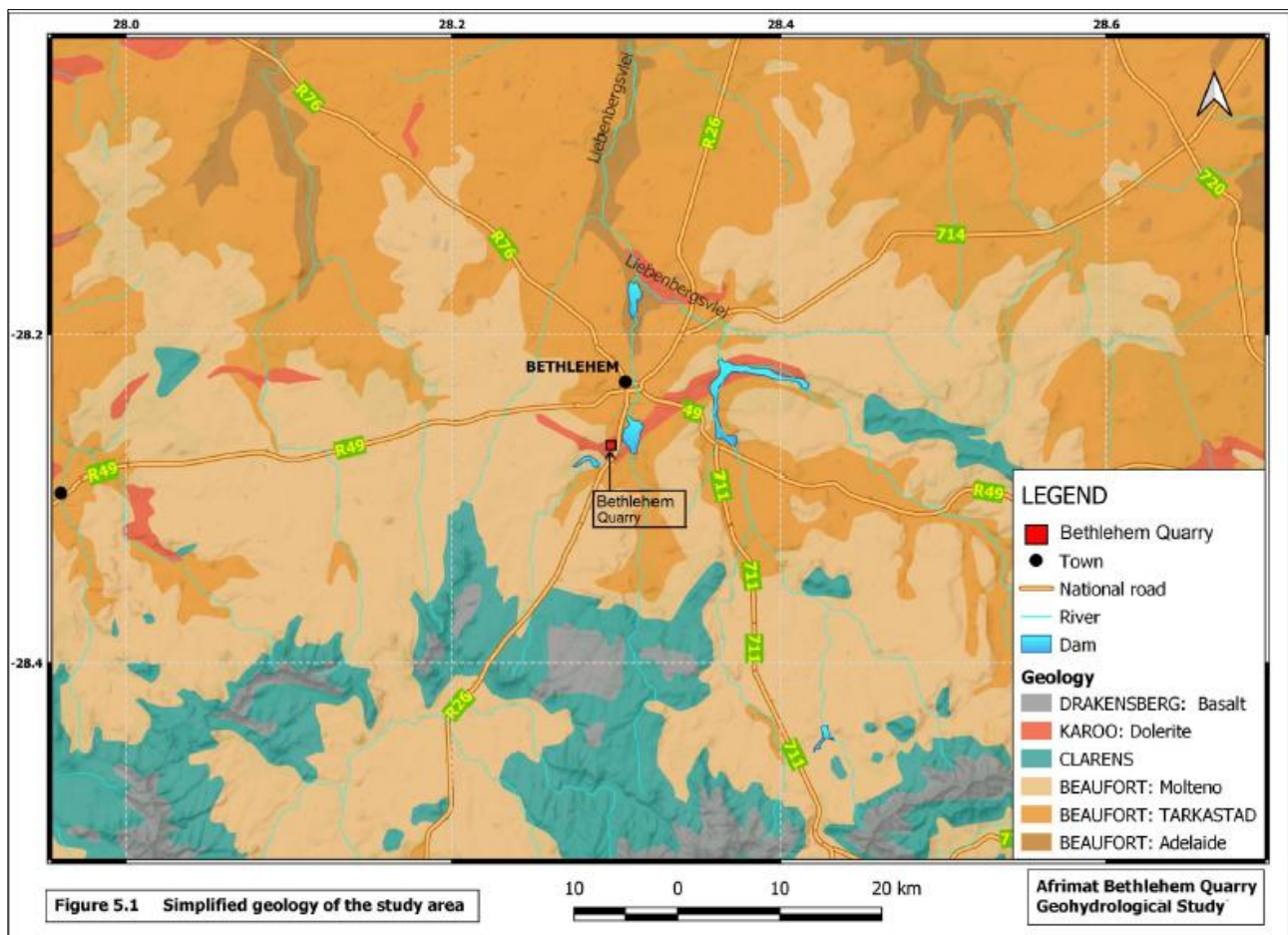


Figure 2-5: Simplified geology of the study area (Water Without Frontier, 2026)

2.4 SOILS

The following information is taken from the 2010 EMPr

The soil depth is < 450 mm. The soil is described as having a marked clay accumulation, strongly structured and reddish in colour^{21A}. The immediate surrounding soils are classified as red-yellow and greyish soils with a high base status and soils with minimal development, usually shallow on hard or weathering rock with or without intermittent diverse soils. Lime is rare or absent in the landscape. The soil clay classes are between 15% and 35%^{21B}. The soil in the immediate area of the study is described as prisma-cutanic and / or pedocutanic with dominant diagnostic horizons and the B horizon mainly not red. The soil potential is described as soils of poor suitability for arable agriculture where the climate permits^{21B}.

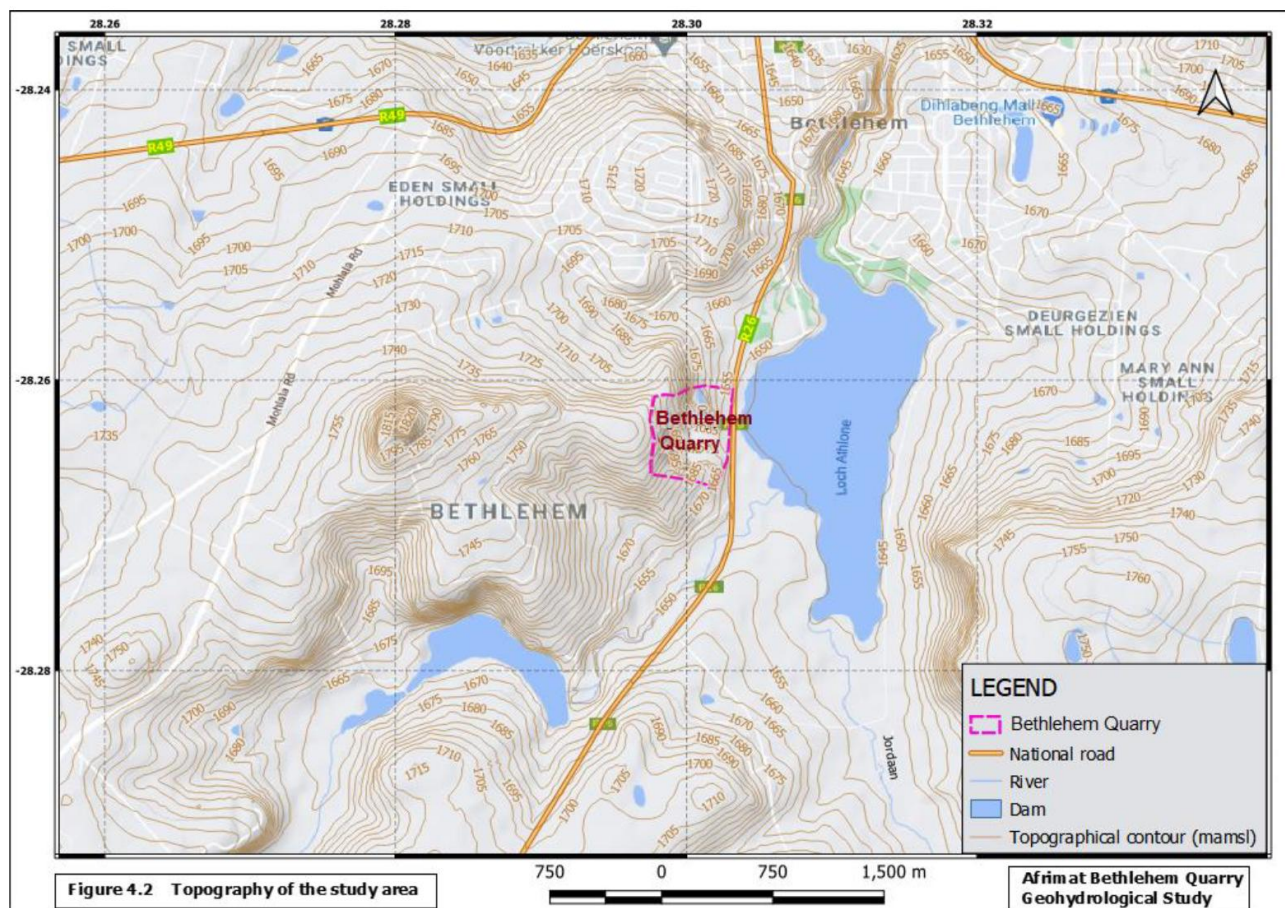
2.5 ► TOPOGRAPHY

The following information is taken from Geohydrological Impact Assessment completed by Water Without Frontiers, 2021 and reviewed during 2026

The full report (2026 version) is included in Section 10.5

Localised Topography

The area in which Bethlehem Quarry is located characterised by moderate relief, with ground elevation rising from 1 645 metres above mean sea level (mamsl) at the perimeter of Loch Athlone Dam (to the east of the mine), to about 1 820 mamsl at the peak of the dolerite ridge on which quarrying is taking place; a change in elevation of 175m over a distance of ~2.3 kilometres.



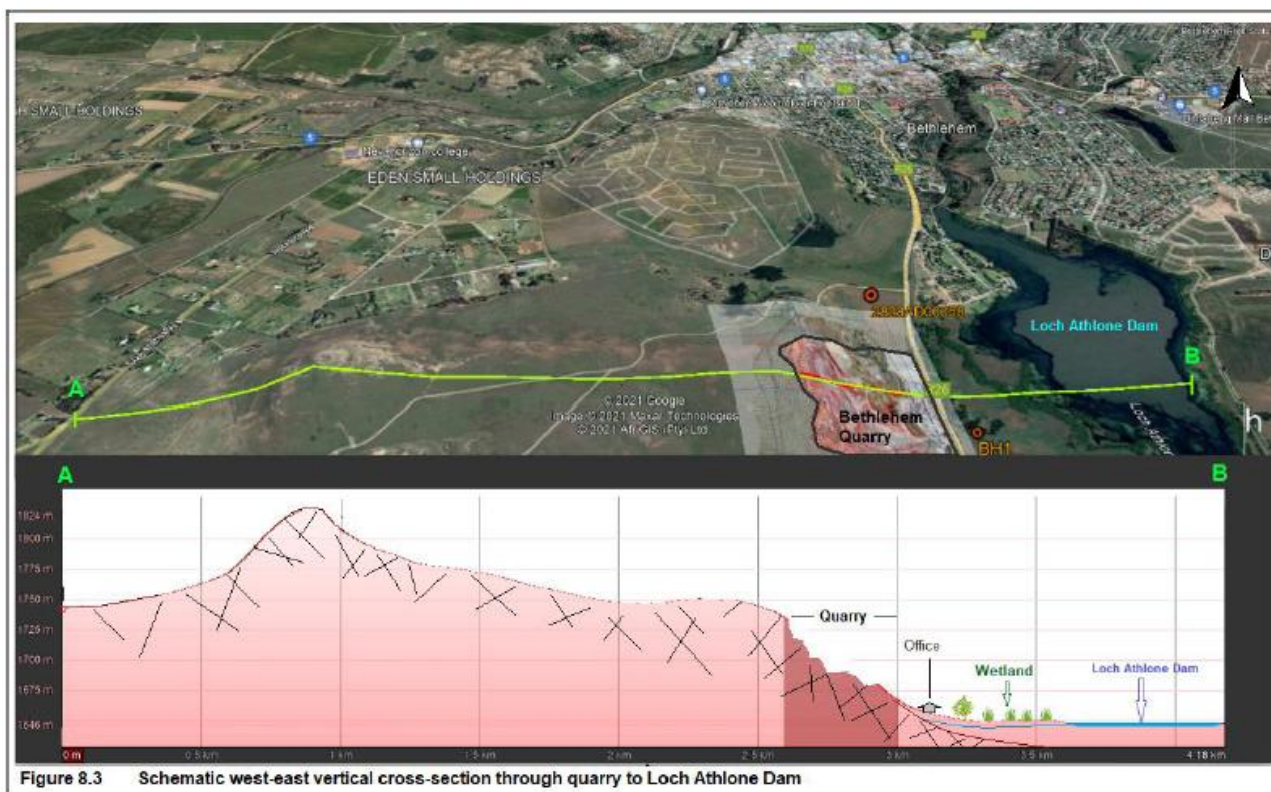


Figure 2-7: Schematic west-east vertical cross-section through Bethlehem Quarry to Loch Athlone Dam (Water Without Frontiers, 2026).

2.6 ► SURFACE WATER RESOURCES

The following information is taken from • the Aquatic Biodiversity Assessment undertaken by Limnosella Consulting during 2021 and revised in 2026, and • the Avifaunal Assessment undertaken by Feathers Environmental Services during 2021 and confirmed during 2026.

The full report (2026 version) is included in Section 10.6 and Section 10.7, respectively.

Catchment Management Area:	Vaal-Orange, managed by the Vaal-Orange Catchment Management Agency (VOCMA)
Water Management Area:	#5 Vaal; major rivers include the Wilge, Liebenbergsvlei, Mooi, Renoster, Vals, Sand, Vet, Harts, Molopo and Vaal
Quaternary Catchment:	C83B
Description in the greater hydrological area:	Non-perennial drainage features occur west and southwest of the quarry, while mapped wetland areas (described in detail below) occur to the north, east and southeast; the latter occurring in association with Loch Athlone Dam and the Jordaan River floodplain (Figure 2-6 and Figure 2-8). Two nearby dams are listed as Rank 6 wetlands, Loch Athlone Dam to the east and Gerrards Dam 1.36km to the south (the latter being up-stream of the mine). The relative locations are shown in Figure 2-6 and Figure 2-8. The classification and hydrological setting indicate that the quarry is positioned within a sensitive downstream aquatic context, even though no natural watercourse occurs within the MR area.
Drainage on-site:	Drainage is towards the Loch Athlone Dam (part of the Jordaan River system).

Information above is from Limosella, 2026.

Rivers and Dams

The rivers within the vicinity of the mine include the Jordann River and a tributary (which flows out of Gerrards Dam), both flowing into the Loch Athlone Dam (located ~590m directly west / adjacent to and down-stream of the MR area), refer to Figure 2-6 and Figure 2-8. Loch Athlone Dam discharges into the Jordaan River, which flows into the Liebenbergsvlei River and ultimately into the Vaal Dam. (Limosella, 2026).

According to the National Screening Tool, the Jordaan River is classified as “Very High Aquatic Sensitivity” (Limosella, 2026).

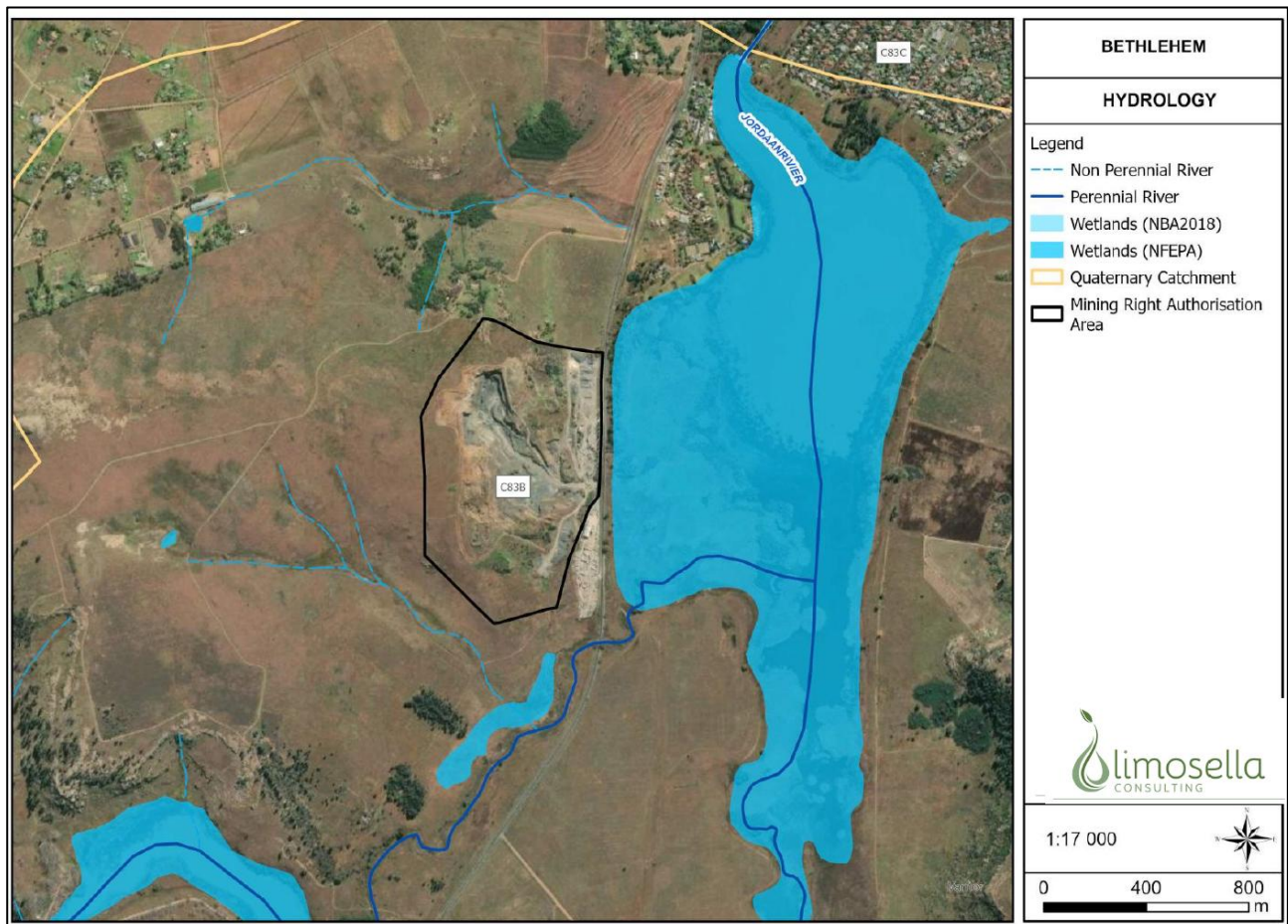


Figure 2-8: Regional hydrology relative to the study site (Limosella, 2026).

Wetlands

Three (3) wetlands are located outside of the MR area, but within 500m²² of the mine (see Figure 2-9), Limosella, 2026.

1. Unchanneled valley bottom wetland

The unchanneled valley bottom wetland occurs north of the quarry and represents a linear, valley-bottom wetland system without a distinct channel. This wetland drains towards Loch Athlone Dam, approximately 880 m north of the site. Based on the previous assessment and the current desktop review, this wetland remains spatially separated from the active quarry footprint and is unlikely to be directly affected by quarry-related runoff, provided that the quarry footprint and stormwater flow paths remain materially unchanged.

2. Hillslope seepage wetland

The hillslope seepage wetland is associated with the Wolhutterskop Nature Reserve area. This wetland occurs on a hillslope setting where groundwater or subsurface interflow contributes to seasonal or temporary soil saturation. The wetland drains towards a tributary of the Jordaan River upstream of Loch Athlone Dam. The previous assessment indicated that this system is also unlikely to be directly affected by the quarry due to the local topography, although indirect risks such as dust deposition and broader catchment disturbance should still be managed.

3. Floodplain wetland

The floodplain wetland is associated with Loch Athlone Dam and the Jordaan River system east and southeast of the quarry. Large portions of this floodplain system have been inundated because of the construction of Loch Athlone Dam, which has substantially modified the natural hydrological character of the floodplain. Although artificial in origin, Loch Athlone Dam is long established and forms part of the local aquatic receiving environment and bird sanctuary. The floodplain wetland remains the most important aquatic receptor from an operational management perspective because stormwater and surface runoff from the quarry may potentially be directed towards this system.

²² The Department of Water and Sanitation regulated area

The hillslope seepage and unchanneled valley bottom wetlands both ultimately drain towards the floodplain wetland / Loch Athlone Dam system.

Small isolated ponded areas and wet patches may occur within the active quarry area due to water collecting in depressions created by quarrying activities. These features may support hydrophytic vegetation; however, they were previously regarded as artificial quarry-related features rather than natural wetland systems requiring formal aquatic buffer protection. The primary management focus should therefore remain the protection of the natural wetland systems outside the quarry footprint, particularly the floodplain wetland and Loch Athlone Dam receiving environment. (Limosella, 2026).

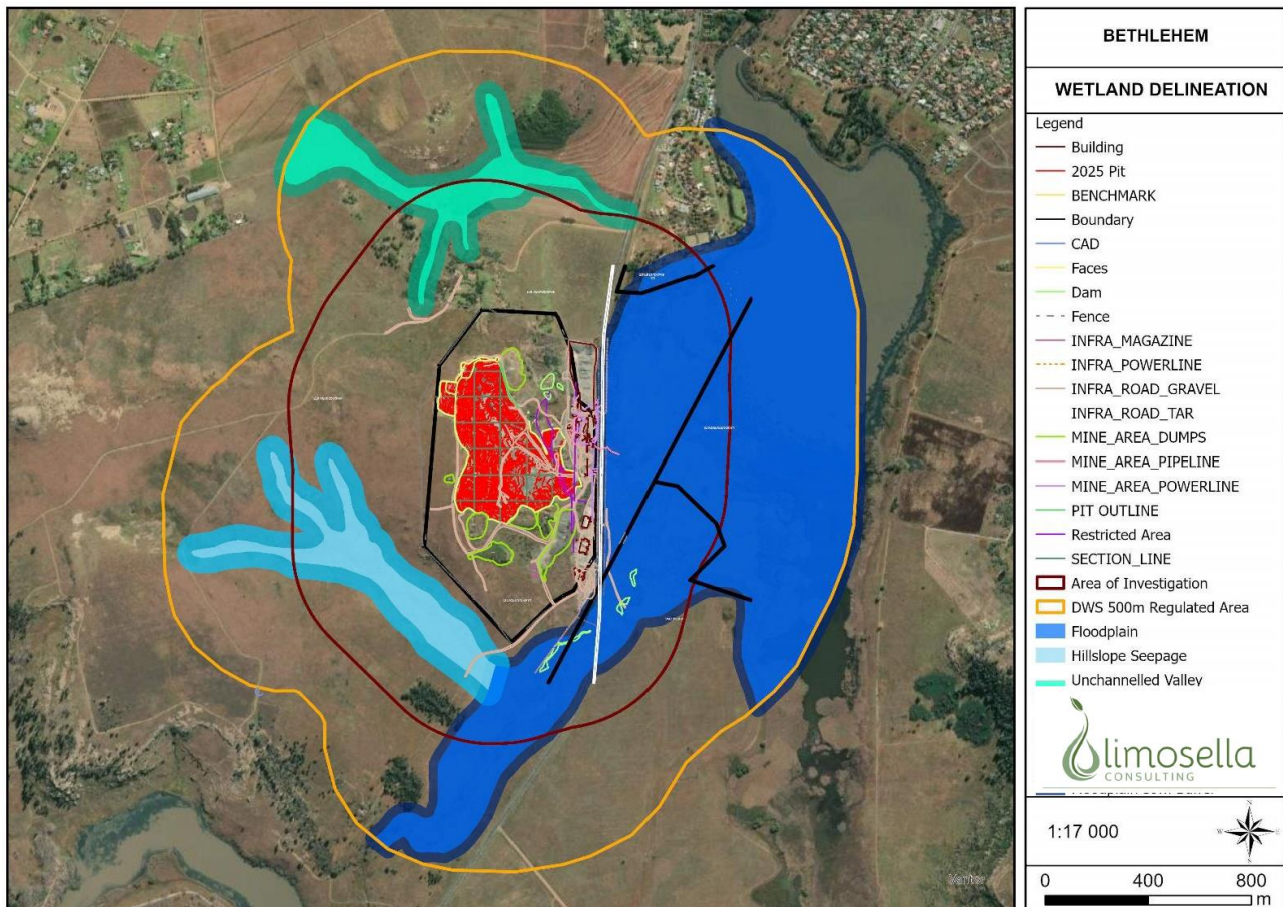


Figure 2-9: The watercourse delineation with calculated buffer zones (Limosella, 2026).

Other Surface Water Features

Although not identified as a wetland in Limosella (2021 and 2026), likely due to the transformed nature of the area, there is an area at the quarry entrance where water bubbles to the surface (location shown in Figure 2-32). This site has not been identified as a spring in the Geo-hydrological Study (Water Without Frontier, 2026) or the Aquatic Biodiversity Assessment (Limosella, 2021 and 2026). However, it is included in the EMPr as water bubbles out of the ground at this point²³ and provides a consistent flow of water throughout most of the year, only drying up in winter months²⁴. (Limosella, 2026)

Water Quality

At the time of compiling this document, water quality monitoring had only been undertaken for the domestic drinking water supply.

In terms of water quality, the Loch Athlone Dam was described as “not pristine” (Feathers ES, 2021), although no water quality data was presented to support this statement. Pollutants / sources of poor water quality were described as “sedimentation and the accumulation of pesticides and fertilizers in the water as well as the levels of residential and both heavy and light industry disturbance currently experienced within close proximity” (Feathers ES, 2021).

²³ Observed by Umhlaba personnel during the site visit in March 2026

²⁴ Confirmed through verbal communication with various mine personnel working at the site

2.7 ► GROUND WATER

*The following information is taken from Geohydrological Impact Assessment completed by Water Without Frontiers, 2021 and reviewed during 2026
The full report (2026 version) is included in Section 10.5*

Geo-hydrogeological Setting

The rocks in the study area are consolidated masses, and generally have very little, if any, primary porosity and permeability. Their water storage and transmission properties arise as a result of secondary processes of fracturing, faulting and weathering.

Groundwater recharge ranges from 25 to 37mm per annum (Vegter, 1995). Figure 2-10 shows the distribution of groundwater recharge in the area. The groundwater harvest potential, which defines the amount of groundwater that can be sustainably abstracted from a square kilometre of an area per annum, is estimated at between 15 000 and 25 000 m³/km²/annum (Saymour and Seaward, 1995).

The groundwater potential in the area is classified as low with an average borehole yield of less than 0.5 l/s (1.8m³/h), (King, 1998). However, higher yields are not uncommon and are associated with major faults and fractured dolerite dyke margins.

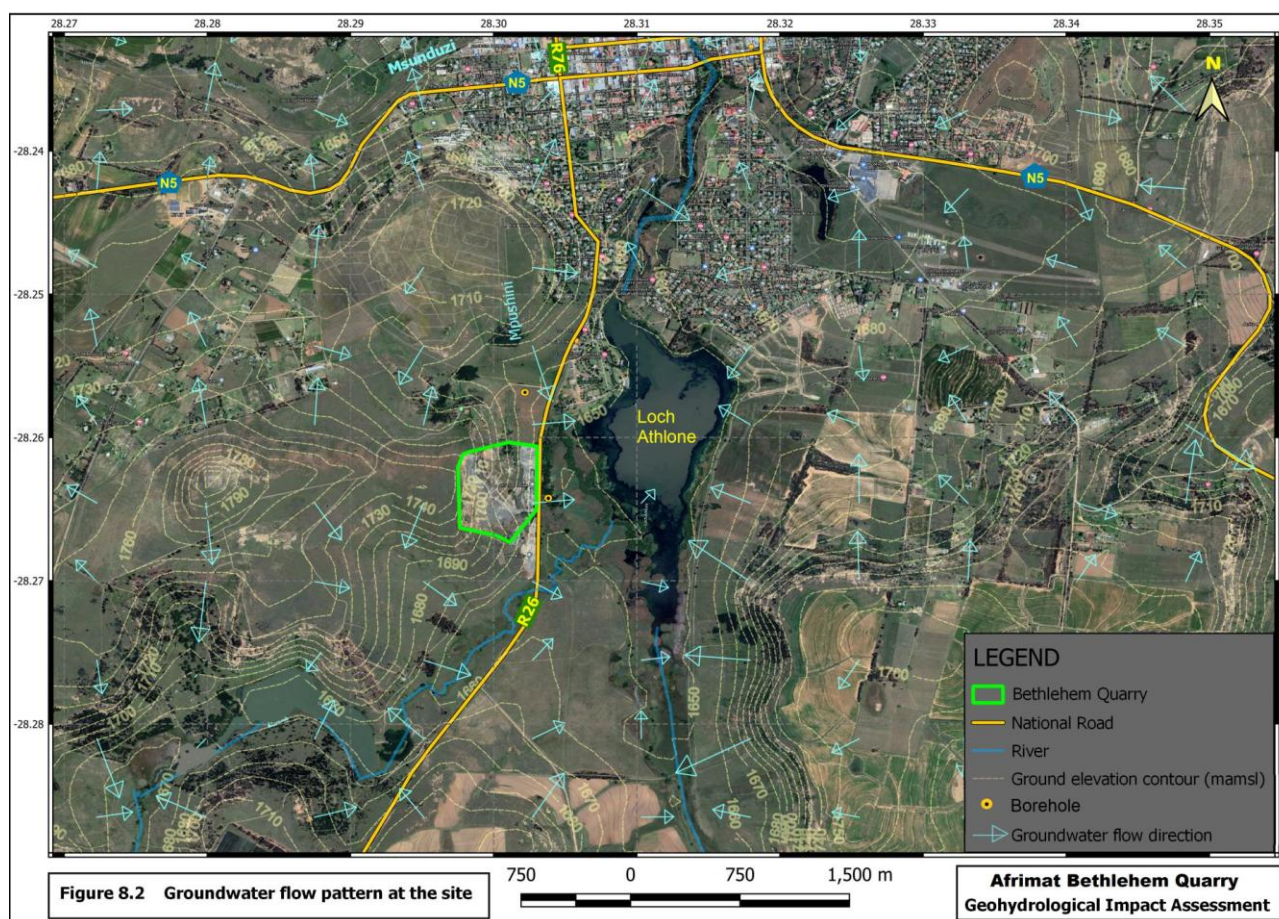


Figure 2-10: Ground water flow pattern (Water Without Frontiers, 2026).

Groundwater level data

Available data indicates that groundwater level in the area is around 9 to 10 metres below ground surface. The boreholes nearest to the quarry (BH1, located in the wetland between the mine and the Loch Athlone dam) could not be accessed during the field visit, and no information on it could be found.

Five boreholes are located within the vicinity of the mine (Table 2-2), with the next nearest borehole to the quarry (2828AD00058) being on private property about 0.45 kilometres north of the quarry (Figure 2-11). The water level in the borehole, based on the National Groundwater Archive (NGA) data, is about 10.22 metre below ground surface; with the water-table estimated to be 1647 mamsl.

The water level elevation in the nearby wetland is estimated to be between 1 640 and 1 645 mamsl, indicating that there is a shallow water-table gradient from the borehole (north of the quarry) to the wetland and ultimately to Loch Athlone Dam. This suggests that groundwater contributes baseflow into the wetland.

Lack of adequate groundwater level data precluded the creation of a piezometric surface map to depict groundwater flow patterns at the site. Under these circumstances the principle that the water-table mimics surface topography in hard rock environments was adopted. Figure 2-10 shows the inferred groundwater flow directions in the vicinity of the site, with Loch Athlone Dam being the final receptor of groundwater in the area.

Table 2-2: Information on existing boreholes (Water Without Frontiers, 2026).

Borehole ID	Latitude	Longitude	Distance from site (m)	BH Depth (m)	Water-strike (m)	Blow-yield (L/s)	Water-level (m)	EC mS/m	Geology
BH1	-28.263647	28.303513	< 100						
BH2	-28.277785	28.295182	1.6						
2828AD00058	-28.256820	28.302730	0.5				10.22	47	
2828AB00145	-28.234640	28.318330	3.6	41.45	24.38	0.4	9.4		Sandstone, shale, dolerite
2828AB00046	-28.236900	28.322240	3.5	8.77					dolerite, siltstone & shale

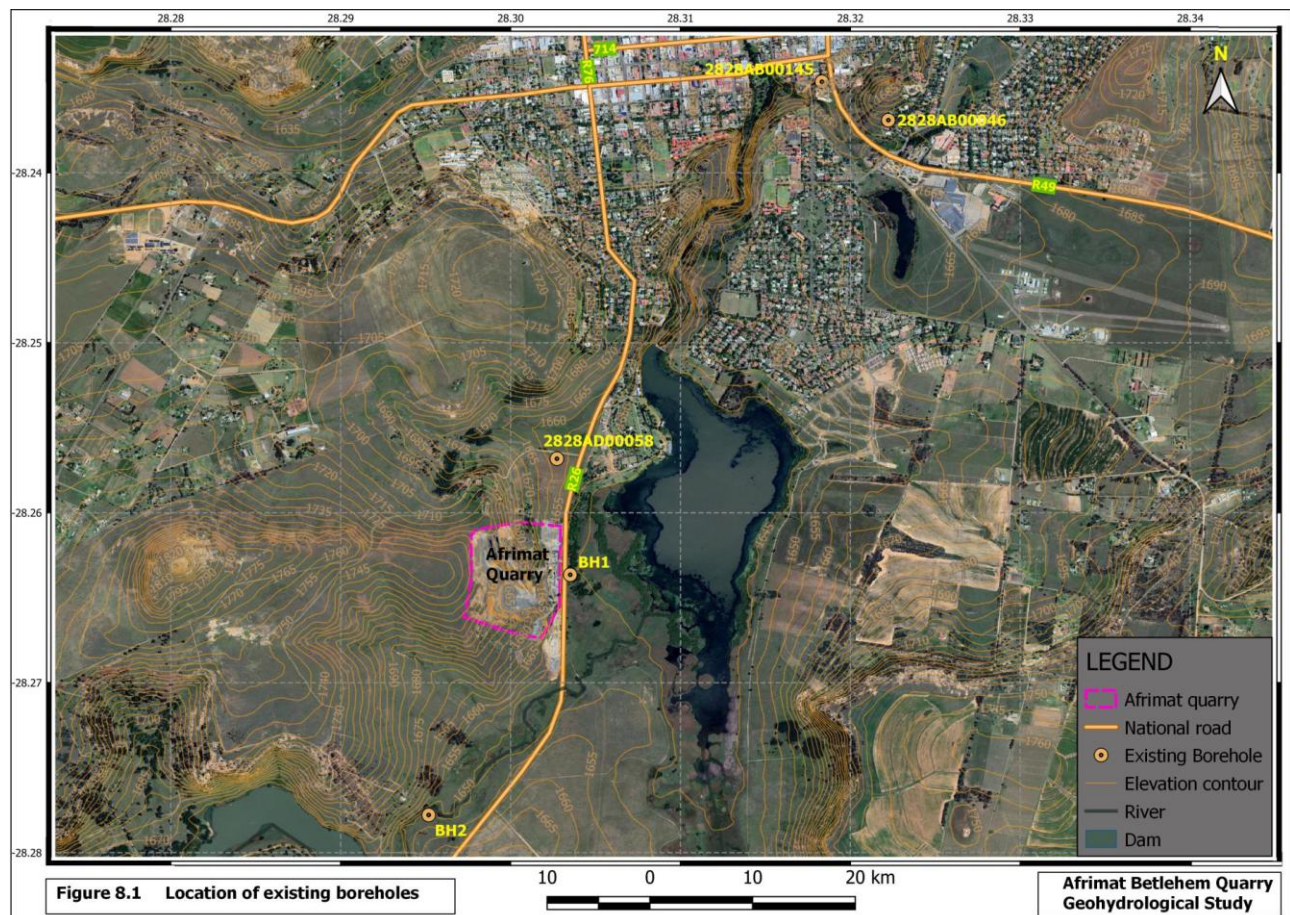


Figure 2-11: Locations of existing boreholes as per the NGA (Water Without Frontiers, 2026).

Ground Water Quality

Groundwater quality is generally good and suitable for human consumption; however, pockets of poor water quality do occur. The average Electrical conductivity (EC) in the area is estimated at less than 70 mS/m²⁵ (King, 1998), while the NGA indicates an average EC of 47 mS/m for the Borehole 2828AD00058, which is good quality for drinking.

²⁵ Milliseconds per meter

At the time of compiling this document, water quality monitoring had only been undertaken for the domestic drinking water supply.

2.8 ► CLIMATE

The bulk of the information is taken from the 2010 EMPr and the Air Quality Impact Assessment completed by Waste Aside during 2021 and revised in 2026
The full report (2026 version) is included in Section 10.8.

The Free State highveld (where Bethlehem Quarry is located), is characterised by summer rainfall, cold winters and moderate to hot summers.

2.8.1 Temperature

The description below is based on an evaluation of the meteorological data simulations run from the global NEMS weather model at ~30 km resolution from 1985 to current of the area, depicted in Figure 2-12.

In the summer months' maximum average daily temperatures are predicted to be 22°C to 27°C on average with a maximum of 32°C possible during hot days, dropping to a predicted 8°C to 14°C on average at night and 1°C minimum on cold nights. During winter months the average day time temperature is predicted in the 15°C to 23°C range while cold winter nighttime temperatures predicted to drop to -6°C.

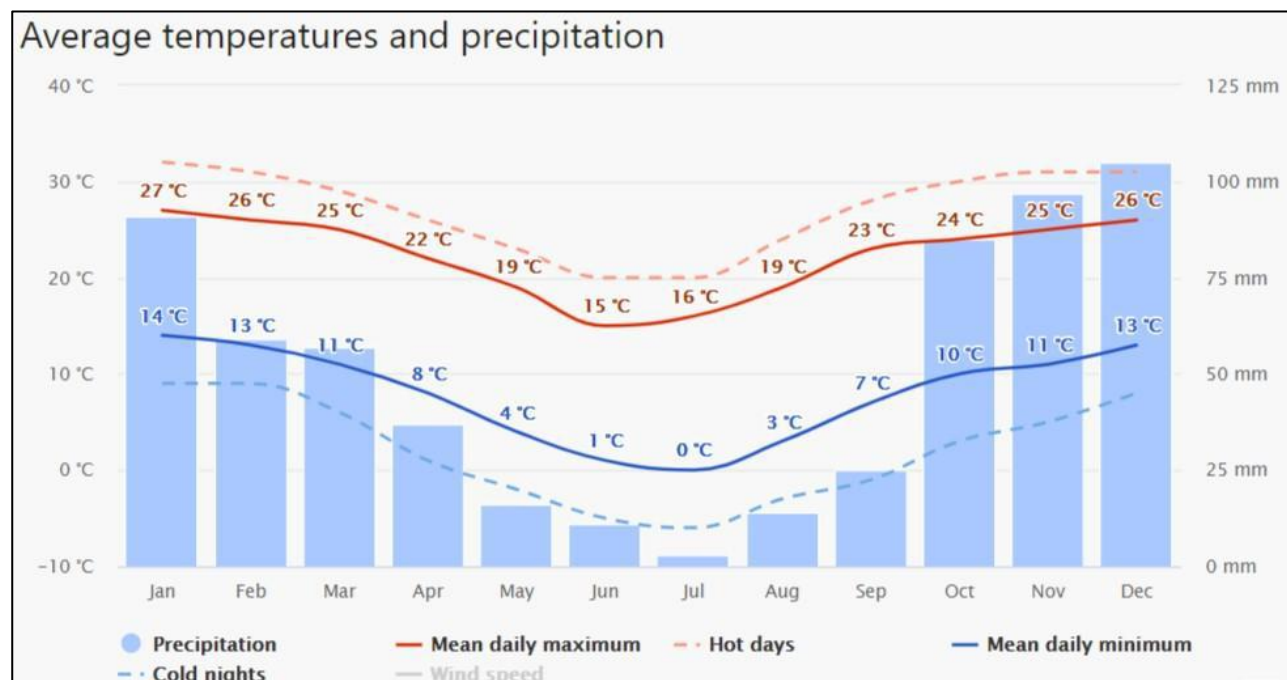


Figure 2-12: Temperature and precipitation simulation results from the NEMS model for the Afrimat Bethlehem project area for the period, 1985 – current (Waste Aside, 2026).

2.8.2 Precipitation (Rainfall)

Falling in a summer rainfall area, the site is expected to receive most precipitation from October to March. October to January is expected to record the highest rainfall, between 85 mm to 105 mm per month, While February and March are expected to receive 57 mm to 59 mm rainfall per month. All other months are expected to receive less than 37 mm per month.

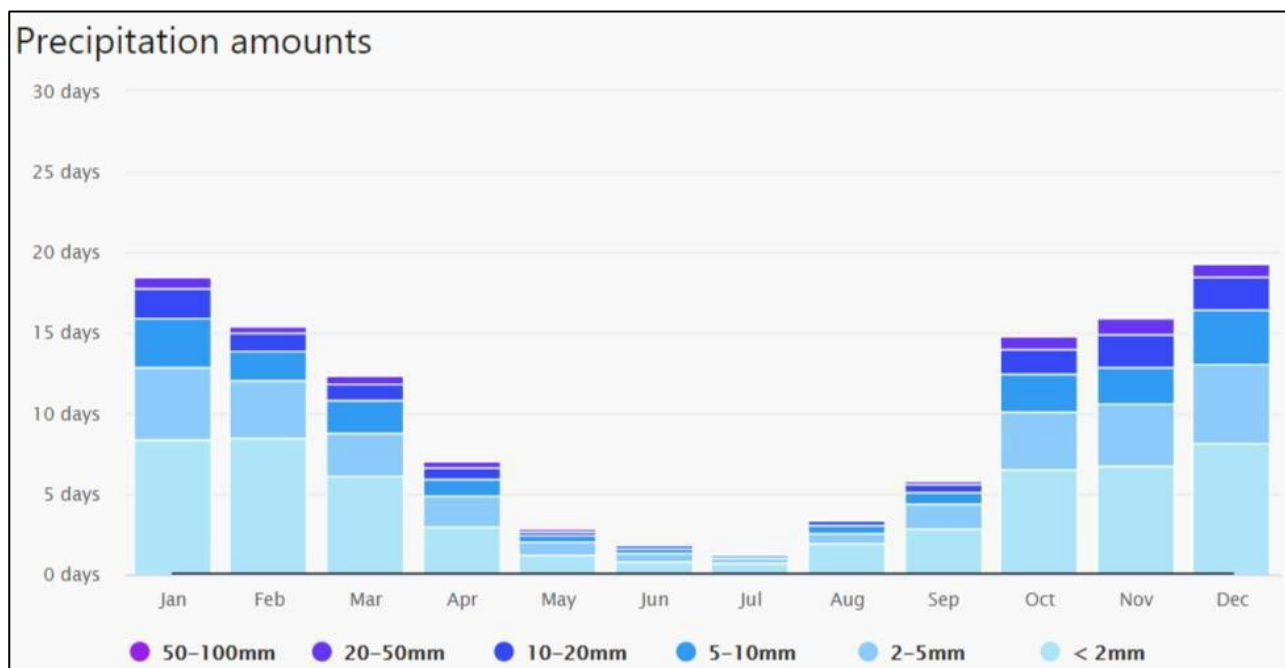


Figure 2-13: Day count of total precipitation per month for the Afrimat Bethlehem project area for the period 1985 – current (Waste Aside, 2026).

2.8.3 Wind Direction and Speed

The description below is based on an evaluation of the meteorological data simulations run from a global NEMS weather model at ~30 km resolution from 1985 to current of the project area.

The predominant wind direction for the area is expected to occur mainly from the east-north-east, blowing for more than 1160 hours per year, with wind speeds higher than 5 km/h (Figure 2-14). Calm conditions with wind speeds of 12 km/h or less, are expected for 2-7 days per month throughout the year, while wind speeds of 12-19 km/h winds are expected for 7-14 days per month through the year, and wind speeds of more than 19 km/h are expected to occur for 12-22 days per year on average (Figure 2-15).

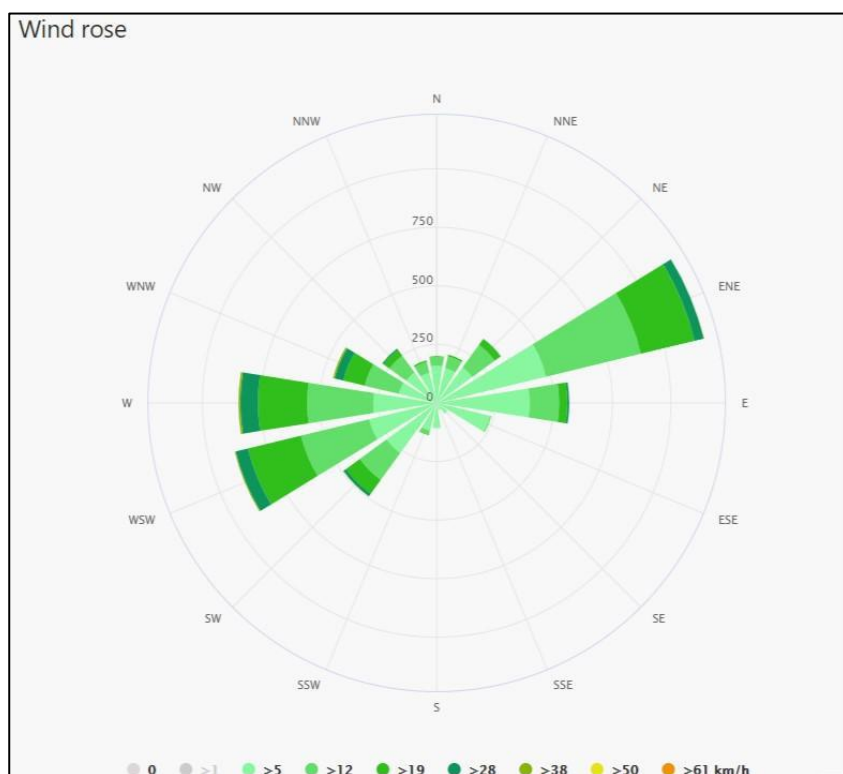


Figure 2-14: NEMS 30 km simulation model wind rose for the Afrimat Bethlehem project area for the period 1985 to current (Waste Aside, 2026).

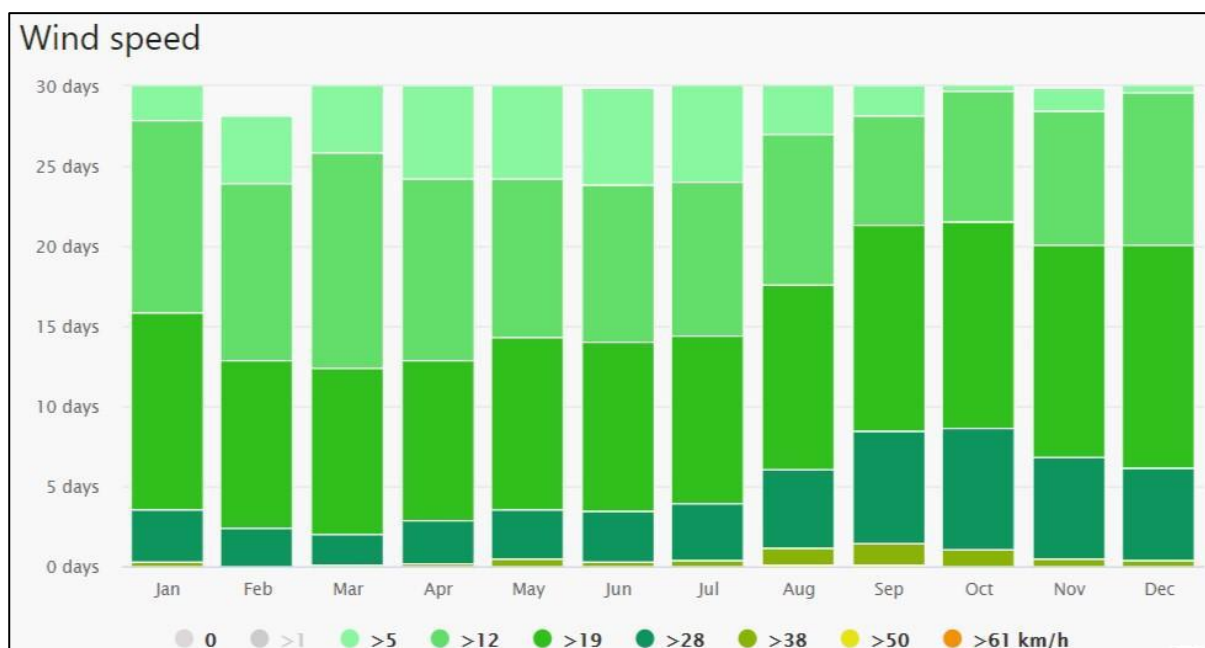


Figure 2-15: Wind Class Frequency Distribution per month (Waste Aside, 2026).

2.9 ► AIR QUALITY

As the mine has been in existence since the 1950s (Limosella, 2021), the description of the air quality considers the mine in operation (not a baseline description) and focussed on the potential / anticipated released of particulate matter (PM) and fugitive dust from mining and related activities.

Other sources of PM and fugitive dust in the vicinity of the mine include:

- Cultivation and windblown dust from exposed surfaces,
- Vehicle emissions,
- Domestic fuel burning (fires for space heating and cooking)
- Periodic veld fires, and
- Emissions from the industrial areas of Bethlehem

The following information is taken from the Air Quality Impact Assessment completed by Waste Aside during 2021 and revised in 2026 and the Health and Occupational Hygiene Laboratory CC, 2025

Dispersion modelling was undertaken to predict the second-highest daily and annual average ground-level concentrations (GLCs) of PM₁₀ (Particulate Matter with an aerodynamic diameter of <10 µ), as well as daily dust fallout rates.

The results are presented below (Figure 2-17 to Figure 2-22), as isopleth plots for the preferred operational scenario, illustrating the spatial distribution of predicted pollutant concentrations across the receptor grid, locations of sensitive receptors in relation to the mine are presented in Figure 2-16).

PM₁₀:

- The annual average PM₁₀ limit of 40 µg/m³ is not predicted to exceed at any of the identified sensitive receptors for any of the modelled scenarios (Figure 2-17 and Figure 2-18).
- For the unmitigated and mitigated daily PM₁₀ concentrations it is predicted not to be higher than the 75 µg/m³ limit for any of the sensitive receptors (Figure 2-19 and Figure 2-20, respectively).

Dust Fallout (DFO)

- For the mitigated and unmitigated scenarios, no exceedances residential limit of 600 mg/m²/day are predicted at the sensitive receptors (Figure 2-21 and Figure 2-22, respectively).
- This is supported by the dust fallout monitoring data that has been measured on the MR boundary during 2025 and 2026; locations of samplers illustrated in Figure 2-23 and fallout rates presented in Figure 2-24 and Figure 2-25. Fallout rates on the mine boundary have been below 620 mg/m²/day.

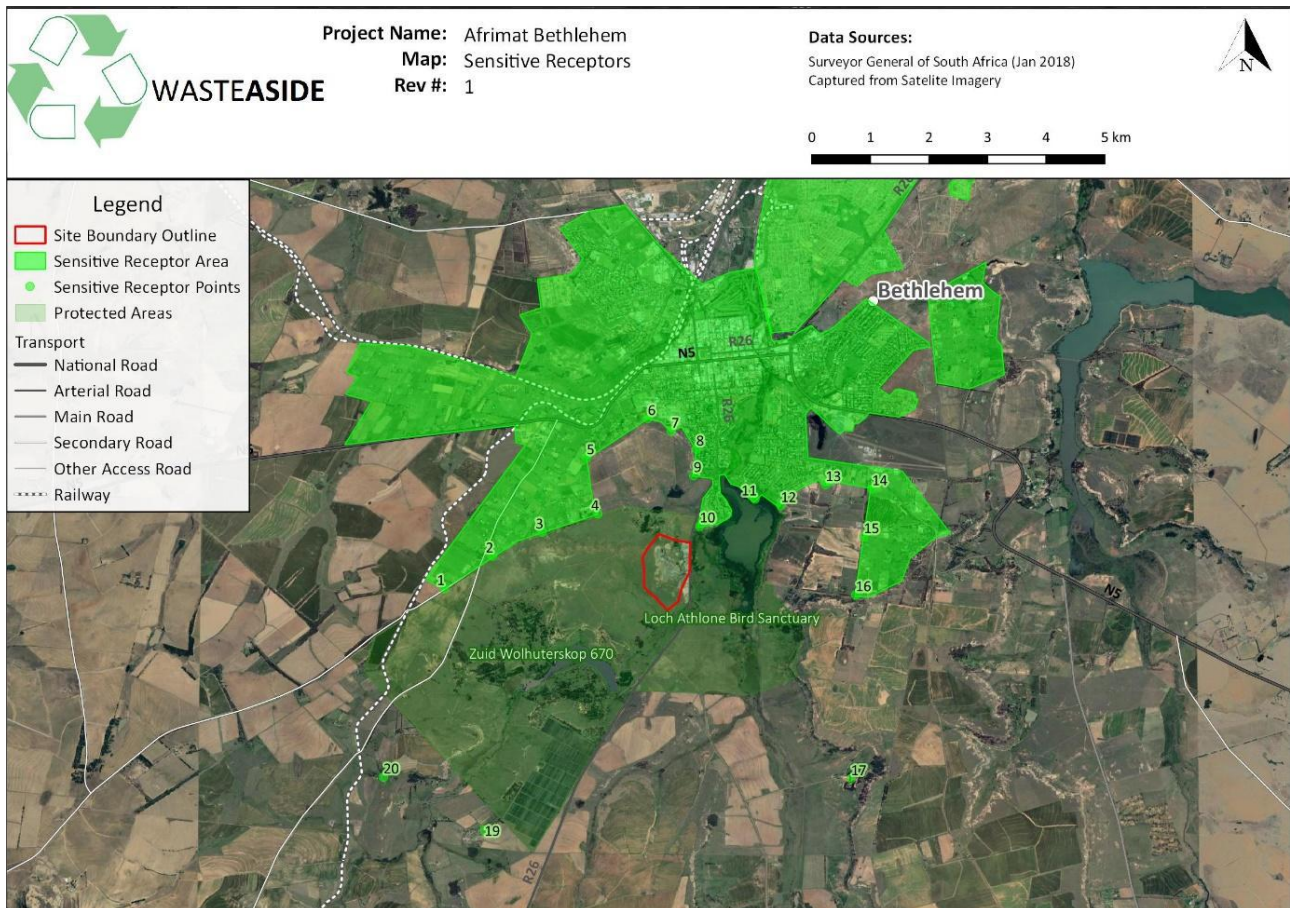


Figure 2-16: Location of sensitive receptors in relation to Bethlehem Quarry (Waste Aside, 2026).

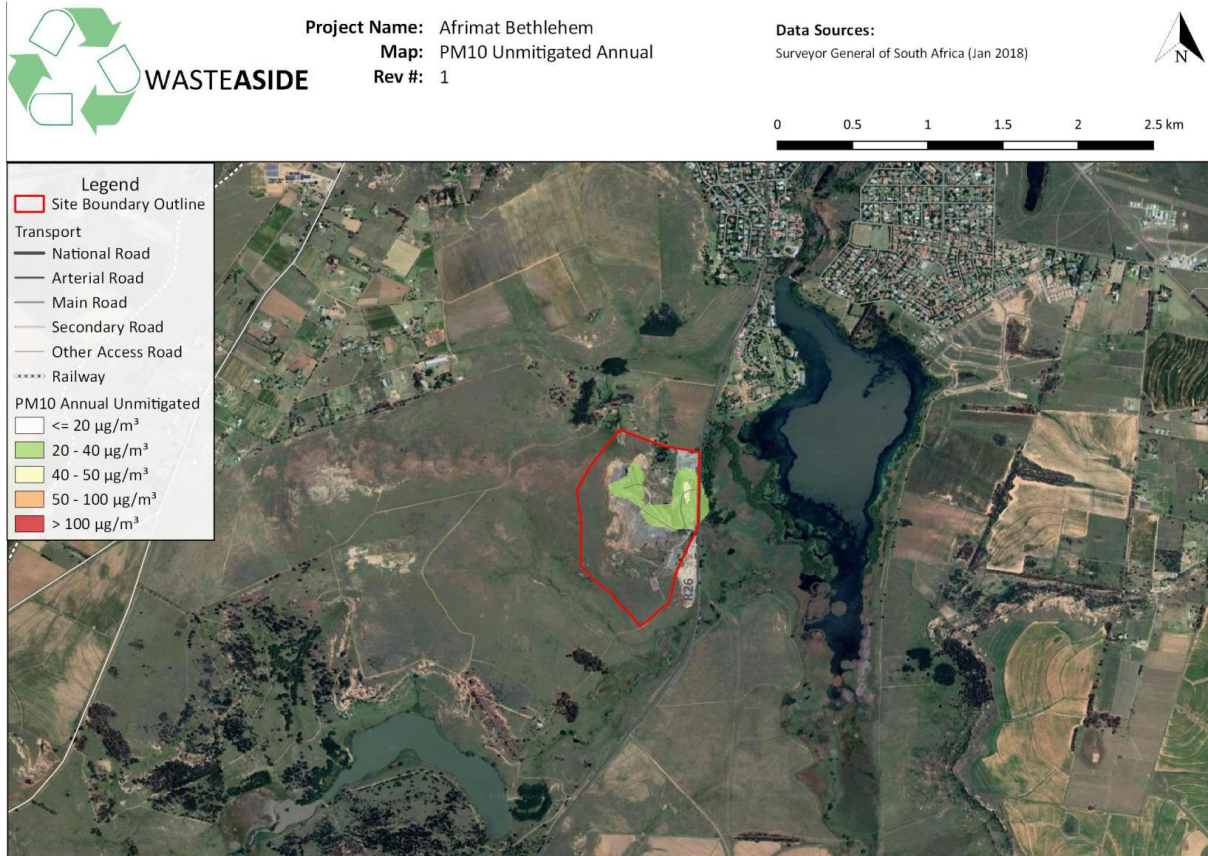


Figure 2-17: Predicted annual average concentrations for PM₁₀ for the Afrimat Bethlehem project operations when *unmitigated* (Waste Aside, 2026).

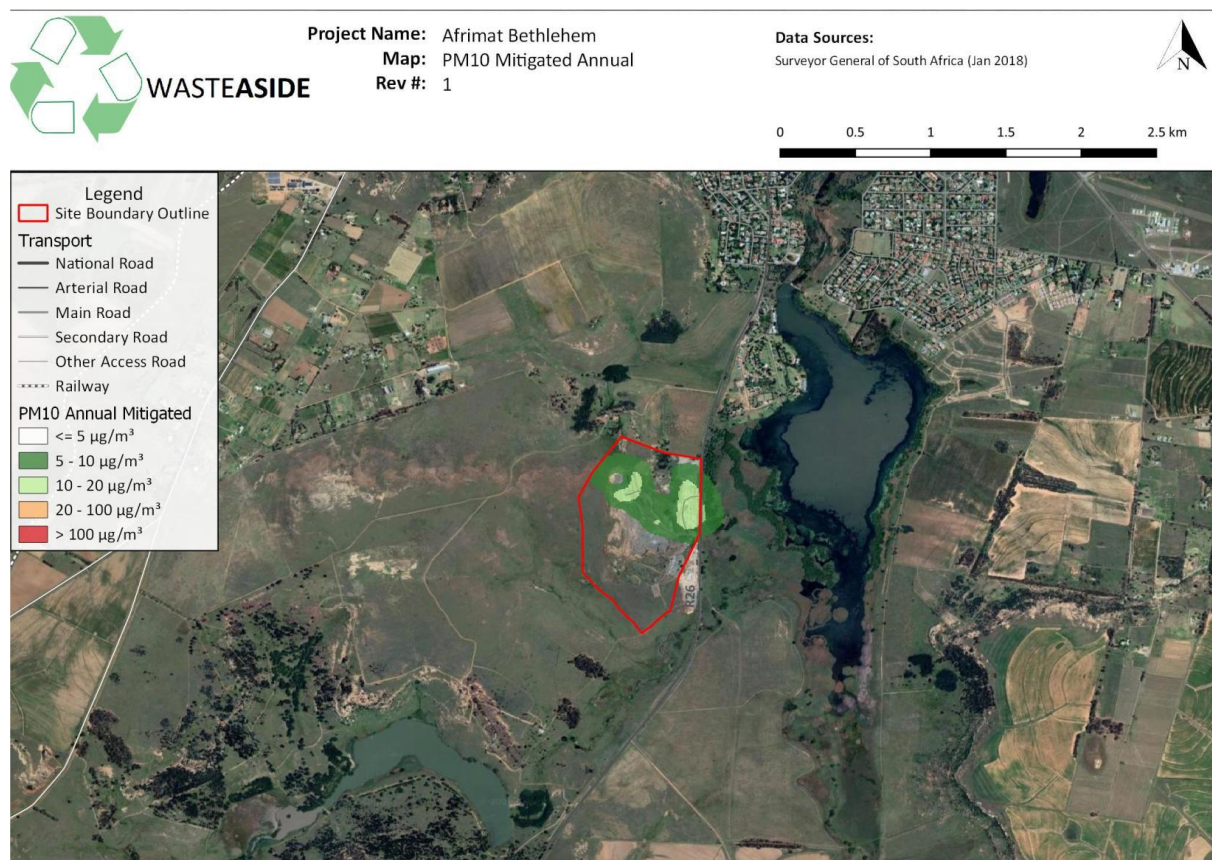


Figure 2-18: Predicted annual average concentrations for PM₁₀ for the Afrimat Bethlehem project operations when *mitigated* (Waste Aside, 2026).

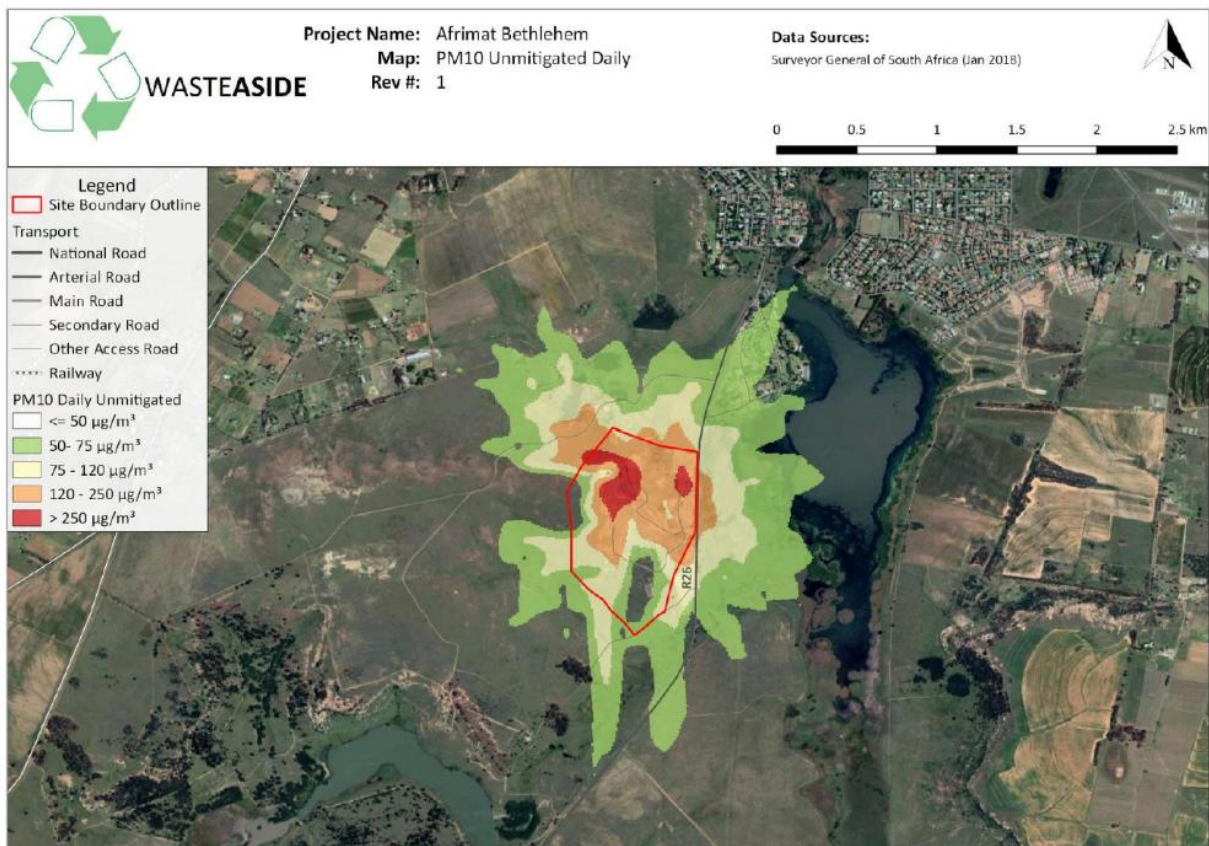


Figure 2-19: Predicted 2nd highest daily concentrations for PM₁₀ for the Afrimat Bethlehem project operations when *unmitigated* (Waste Aside, 2026).

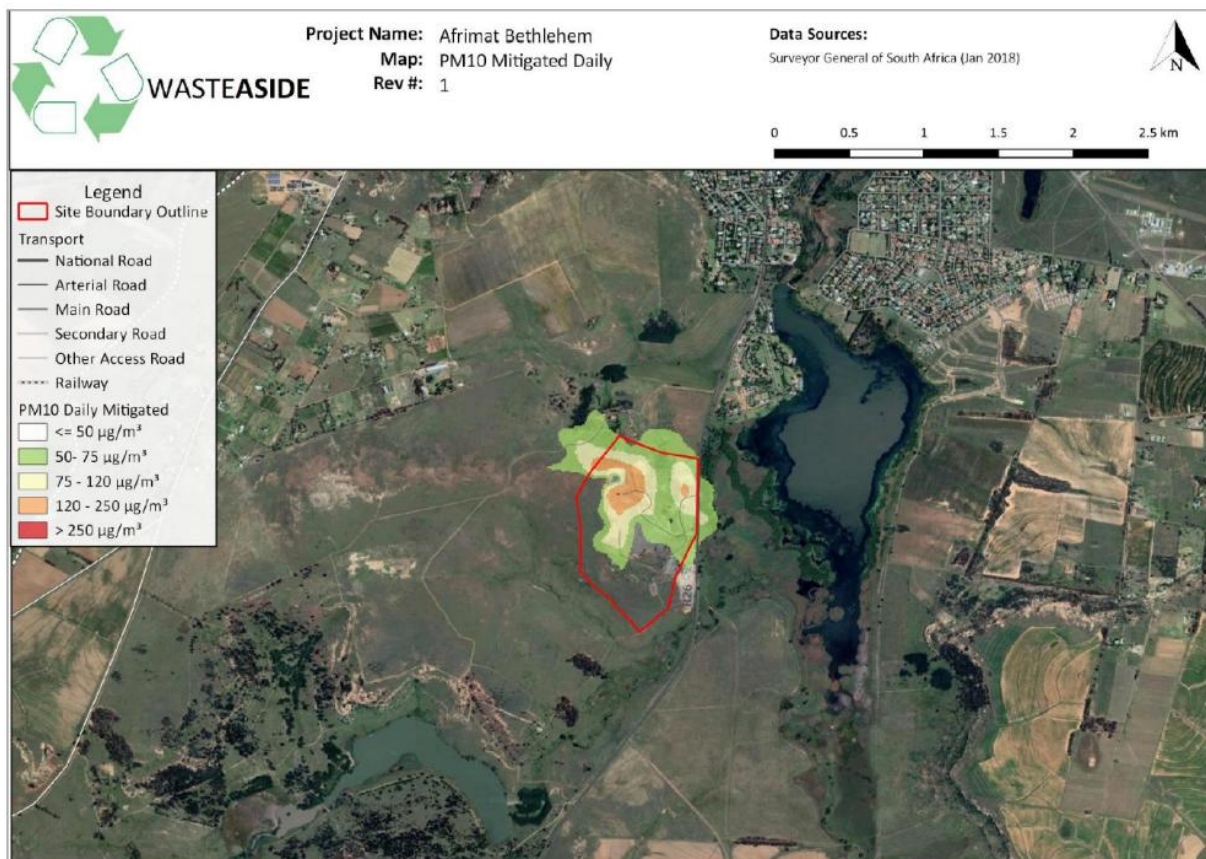


Figure 2-20: Predicted 2nd highest daily concentrations for PM₁₀ for the Afrimat Bethlehem project operations when *mitigated* (Waste Aside, 2026).



Figure 2-21: Predicted DFO rate for Afrimat Bethlehem project operations when *unmitigated* (Waste Aside, 2026).

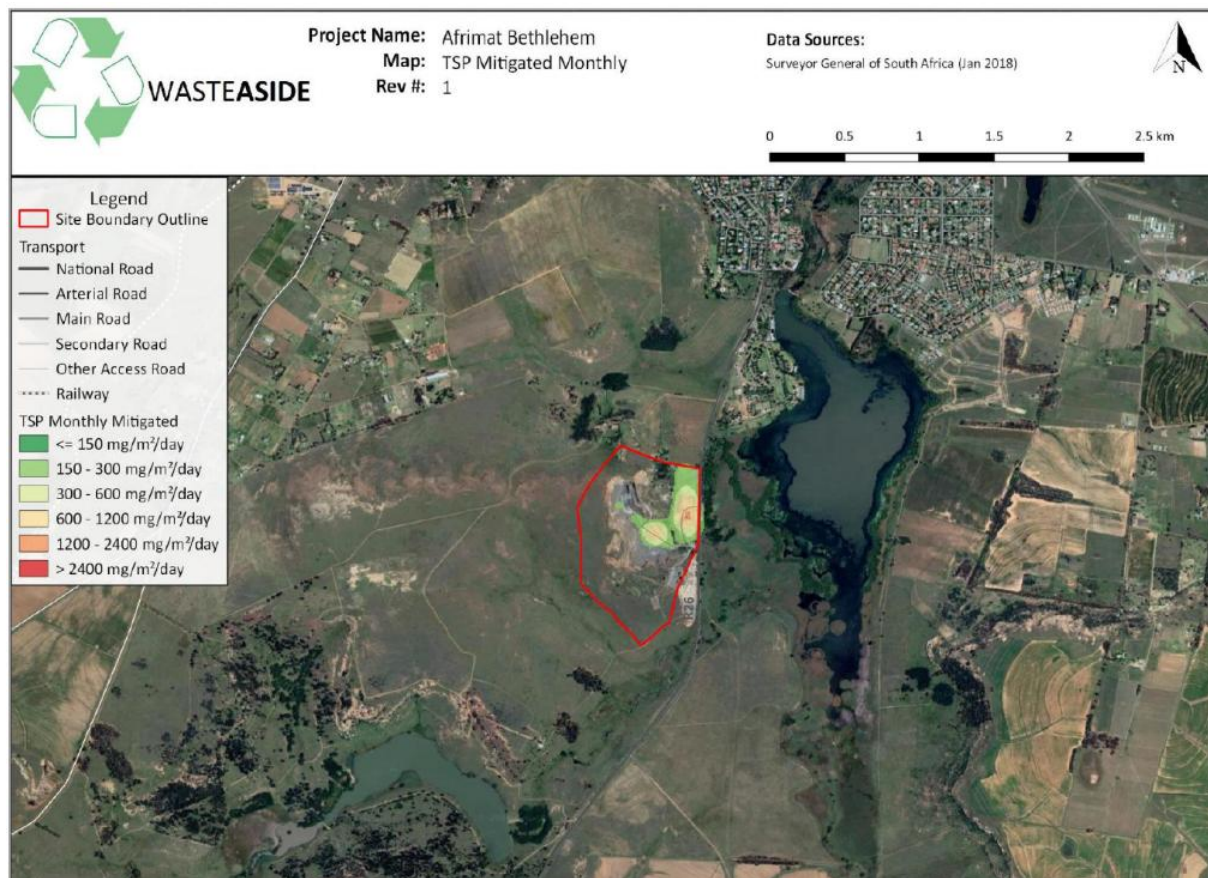


Figure 2-22: Predicted DFO rate for Afrimat Bethlehem project operations when *mitigated* (Waste Aside, 2026).

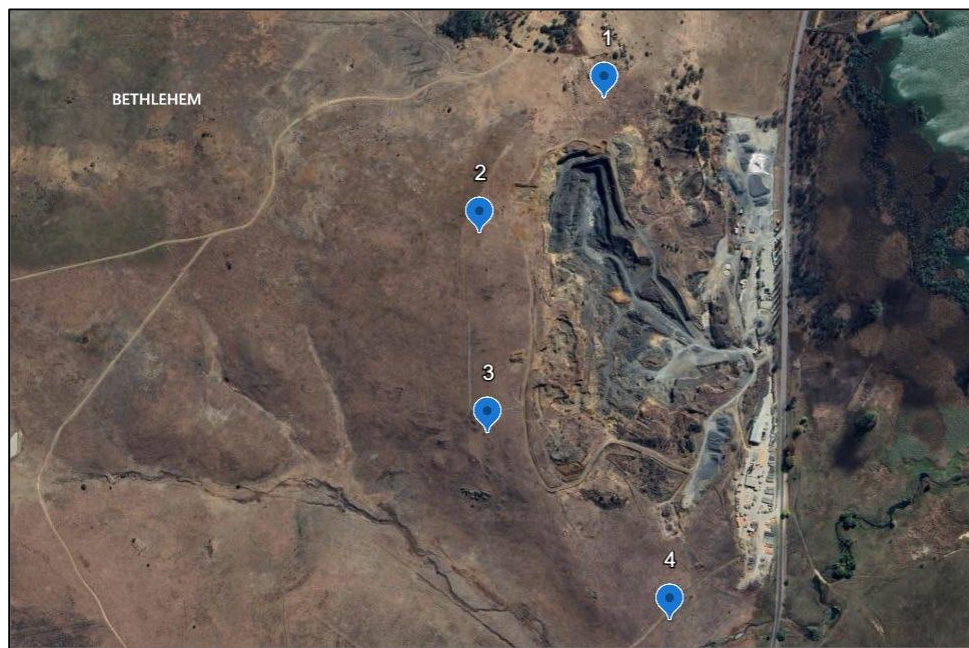


Figure 2-23: Location of dust fallout monitoring points (Health and Occupational Hygiene Laboratory CC, 2025)²⁶.

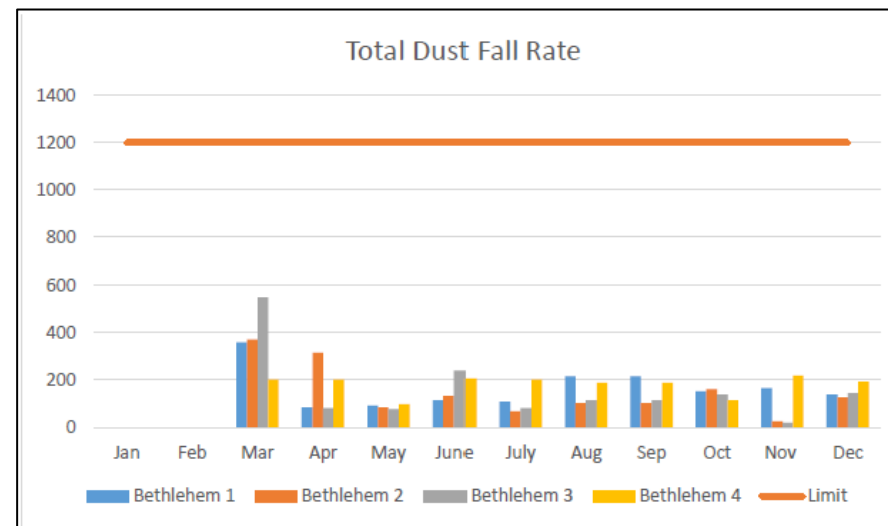


Figure 2-24: Dust fallout monitoring results (2025).

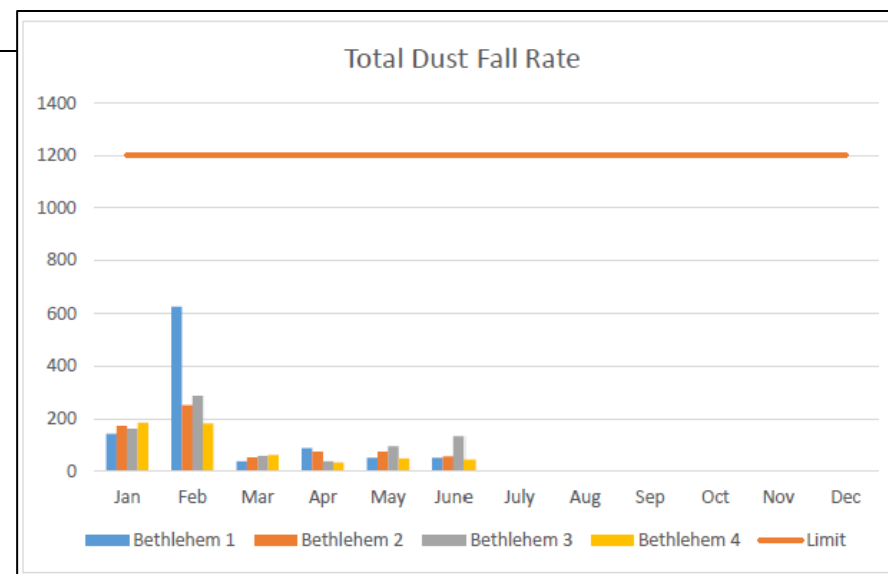


Figure 2-25: Dust fallout monitoring results (2026).

²⁶ Details of the sites (names and co-ordinates) are provided in the specialist report, included in Section **Error! Reference source not found.**

2.10 ► SOUND / NOISE

*The following information is taken from the Environmental Noise report undertaken by Rawlins Mining Engineers CC, 2023 and Health and Occupational Hygiene Laboratory CC, 2025
The full report (2025 version) is included in Section 10.9*

Noise survey results for daytime measurements recorded between 06:00 and 22:00 during the 2023 and 2025 surveys are presented in Table 2-3, at the locations illustrated in Figure 2-26: No exceedance was recorded.

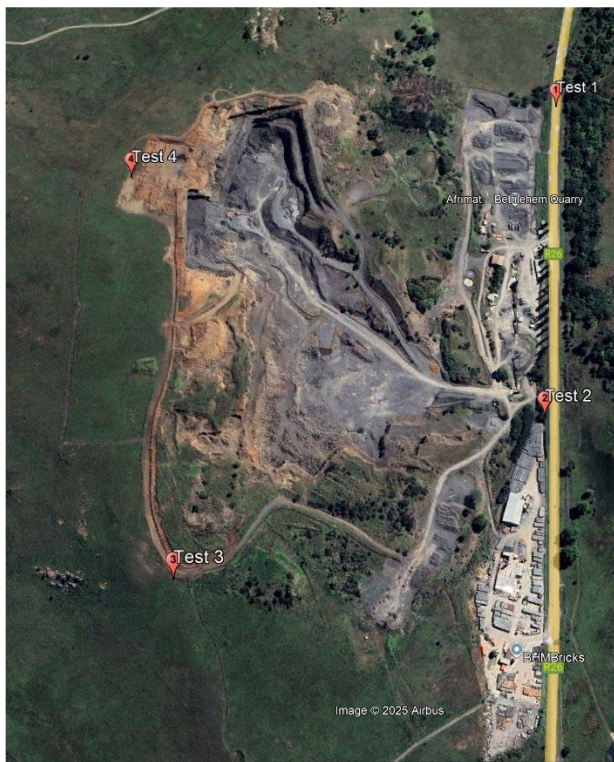


Table 2-3: Results of the Environmental Noise Monitoring for 2023 and 2025.

	2023	2025
	Laeq dB (A) ²⁷	Laeq dB (A)
Test station 1	47.4	56.7
Test station 2	53.2	58.9
Test station 3	54.5	36.7
Test station 4	56.3	36.6

Figure 2-26: Locations of noise survey points (2023 and 2025).

2.11 ► ECOLOGY / TERRESTRIAL BIODIVERSITY

The following information is taken from • the approved EMP_r (2010), • the Botanical Impact Assessment undertaken by Mark Berry Botanical Surveys in 2021 and revised during 2026 (Section 10.10) and the • Aquatic Biodiversity Assessment undertaken by Limosella Consulting during 2021 and revised during 2026 (Section 10.8).

The full reports (2026 versions) are included in Section 10 as indicated above

According to the Free State biodiversity plan, the relatively undisturbed western side of the MR area falls inside an ecological support area (ESA), while the quarry and associated transformed areas have been mapped as a degraded ecological support area (ESA2). The surrounding landscape includes important ecological and aquatic features, including Wolhutterskop Nature Reserve (also referred to as Zuid Wolhutterskop), Loch Athlone Bird Sanctuary, Loch Athlone Dam, mapped wetlands and the Jordaan River system. These features are highlighted in the relevant sections of this report and are illustrated in Figure 2-32, the sensitivity map. (MB Botanical Surveys, 2026)

In addition, the site is located within an Important Bird Area (IBA); Rooiberge-Riemland IBA (SA048) where over 300 bird species have been recorded (Feathers ES, 2021 and 2026).

The natural vegetation on site comprises Eastern Free State Sandy Grassland (Figure 2-27), confined to an undisturbed area around the western side of the excavation area (quarry) from where it extends into the neighbouring Wolhutterskop Nature Reserve. The grassland varies between 0.5 and 1 m in height (average = 0.7 m) and vegetation cover is about 95%. Structurally it can be described as a short, closed grassland following Edward's (1983) classification. Apart from the grasses, there is also a notable presence of

²⁷ Logarithmic Average Sound Pressure Level (Daytime)

asteraceous shrubs in the understorey, which contribute significantly towards the alpha diversity. Asteraceous species encountered include *Helichrysum callicomum*, *H. nudifolium*, *Felicia filifolia*, *Seriphium plumosum*, *Senecio latifolius*, *Berkheya setifera*, *Haplocarpha scaposa*, *Hilliardiella elaeagnoides* and *Schistostephium crataegifolium*. *Searsia pyroides* and *Kiggelaria africana* are prominent emergent species. A few rocky outcrops in the north-western and south-western corners of the site also shelter a small number of succulent species, such as *Crassula dependens* and *Ruschia hamata* (Figure 2-28).

The remainder of the mining site has been significantly disturbed / transformed by mining activities. Certain areas behind the excavation area have been used to spoil overburden material and topsoil. The disturbed areas also accommodate a host of alien species, both herbaceous weeds and woody aliens such as *Fraxinus* sp, *Acacia dealbata*, *Robinia pseudoacacia*, *Gleditsia triacanthos* and *Cirsium vulgare*. A large copse of tall woody aliens was recorded directly north of the dams on the northern side of site. Of a total of 90 species recorded, 23 (26%) were alien. The botanical attributes of the site are presented in Figure 2-29. (MB Botanical Surveys, 2026)



Figure 2-27: Good quality grassland in the south-eastern corner of site (MB Botanical Surveys, 2026).



Figure 2-28: Exposed dolerite, home to a variety of small succulents such as *Crassula dependens* and *Ruschia hamata* (MB Botanical Surveys, 2026).

Given the limited extent of undisturbed area within the MR boundary, a faunal species list has not been compiled for the site. However, it is recognised that as the quarry is located within the Wolhuterskop Nature Reserve (Figure 2-2), the undeveloped area of the MR area will be utilised by faunal species, particularly species whose movement will not be hindered by a barbed wire fence.

Species of Concern / Site Sensitivity

The site's ecological importance (SEI) was determined to include areas of both “very low” and “high” importance. Areas of “very low” importance include the areas of transformed habitat, areas already disturbed mining and related activities. The areas of “high” importance are ranked as such due to the good condition of the undisturbed grassland and good connectivity to the adjacent nature reserve.

No floral Species of Conservation Concern (SCC), regional endemics or protected species were encountered in the Botanical Survey, and all the recorded species are widespread and common in the region (MB Botanical Survey, 2026).

Considering the land surrounding the MR area includes protected areas (see introduction to Section 2, Figure 2-2), it is possible that red data faunal species will be present in the area. Focus is given to avifaunal species (birds) as the site is located within an IBA.

In terms of faunal assessments undertaken, the Avifaunal survey identified that 21 regional Red List species have been identified in the pentad²⁸ in which the mine is located (2815_2815), with very low reporting rates. These species were identified during the SABAP2²⁹ atlassing period. The specialist study confirms that seven of the recorded Red List species may utilise the Loch Athlone Dam, however this waterbody habitat is not pristine (see Section 2.6 Water Quality, page 2.20). Regionally (within the IBA), the following globally threatened species may occur in the grassland and wetland habitats in the vicinity of the mine include Southern Bald Ibis (*Geronticus calvus*), Blue Crane (*Anthropoides paradiseus*), Grey Crowned Crane (*Balearica*

²⁹ South African Bird Atlas Project 2

regulorum), Blue Korhaan (*Eupodotis caerulescens*) and Secretarybird (*Sagittarius serpentarius*). Other threatened species that may utilise the grassland habitats for foraging include Cape Vulture (*Gyps coprotheres*), Bearded Vulture (*Gypaetus barbatus*) and Martial Eagle (*Polemaetus bellicosus*), Black Stork (*Ciconia nigra*), Verreauxs' Eagle *Aquila verreauxii*, Jackal Buzzard *Buteo rufofuscus*, Peregrine Falcon (*Falco peregrinus*), Cape Eagle-Owl (*Bubo capensis*), Lesser Kestrel (*Falco naumanni*), and Black Harrier (*Circus maurus*). (Feathers ES, 2021 and 2026) However, it is unlikely that these species will frequent the MR area, due to the extensive habitat disturbance.

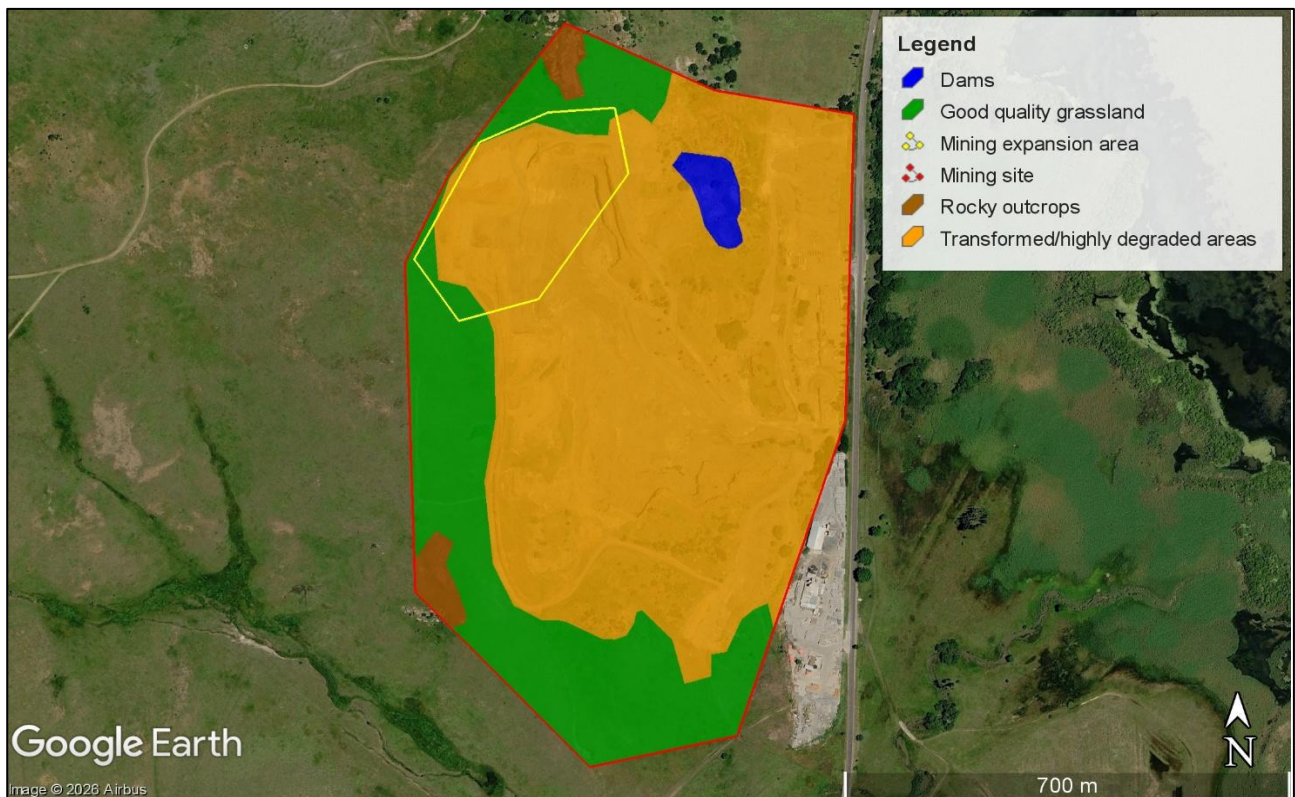


Figure 2-29: Botanical attributes of the mining site (MB Botanical Surveys, 2026).

- Note:**
- The “dams” illustrated above are old settlement dams and are currently not operational as settlement dams, nor are they used for the containment of water.
 - The “mining expansion area” indicates the active mining area at the time of the survey (2021 and 2026).

2.12 ► HERITAGE AND PALAEOLOGY

*The following information is taken from the Heritage Impact Assessment undertaken by Umlando Archaeological Surveys and Heritage Management in 2026.
The full report (2026 version) is included in Section 10.11*

Previously, no Heritage Impact Assessment (HIA) or Paleontological survey had been undertaken for the Bethlehem Quarry MR area. For the purpose of this EMP update, surveys were undertaken during April 2026.

Heritage

Several heritage features have been identified within the vicinity of the MR area, including stone walling for a kraal and sangars, two possible graves and isolated artefacts which are likely remnants from the 2nd Anglo-Boer War (Battle of Wolhuters Kop / Battle for Bethlehem), with only “Kraal 1” being inside the MR area as shown in Figure 2-30. The details of the sites and the significance ranking are provided in Table 2-4.

The details of the sites and the significance ranking are provided in Table 2-4.



Figure 2-30: Location of recorded heritage features (Umlando, 2026).

Table 2-4: Locations and significance ranking of recorded features (Umlando, 2026).

Name	Latitude	Longitude	Description	Significance
LSA Core 	28.263835233	28.296324231	Single artefact	Low
LSA Flake 	28.263550952	28.296045417	Single artefact	Low

Name	Latitude	Longitude	Description	Significance
Sangar 1 	28.263482045	28.296491979	Defensive stone walling	Medium
Stone Cairn 	28.263469709	28.296431399	Pile of stones behind Sangar 1	Medium
Grave 1 	28.264592498	28.296166647	Smaller than Grave 2	High
Grave 2 	28.264592324	28.296181793	0.8m x 1.4m	High
Sangar 2 	28.265028209	28.296445957	Defensive stone walling	Medium
Kraal 1 	28.268695858	28.298241168	8m x 10m	Low

Palaeontology

No items of Palaeontological concern were noted within the MR area (see Figure 2-31).

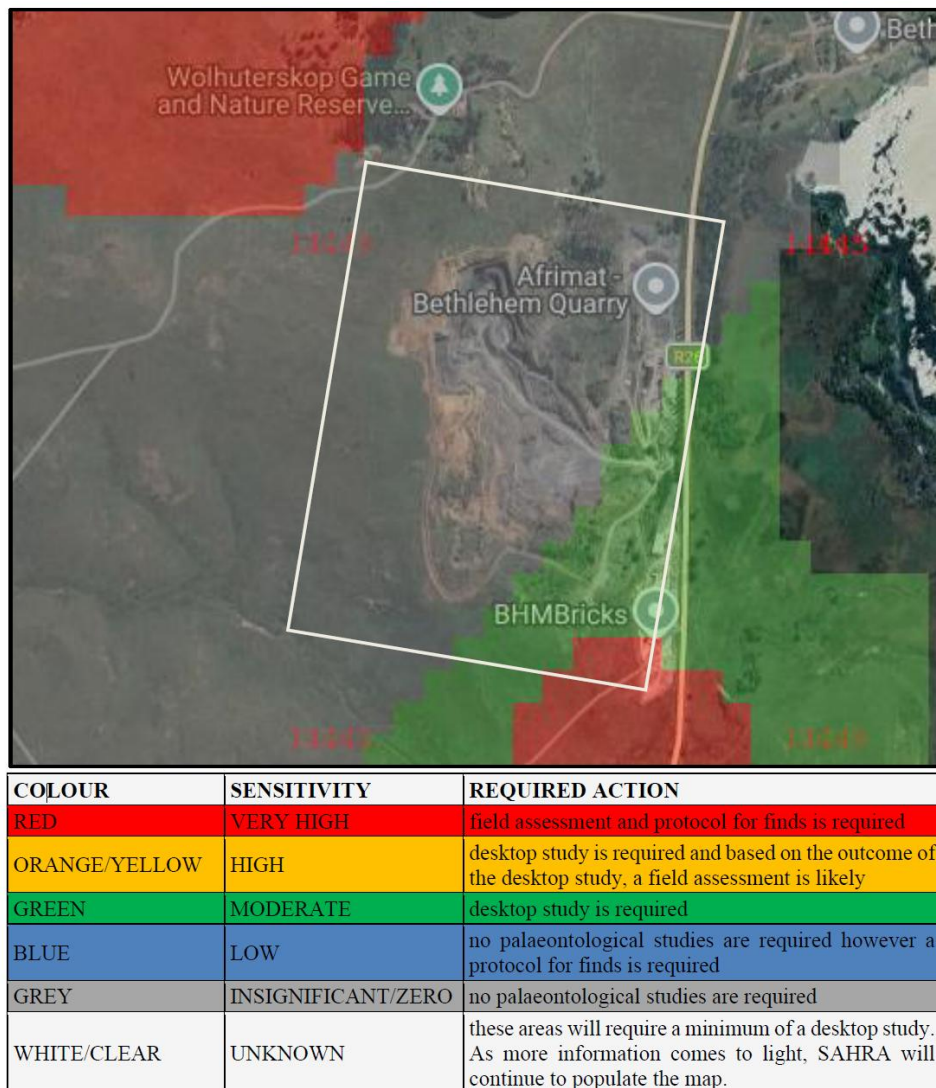


Figure 2-31: Palaeontological sensitivity map (Umlando, 2026).

2.13 ► SOCIO-ECONOMIC SETTING

The following information is taken from the approved Social and Labour Plan (SLP, 2024) and the Dihlabeng Integrated Development Plan (IDP), 2024/2025.

The information below has been simplified and is presented in bullet points, taken from information in the latest Social and Labour Plan (SLP); SLP, 2024 and the latest Integrated Development Plan (IDP) for the Dihlabeng Local Municipality, 2024/2025. More detail is not included as this is an existing operation.

- Bethlehem Quarry is located within the Dihlabeng Local Municipality, which is a Category B municipality situated in the Thabo Mofutsanyana District Municipality in the Free State Province.
- The Dihlabeng Local Municipality includes Clarens, Fouriesburg, Paul Roux and Rosendal.
- The total population of the municipality is 130 434 (Census, 2022), which is an increase of 1.87% from the 2011 census results (128 704).
- The predominant age group within the municipal population is 30-34, with the age group 0-4 the second largest.
- Women hold most of the population, with 53.34%, while men make up 46.66%.
- The predominant language spoken is Sesotho (106 168), with Afrikaans (11 962) being the second most spoken language.
- "Some Secondary" is the most common educational attainment level (30.69%), followed by "Secondary completed" (28.57%) and "Some Primary" (21.13%).

- 38% of residents, including students and those outside job searches, are not directly contributing to the local economy. Furthermore, within the active population, unemployment related to 40.4%, leaving 59.6% with secure employment.
- The business services sector (20.2%) is the single largest contributor to Dihlabeng's local economy.
- 64.9% of households can be considered low-income households (monthly income less than R3 500 and eligible for government subsidy). 20.5% of households have an average annual income of between R48 000 and R196 000. Affluent households (R1 600 000 and more) represent 0.4% of all households in the municipality.

In addition to the information presented in the SLP and IDP, the following is noted:

- The mine employs 36 permanent employees. The following businesses have established as a result of Bethlehem Quarry:
 - BHM Bricks.
- Bethlehem Quarry supports the following business sectors based in the town of Bethlehem
 - Lone Star Recycling (paper recycling business).

2.14 ► ECOLOGICAL SENSITIVITIES

Source Data / Information

The ecological sensitivity aspects shown in the sensitivity map (Figure 2-32), were generated using the following -

1. Map Viewers from BGIS, accessed on the 24th of July 2026 - <https://bgis.sanbi.org/MapViewers>:
 - A. 2015 Terrestrial Critical Biodiversity Areas (CBAs) for the Free State
 - B. 2011 National Freshwater Ecosystem Areas (NFEPA) Rivers
 - C. Protected areas
 - D. 2015 Important Bird Areas
2. Data (Google Earth and shapefiles) received from specialists:
 - A. Heritage Impact Assessment (Umlando, 2026)
 - B. Aquatic Biodiversity Assessment (Limnosella, 2026)
 - C. Biodiversity Impact Assessment (MB Botanical Surveys, 2026)³⁰

Summary Assessment

A summary of the information reviewed is presented in; details in the 'Info Source' column below refers to the map layers specialist data as listed above and is presented in Figure 2-32.

Note: Areas of High, Medium and / or Low sensitivity are not defined for this site as it is an existing operation with extensive surface disturbance of the MR are being evident as far back as 1974 (Figure 2-1).

Table 2-5: Summary of the ecological sensitivity of the area around Bethlehem Quarry.

FEATURE	COMMENT	PRESENT ON-SITE	INFO SOURCE
NFEPA Rivers	Jordaan River system within 500m of the MR boundary	None	BGIS – Layer 1B
Dams	Two dams are located within 500m of the MR boundary: 1. Loch Athlone Dam 2. Gerards Dam	None	Specialist data - Layer 2B
Wetlands	Three (3) wetland features identified within 500m of the MR boundary: 1. Flood line wetland 2. Unchanneled valley-bottom 3. Seep	None	Specialist data - Layer 2B
CBA	None within 5km of the site	No	BGIS – Layer 1A
ESA	ESA 1 present within the MR and surrounds:	ESA 1 and ESA 2 present throughout the MR area.	BGIS – Layer 1A

³⁰ SEI features of the MR included within Ecological Support Areas 1 and 2

FEATURE	COMMENT	PRESENT ON-SITE	INFO SOURCE
	- South - South-east - South-west ESA 2 present within the MR and surrounds: - North - North-east		
Protected areas (PA)	No National or Provincial PA within 5km of the MR boundary	No	BGIS – Layer 1C
	Municipal PA adjacent to the MR boundary		
IBA	Rooiberge-Riemland IBA (SA048)	Present throughout the MR area.	BGIS – Layer 1D
HIA	Eight (8) heritage related findings made: 6. 2 x Grave sites 7. 2 x Sagnar sites 8. 1 x Kraal 9. 1 x Stone Cairn 10. 2 x LSA features	Present throughout the MR area.	Specialist data - Layer 2A

Note: CBA = Critical Biodiversity Area
 ESA = Ecological Support Area
 IBA = Important Bird Areas
 NFEPA = National Freshwater Ecosystem Areas
 HIA = Heritage Impact Assessment

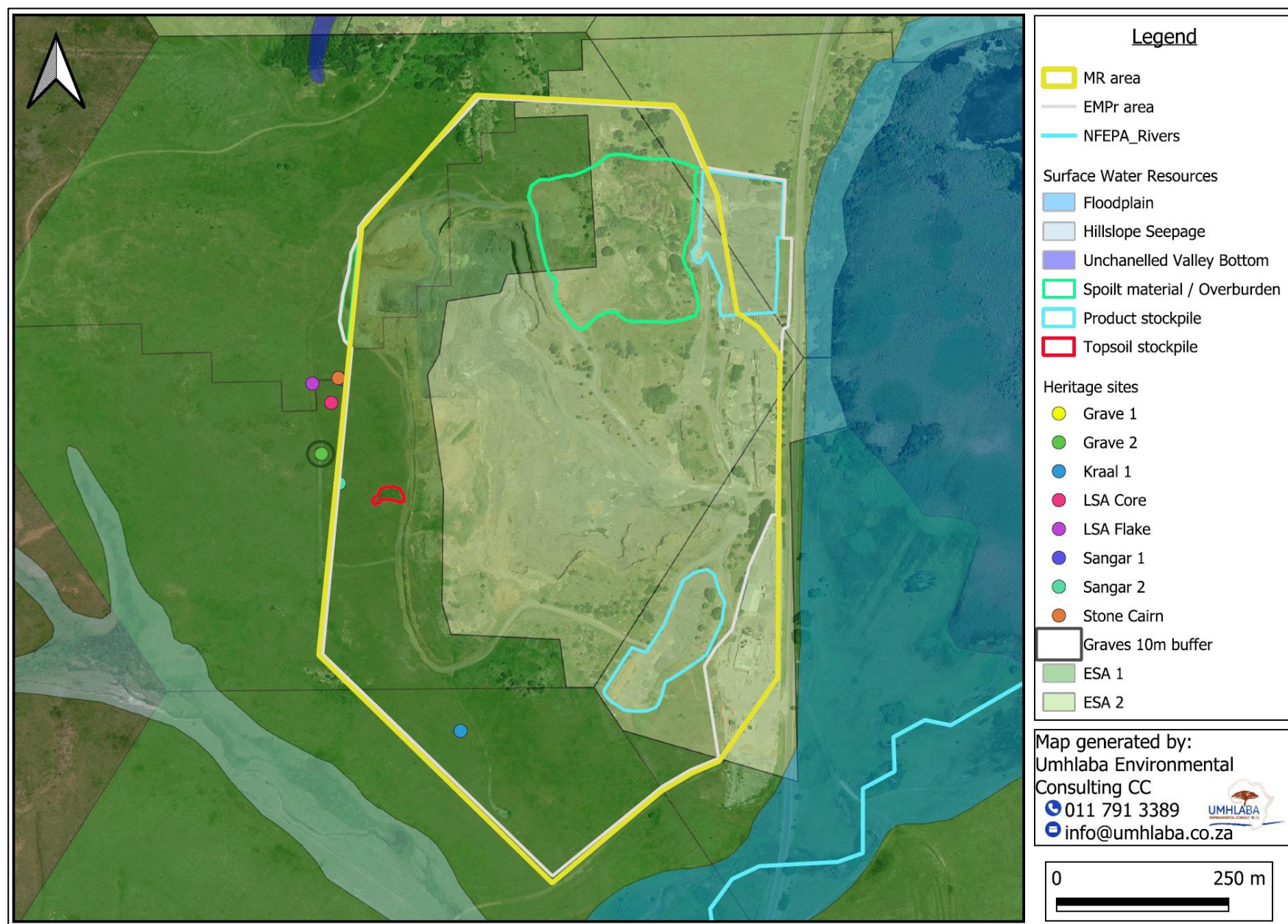


Figure 2-32: Sensitivity map – showing potentially ecologically sensitive areas in the vicinity of the Bethlehem Quarry Mining Right area.

3 PUBLIC PARTICIPATION PROCESS

This Section will be updated with more detail once the PPP has been implemented and will form a record of the process, with a Comments and Response Report included as required.

3.1 DESCRIPTION OF THE PUBLIC PARTICIPATION PROCESS

GN R 982 of NEMA: Regulation 32(1)(a)(aa)

This Section will be completed at end of PPP.

3.2 COMMENTS AND RESPONSE REPORT

GN R 982 of NEMA: Regulation 32(1)(a)(bb)

This Section will be completed at end of PPP.

4 DESCRIPTION OF ACTIVITIES COVERED IN THE EMPR

NEMA:	Section 24N (2)
GN R982 of NEMA:	Appendix 4 (1)(1)(b)

The following description is a consolidated summary of the information presented in the 2010 EMPr with updated information in relation to mining and processing, site layout and supporting services highlighted by an arrow (►). However, it must be noted that this 'updated information' included in the EMPr is not as a result of new activities being undertaken, only an improved record of activities taking place on-site.

The physical area considered in this EMPr (the EMPr area as defined in Section 1.3.2) and the locations of infrastructure referred to in the description is provided in Figure 4-1 for the entire site. Infrastructure relating to 'Supporting Services' is presented in Figure 4-2.

The description of activities is presented in tables as follows:

- *Activity* – a description of the activities undertaken.
- *Equipment* – a list of the major equipment used to undertake the activity. This is not an exhaustive list but given in order to understand potential impacts such as (but not limited to) dust and noise generation.
- *Time-frames / Operating hours* (T-f / Op hr) – the frequency of the activity (if not a routine activity that is undertaken daily) or the hours during which the activity is undertaken (for routine activities).

Note: As described in Section 1.3.2, the EMPr area is depicted by the white boundary on all applicable maps (the current approved Mining Right boundary is depicted by the yellow boundary).

4.1 CONSTRUCTION PHASE ACTIVITIES

As this is an existing mining operation with no changes in activities proposed as part of this EMPr amendment, no construction phase is applicable.

4.2 OPERATIONAL PHASE ACTIVITIES

4.2.1 ► Mining and Processing

Dolerite is mined by conventional opencast bench mining methods, including drilling and basting. Table 4-1 below outlines the mining method utilised at Bethlehem Quarry.

Table 4-1: Mining and Processing description.

	Activity	Equipment	Max No. / Capacity	T-f / Op hrs
Mining within Opencast Void	Mine Planning is undertaken in consultation with the Rock Engineer; with meetings taking place bi-annually.	Computers Office equipment	-	Office hours 07:00-16:30
	Topsoil ³¹ removal (which includes soil and rocky material) only takes place during pit expansion. Removal is undertaken by front-end loader (FEL), which loads material to dump trucks for transportation of soils to the designated storage area indicated in Figure 4-1. Soils are stored for potential use in rehabilitation activities.	Excavator Dump trucks	Two (2) Five (5)	07:00 – 18:00
	Spoilt material / Overburden ³² is removed removal (which includes soil and rocky material) only takes place during pit expansion. Removal is undertaken by FEL which loads material to dump trucks for transportation of soils to the designated storage area indicated in Figure 4-1.	Excavator Dump trucks	Two (2) Five (5)	07:00 – 18:00
	Drilling (within the pit / for pit expansion) is undertaken by means of percussion drill rigs.	Percussion drill rig	Two (2)	24 hours (full day) ³³
	Blasting (within the pit / for pit expansion) is undertaken by a competent blaster, using electronic detonation to control the timing of the blast. Emulsion bulk explosives are used for the primary charge.	Electronic detonation Emulsion bulk explosives	-	Frequency: Monthly Time: 15h00 - 17h00 ³⁴
	Secondary breaking is undertaken within the pit as and when necessary, by hydraulic hammer.	Hydraulic hammer Excavator	Two (2) Two (2)	Monday-Saturday 24 hours (full day)
	Hauling: Blasted rock is loaded to haul trucks by excavators and transported to the primary crusher feed-bin.	30T Excavator 25T Dump trucks	Two (2) Six (6)	Monday-Friday 05:00-24:00 Saturday 05:00-17:00
Processing – Fixed Primary and	The primary crusher is fed directly from dump trucks	Jaw crusher	150t/hr	Routine maintenance: Monday to Friday 06:00-18:00
	Rock from the primary crusher is transported via conveyor belts to the secondary crushers , after which the crushed rock is transported via conveyor belts to the intermediate Stockpiles (ISP's).	Cone Crusher Impact crusher Conveyor belts	120t/hr	Saturday 06:00-17:00

³¹ Surface soils on which vegetation is growing; soils removed may include boulders that can be removed by FEL.

³² A combination of sand and decomposed rock that is not currently viable to process into aggregate and / or sand products. If a demand for such material becomes available, this overburden may be sold.

³³ Typical drilling for ~3 weeks, five times a year, although the frequency of drilling is dependent on market demands.

³⁴ Blasting times may vary due to exogenous circumstances (weather)

	Activity	Equipment	Max No. / Capacity	T-f / Op hrs
	From the ISP, the rock is fed to the screens by conveyor.	Screens (wire mesh) Conveyors	Three (3) screens	Breakdown maintenance: within the hours of operation of the equipment being serviced.
	Aggregate products are moved via conveyor belts from the screens to overhead Final Product bins : 1. 20 mm concrete stone 2. 14 mm / 10 mm concrete stone 3. 8 mm crusher dust	Conveyors Final product bins	-	
	Product is loaded from the overhead product bins to dump trucks, then moved to the stockpile area north of the plant.	Dump truck	Six (6)	
	Routine maintenance is undertaken according to a maintenance schedule, based on production hours Ad-hoc maintenance is undertaken as and when required.	Dependant on maintenance required	N/A	
Mobile Plant	When demand for product exceeds the capacity of the fixed plants, a mobile crusher / crushing train may be used to meet the demand.	Crushing train (crusher, screens and conveyors) FEL to load to crusher	One (1) Two (2)	Monday to Friday 06:00-18:00 Saturday 06:00-17:00
Sales	Product from the Bethlehem Quarry are removed from site by either; Afrimat trucks, contractor trucks or customers' trucks. Haul trucks are loaded by FEL in the product stockpile areas. Vehicles pass over a weighbridge when entering and leaving the site, to manage sale volumes.	FEL Haul trucks Weighbridge	Two (2) N/A One (1)	06:00-18:00



Figure 4-1: Site layout – EMPr area depicted by the white line around the area in which mining and related activities are undertaken.

4.2.2 Supporting Services

In order to produce aggregate, there are a number of supporting activities and services being provided to assist in the day to day running of the mine. These activities and services are described below; the locations of infrastructure presented in Figure 4-2.

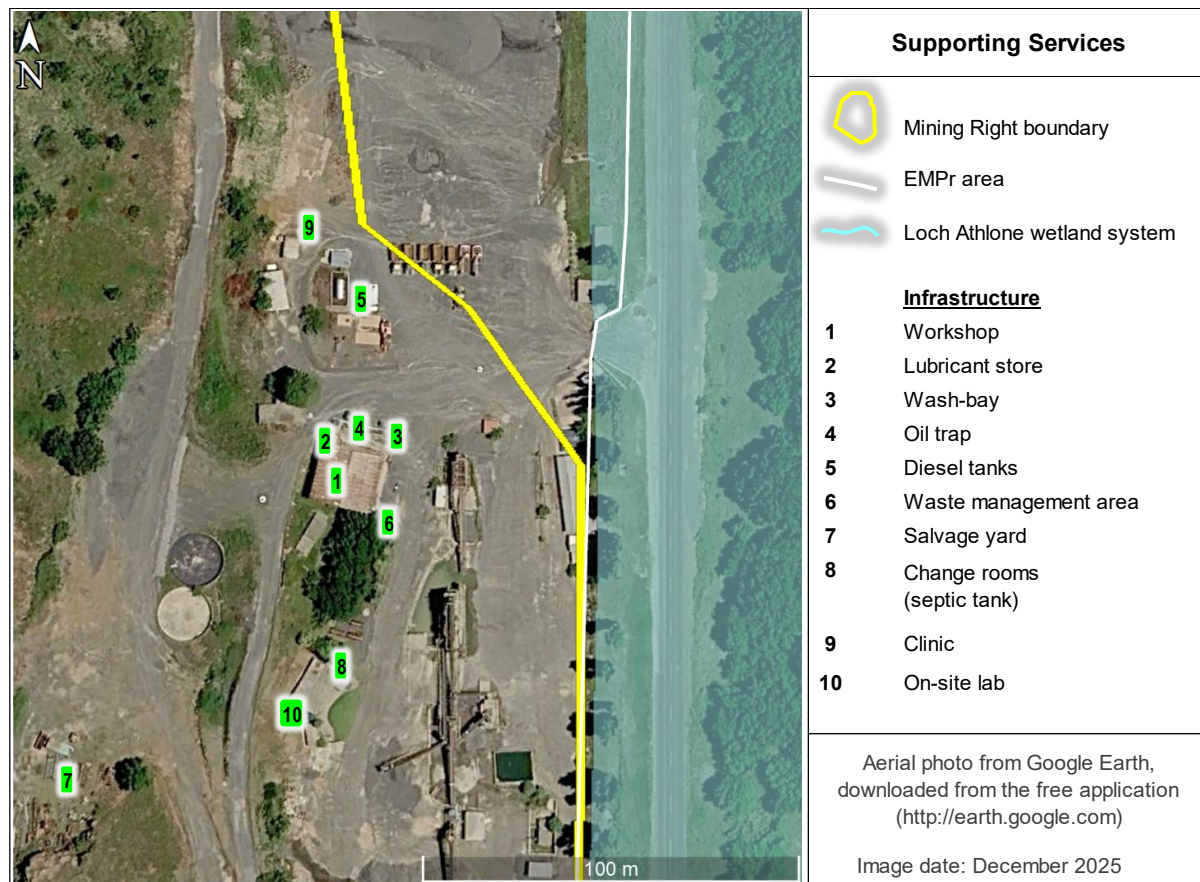


Figure 4-2: Site layout – Infrastructure relating to ‘Supporting Services’.

1. **Administration** activities are undertaken in the admin offices.
2. **Electricity Supply:** Electricity is provided by an on-site generator (Capacity: 700 kVA); housed in a bunded area, with a roof (see Photo 5 below).
3. **Potable and domestic water** is supplied by the Municipality supply.
4. **Process water**, for dust suppression, water is taken from two sources:
 - a. On-site source: A point near the entrance to the quarry where water collects through surface and sub-surface flow, referred to as the “seepage collection point” / quarry entrance (QE) abstraction point (Figure 4-1). This is a seasonal water supply, and water is abstracted from this point when flowing (typically during the wet season from October to May).
 - b. Off-site source: From the Municipal supply (which is stored in the on-site reservoir –Figure 4-1) during the dry season / when the “seepage collection point” is dry.
5. **Storm water management** will take place as per an approved SWMP³⁵. A Conceptual SWMP has been developed for Bethlehem Quarry (ZTD Group, 2026), however it must be noted that storm water management (SWM) measures will change during the life of the mine in order to accommodate changes in surface layout (i.e. road network, stockpile locations, etc.).
Current storm water controls present on site include an earth berm along the southern MR boundary adjacent to the public road (R26), with incremental stone energy dissipaters to reduce the speed of water leaving the EMPr area.
In addition, excess water from the seepage collection point is piped and released off site (release point indicated in Figure 4-1).

³⁵ To be approved by the Department of Water and Sanitation (DWS) during the Water Use License Application (WULA) process.

As an approved SWMP is not yet available, the following principles will apply to SWM on-site, taken from the current conceptual SWMP (ZTD Group, 2026), with Figure 4-4 outlining these recommendations;

► Clean Water Management

- Divert clean upslope runoff around disturbed and dirty areas using cut-off berms and lined drains.
- Prevent clean water from entering the pit, stockpile areas, workshops, contaminated roads and sediment-laden areas.
- Maintain vegetated clean areas and stabilise topsoil stockpiles to prevent them becoming dirty water sources.
- Discharge clean water only to stable, erosion-protected routes downstream.

► Dirty Water Management

- Classify runoff from the pit, haul roads, crushing/screening areas, stockpiles, loading areas, maintenance areas and waste/oil-risk areas as dirty water.
- Collect dirty water in channels and direct it to retention ponds, sediment traps or treatment points.
- Use sediment forebays, silt traps (see Figure 4-3) and 'check dams' to reduce sediment load before water reaches the main retention pond.
- Use captured water for dust suppression where lawful, safe, and operationally appropriate.
- Treat or test water before any off-site discharge and keep records of the results and decision process.

► Erosion and Sediment Control

- Shape roads to drain towards controlled side drains rather than allowing diffuse runoff.
- Install berms on the roadside of storage areas and stockpiles to prevent dirty water from entering public road reserves or downstream drains.
- Install 'check dams' or stone pitching in steep drains to calm flow and prevent erosion.
- Vegetate or armour exposed slopes and topsoil stockpiles.
- Desilt silt traps and retention ponds when sediment occupies 30% of the design volume or after major storm events, whichever occurs first.

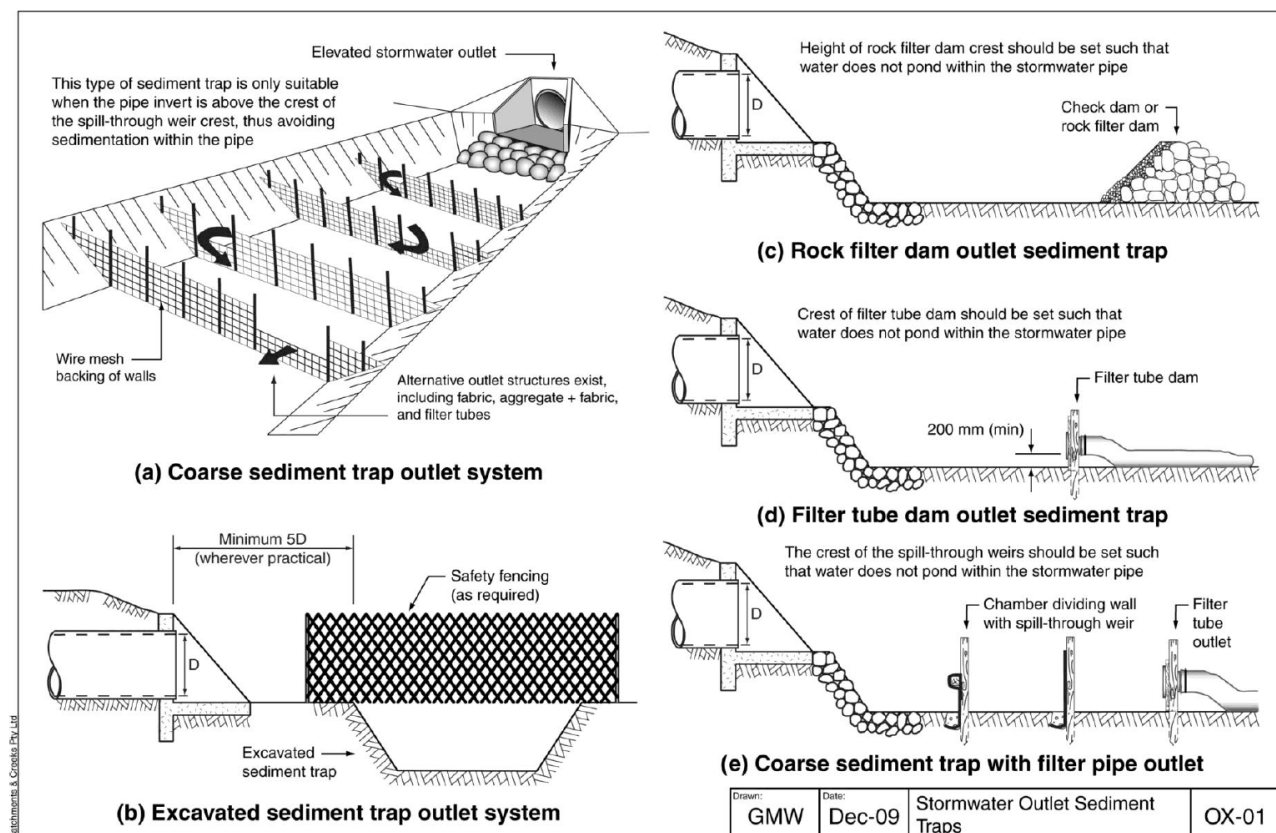


Figure 4-3: ► Conceptual Sediment Trap Arrangement (ZTD Group, 2026).

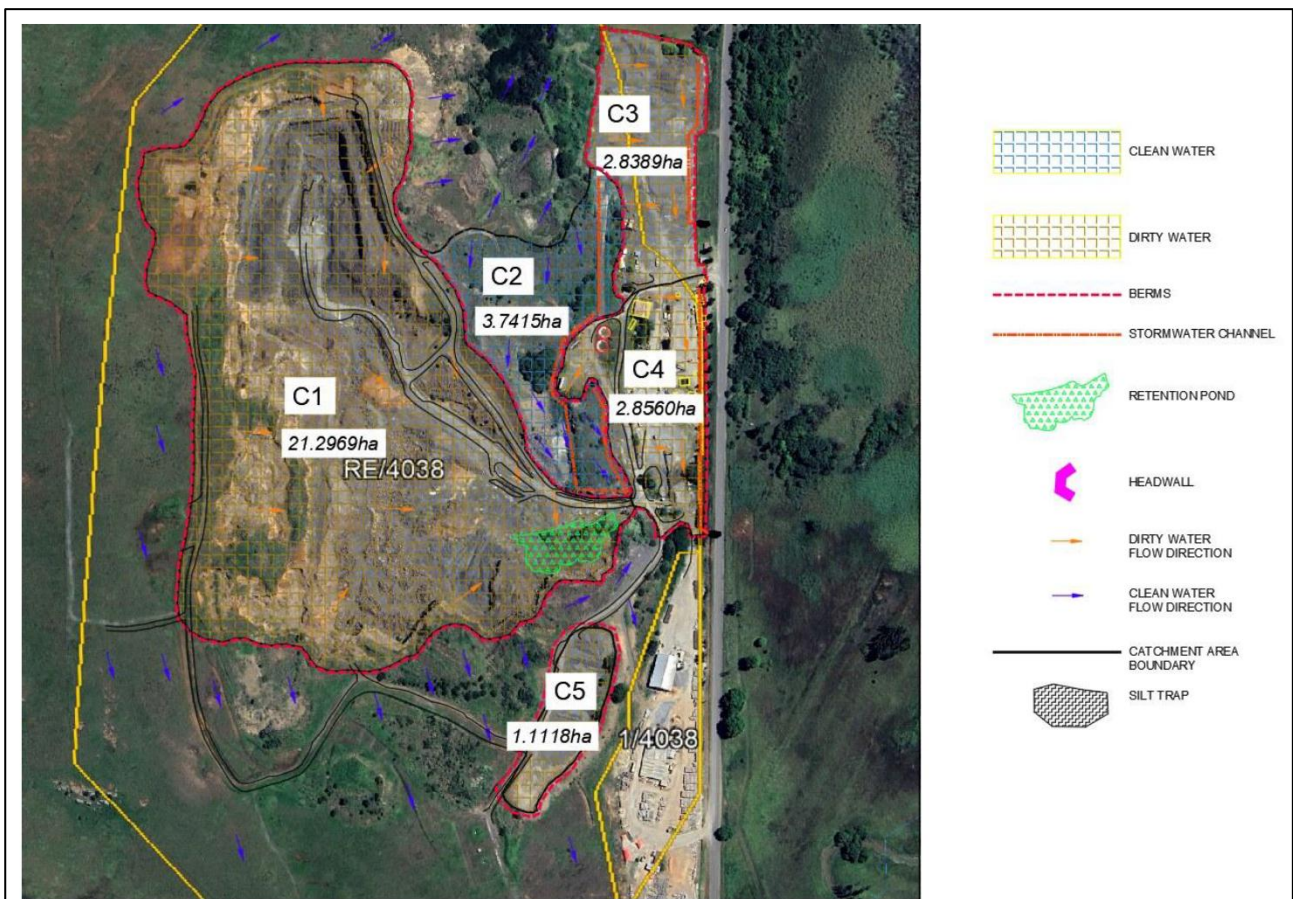


Figure 4-4: ► Current available clean/dirty water separation plan (ZTD Group, 2026).

6. **Maintenance / Workshop:** (also see Waste Management)

- a. Road maintenance (on-site) is undertaken by mine personnel, during mine operating hours, as and when necessary. Material used for road maintenance is obtained from Bethlehem Quarry products.
- b. Vehicle / earth moving equipment: Routine maintenance is carried out at the Workshop (see below), according to a maintenance schedule for each vehicle (based on operational hours). Daily vehicle inspections are also undertaken by the driver at the start of each shift.
If there is a breakdown and the equipment cannot be moved to the Workshop, repairs are undertaken outside of the Workshop (at the breakdown site).
- c. Plant: Routine maintenance is conducted in-situ in accordance with a maintenance schedule (based on production hours). Activities include (but not limited to); repairing any damage to plant equipment, application of lubricants to moving parts, and changing of oils.
- d. The Workshop area includes;
 - A concreted and covered area for vehicle maintenance.
 - The lubricant stores - bunded, covered, and locked.
 - A drain from the workshop area to the oil sump and JoJo Tank.

7. **Wash-bay** is concreted and has a drain down the centre (Photo 1), directing water to the oil sump. "Clean water" is stored in a JoJo Tank (see Photo 7)
8. **Fuel** (diesel) is stored in a above ground tank, housed within a bunded area (Photo 2), including a drain leading to an oil separator dedicated to the diesel tank (Photo 3).
9. **Waste Management**: Details regarding the waste generated by the site, the manner of storage, and the method of final waste management is included in the Waste Inventory – see Appendix 1.1. Registered waste transporters are contracted to remove waste from the site, for final waste management at licensed facilities (in accordance with NEM:WA³⁶). A summary of the key waste types is listed, and the manner of temporary on-site storage is described below, however the details in the waste inventory (which will be managed as per Section 6.1 of this EMP) will be the most current record of waste management.

³⁶ National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)

- a. Overburden is stored east of the pit (indicted in Figure 4-1).
 - b. General waste is collected either in bins throughout the site, with waste being consolidated in bins in the waste management area (indicted in Photo 6) prior to removal from site.
 - c. Hazardous waste is stored in the workshop and wash bay area in containers that prevent contact of waste with soils and or storm water. Much of the hazardous waste is from maintenance activities undertaken at the workshop or the plants.
 - d. Sewage from the admin offices and change house (near the Workshop) is serviced by a conservancy tank (see Photo 8) and is emptied by a third party who disposes the sewage waste at the Municipal Treatment Works.
 - e. Medical (HCR³⁷) waste generated in the on-site clinic building is removed by the Health Care Practitioner who is contracted to Bethlehem Quarry.
 - f. Salvage material is stored in the salvage yard (indicted in Photo 4).
10. **On-site laboratory** is used to test materials before products are sold. No chemicals are used at the laboratory and products (aggregate and sand) that have been tested are used as earth berm materials.

³⁷ Health Care Risk

Photo Gallery for Supporting Services



Photo 1: Wash bay with drain to oil sump.



Photo 2: Above ground diesel tank and bund.



Photo 3: Oil separator attached to diesel tank bunding area.



Photo 4: Salvage yard.



Photo 5: Generator in bund with oil separator attached (evident in the foreground of the photo).



Photo 6: Waste Management area.



Photo 7: JoJo Tank storing "clean water" from the oil sump located in the wash bay.



Photo 8: Conservancy tank attached to the change house ablution facility.

4.3 POTENTIAL ENVIRONMENTAL INCIDENTS / EMERGENCIES

Two (2) potential environmental incidents / emergencies have been identified and will be managed as described below. It must be noted that these incidents will only be reported in terms of Section 30 of NEMA and Section 20 of the NWA³⁸ if off-site pollution occurs; i.e. the incident caused or may cause significant harm to the environment, human life or property. If the pollution / incident is contained on-site the incident will be logged on the incident management system only (and not reported externally, to the competent authority).

1. **Hydrocarbon / Hazardous Chemical Spills:** Spills onto bare ground (i.e. not on concreted surfaces), covering a surface area >1m², are considered an 'emergency incident'. These will be contained, and all contaminated material will be lifted and collected for final waste management. The method of final waste management will be determined based on the material that was spilled and the disposal requirements of that material (in terms of the NEM:WA and applicable Regulations).
2. **Fire:**
 - a. *Building, plant and vehicle* fires will be controlled by use of fire extinguishers which are available in all buildings, in the vehicles and in the plant area. If they cannot be controlled by site personnel, they will be report it to the fire brigade immediately, and then to their supervisor (if not already notified).
 - b. *Veld fires* that cannot be controlled by means of fire extinguishers (which are available in all buildings, in the vehicles and in the plant area), will be reported to the fire brigade immediately, and then to their supervisor.

4.4 CONCURRENT REHABILITATION AND ALIEN VEGETATION CONTROL

The concurrent rehabilitation commitments include:

1. **Quarry Pit:** No concurrent rehabilitation of the quarry pit faces is proposed during the life of mine as this may restrict various access options and the possibility of expanding the pit.
2. **Vegetation of Overburden Berms:** Surfaces will be allowed to self-vegetate (with alien vegetation control implemented routinely). Trees may be planted on the slopes to break the skyline of the berms and act as additional visual screening. However, this is not a confirmed concurrent rehabilitation action (only an option to consider) given that the overburden dump material may prove to be unsuitable for tree growth.
3. **Alien Vegetation Removal:** Floral alien and invasive species (AIS) are removed systematically by a third-party service provider. Quarterly progress reports are shared with the mine and kept on site.

4.5 DECOMMISSIONING AND CLOSURE PHASE

Closure Planning is currently required in terms of GN R 1147³⁹, which will include the annual review (and update if necessary) of the Closure Plan when enacted⁴⁰. Hence, no detailed information regarding decommissioning and closure is provided in this section of this report to avoid having contradicting or outdated information in the EMPr (given that the Closure Plan will require a more frequent review schedule than an EMPr). Closure Planning will be undertaken in accordance with the time frames stipulated in the Regulations applicable at the time. The "Final Footprint"⁴¹ of the quarry pit for Bethlehem Quarry is depicted in Figure 4-5 below.

4.5.1 Mine Closure Objectives

The factors influencing mine closure and rehabilitation may change over the life of the mine, including changes in environmental conditions, socio-economic circumstances, land-use planning, regulatory requirements and the needs and objectives of affected stakeholders. Accordingly, the final closure and rehabilitation objectives must be reviewed and refined, where necessary, to ensure that closure is undertaken in accordance with the applicable environmental, socio-economic and regulatory requirements prevailing at the time of closure.

Based on the 2010 EMPr, the following potential end land uses have been considered and are still applicable;

- Development of the area as a waste management and/or landfill facility. (Given the location of the site in close proximity to protected areas and wetland systems, it is acknowledged that this final land use option is not likely to be approved.)

³⁸ National Water Act, 1998 (Act No. 36 of 1998)

³⁹ Financial Provisioning Regulations, 2015 (published in terms of NEMA).

⁴⁰ Although at the time of drafting this EMPr, this provision has not yet been enacted.

⁴¹ At the time of drafting this report

- Incorporation of the area for future development, potentially aligned with the objectives and spatial planning framework of the relevant Local and/or District Municipality, including the applicable IDP.
- Making the final pit safe and stable.

As the mine approaches the end of its operational life, the preferred end land use should be formally confirmed through the applicable closure planning and stakeholder consultation processes. The confirmed end land use should inform the final Closure Plan, including the closure objectives, rehabilitation measures, final landform design, decommissioning requirements and post-closure management and monitoring measures.

Where practicable, concurrent rehabilitation and mine planning should be undertaken with consideration of the intended final land use to ensure that mining activities, rehabilitation and closure measures can be achieved when Bethlehem Quarry reaches the life of mine.

The following overarching principals will be used to generate the detailed Closure Plan for the Bethlehem Quarry;

1. The relevant legislation of the time when closure is implemented will be adhered to.
2. The safety and health of humans and animals are safeguarded from hazards resulting from the mining operations.
3. The land is rehabilitated to, as far as is practicable, a state whereby it can complement surrounding land use activities at the time of closure and does not represent a source of pollution.
4. The mine will be closed efficiently and cost effectively.
5. The cost of implementing closure will be covered by the financial provision set aside during the life of the mine.
6. Afrimat recognise the socio-economic impacts associated with mine closure. As the mine draws closer to closure, the social and labour plan will place more emphasis on future sustainable projects in the region and the multi-skilling of the workforce to minimise the socio-economic impacts associated with closure.

Pit design

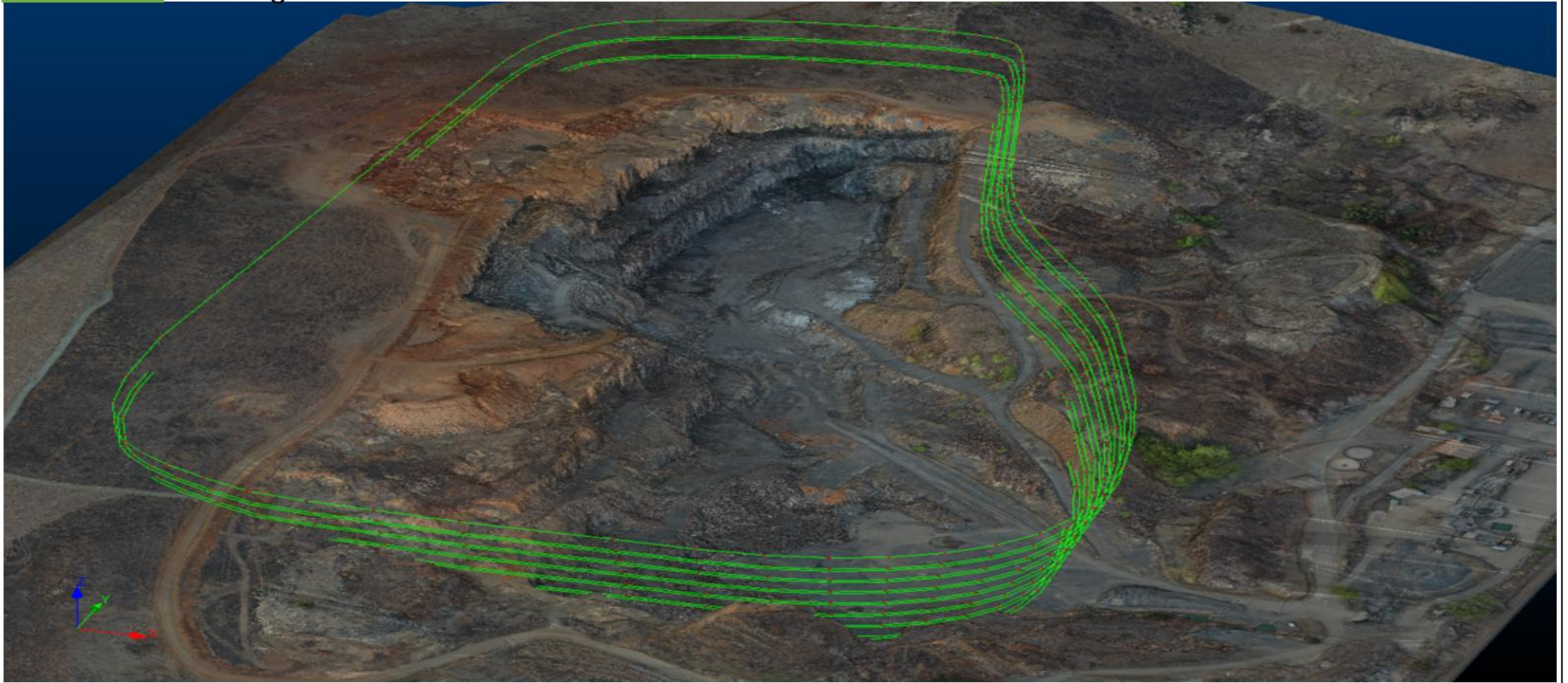


Figure 4-5: "Final Footprint" of the Bethlehem Quarry pit

5 IMPACTS / RISKS ASSOCIATED WITH THE MINING ACTIVITIES

<i>NEMA:</i>	Section 24N (2)
<i>GN R982 of NEMA:</i>	Appendix 4 (1)(1)(c) and (d)

Note: Given that Bethlehem Quarry is an existing operation (see Figure 2-1 on page 2.12), the aspects, impacts and risks associated with the phases listed in Appendix 4(1)(d) as listed below, are not evaluated as these phases are complete and are not being undertaken.

- (i) Planning and design
- (ii) Pre-construction activities
- (iii) Construction activities
- (iv) Rehabilitation after construction

As this is an existing operation and there are no changes to the already authorised activities being undertaken on-site (and the EMPr update is in response to a pre-compliance notice – see Section 1.1), the impacts and ranking presented are a summary of available information. Since the approval of the 2010 EMPr, monitoring and a number of specialist studies have been undertaken (listed in Section 2 on page 2.12). Where this data and / or these specialist studies have given input to the impact identification and / or ranking, this is included and indicated.

The overview of the sensitivities of the area in which the mine is located are presented (see Figure 5-1, in Section 5.1), followed by the identification and ranking of impacts (Section 5.2).

5.1 ► INFRASTRUCTURE IN RELATION TO ENVIRONMENTAL SENSITIVITIES

<i>NEMA:</i>	Section 24N (2)
<i>GN R982 of NEMA:</i>	Appendix 4 (1)(1)(c)

Note: Environmental Sensitivity Maps were not a legal requirement when the previous EMPr was drafted, hence this is new information documented in this EMPr.

Mining and related activities have caused surface disturbance across most of the MR area, with expansion of the pit since the approval of the 2010 EMPr being in a northerly and westerly direction. As this is an EMPr update (with no new activities), the visual presentation of mining related activities considers the existing surface disturbance and not specific infrastructure. The current infrastructure present on site is shown in the site layout map (Figure 4-1 and Figure 4-2, on pages 4.5 and 4.6) and the area of disturbance in relation to sensitive features is illustrated in Figure 5-1 below. The special extent of the map considers the zone of impacts and / or sensitive receptors identified by the specialist studies (listed in Section 2 on page 2.12).

This section does not include alternate and / or the preferred sites as this is an existing activity with no new activities since the approval of the EMPr nor any proposed developments.

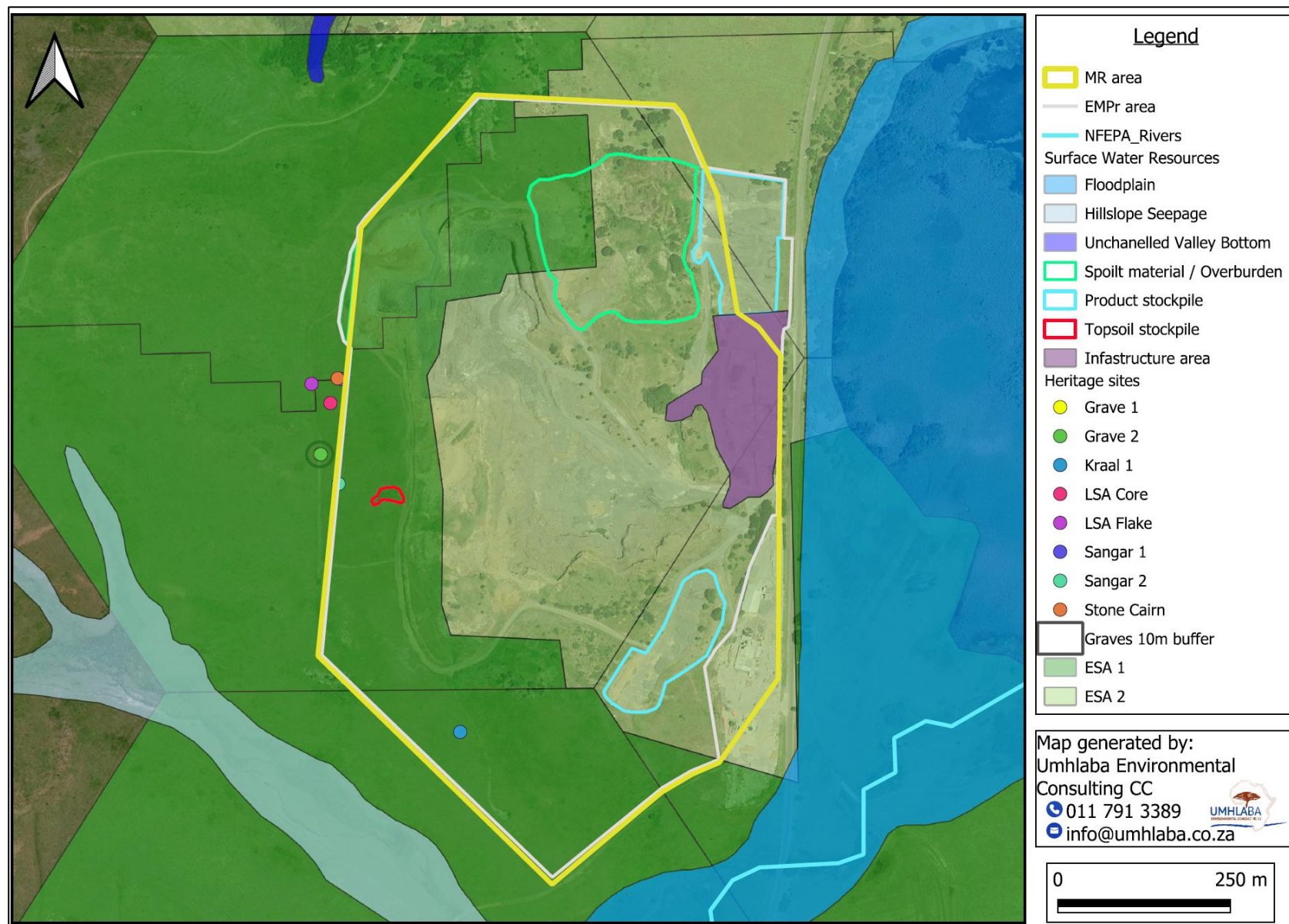


Figure 5-1: An overlay of infrastructure on the environmental sensitivity map.

5.2 IMPACT AND RISK IDENTIFICATION

NEMA: Section 24N (2)
GN R982 of NEMA: Appendix 4 (1)(1)(d)

Note: As the Impact Assessment was not included in the previous approved EMP, and additional information has become available since the drafting of the 2010 EMP (monitoring data and specialist studies), this section is indicated as “updated”. However, it must be stressed that there are no changes to the impacts as no new activities are being undertaken.

A summary of the aspect identification and impact ranking⁴² is presented in Table 5-2 for the operational phase for all mining and related activities. The ranking of impacts is based on a worst-case scenario, assuming no mitigation or management actions have been implemented. This allows for prioritising the setting of Outcomes and associated Management Actions.

The impact ranking used categorizes impacts as defined below (see Table 5-1), with the Impact Ranking methodology provided in Section 10.13. Although the 2010 EMP does not include a copy of the full Impact Assessment (only a summary), various specialist studies have been completed since 2010 (see full list in Section 2 on page 2.12), and the findings of these studies have been considered along with monitoring data.

Table 5-1: Impact Ranking descriptions.

Low	Management actions may not be necessary, but in some instances are encouraged to ensure that the impact remains of Low significance.
Low-Medium	Management actions are usually encouraged to ensure that the impacts remain of Low-Medium significance.
Medium	Management actions are required to ensure, at minimum, the significance of the impact does not increase.
Medium-High	Management actions are required to reduce the significance of the impact to, at least, Medium significance.
High	Impact should be avoided, or if not possible, managed to reduce the significance of the impact to, at least, Medium significance (where possible).

Each activity implemented as part of Mining and Processing, and Supporting Services (described in Sections 4.2.1 and 4.2.2 respectively), result in impacts that relate to more than one aspect. The impact ranking shown in the Tables in this section are the most significant ranking identified for that aspect.

5.2.1 Construction Phase

Not applicable as this is an existing operation, refer to Section 2 on page 2.12.

5.2.2 ► Operational Phase

The impact rankings are presented in Table 5-1; linked with the aspects, what the impacts are associated with, and factors considered in the ranking. To facilitate an understanding of the change in impact ranking with the implementation of Impact Management Actions (as outlined in Section 6.1), Table 5-1 presents the unmitigated (ranking *without* MA) and mitigated ranking (ranking *with* MA).

⁴² Definitions of ‘aspect’ and ‘impact’ are given in the Glossary of Terms.

Table 5-2: ► Aspects and impact rankings associated with the OPERATIONAL phase activities. (Most significant ranking presented per aspect.)

	ASPECT ⁴³	IMPACTS ASSOCIATED WITH -	FACTORS CONSIDERED IN THE RANKING	RANKING <i>WITHOUT</i> MA ⁴⁴	RANKING <i>with</i> MA ⁴⁵
NEGATIVE	TOPOGRAPHY	Topographical variation caused by the excavation of the pit and the creation of stockpiles and deposits	The age of the mine ^(A)	Med-H	Med-H
	SOIL	Stripping of topsoil for the expansion of the pit	Removal of soil is an unavoidable activity for pit expansion	High	Med-H
	BIODIVERSITY	Loss of biodiversity due to surface disturbance	Ranking elevated due to the proximity to sensitive environments (see Figure Figure 2-32) Specialist studies (Feathers Environmental Services, 2021 and 2026; MB Botanical Surveys, 2021)	Med-H	Med-H
	VISUAL	Visual intrusion due to surface disturbance and infrastructure	The age of the mine ^(A)	High	Med-H
	VIBRATION	Ground vibrations as a result of blasting	Blast vibration monitoring results (measures currently taken during every blast)	Low	Low
	FLY-ROCK	Fly-rock as a result of blasting	No record of fly-rock incidents documented	Low	Low
	AIR QUALITY	Fugitive dust emissions	Specialist study (Waste Aside, 2021 and 2026) Dust fallout monitoring data (April 2025 – June 2026)	Med-H	Low-M
	NOISE	Sound emissions during operational periods	Day-time boundary sound level surveys (2023 and 2025)	Med ^(A)	Med
	ILLUMINATION	Lights within the infrastructure area being visible off-site	The plant area is 700m from the nearest residential receptor	Low	Low
	SURFACE WATER				
	Run-off / Volume	Alteration of storm water run-off volumes and patterns affecting the volume of run-off feeding water courses and seepage to ground water	Proximity of the mine to water courses (wetlands considered separately below)	Med-H	Med-H

⁴³ "A particular part or feature of something" – definition from the Oxford Dictionary

⁴⁴ Unmitigated scenarios – assuming no Management Action(s) have been implemented

⁴⁵ Mitigated scenarios – assuming Management Action(s) as per Section 6.1, Table 6-2 on page 6.3 have been implemented successfully

	ASPECT ⁴³	IMPACTS ASSOCIATED WITH -	FACTORS CONSIDERED IN THE RANKING	RANKING <i>WITHOUT</i> MA ⁴⁴	RANKING <i>with</i> MA ⁴⁵
	Wetland(s)	Mining and related activities that may affect water flow to the wetlands in terms of quantity and quality	Specialist study (Limosella Consulting, 2021 and 2026) Presence of wetlands within 100m of the mine (see Figure 2-32)	Low -M	Low
	Quality / Pollution	Changes in quality of / Pollution of surface water that leaves the site	Proximity of the mine to water courses ^(C)	Med	Low
	GROUND WATER				
	Ground water level	Ground water abstraction	No ground water abstraction occurring. The ground water level has not been reached.	Low	Low
	Quality / Pollution	Changes in quality of / Pollution of ground water as a result of mining and related activities	Specialist study (Water without Frontiers, 2021 and 2026) ^(C)	Low-M	Low
	WASTE (LITTER)	Litter (typically wind-blown) leaving the site	The proximity to sensitive environments (see Figure 2-32)	Low-M	Low
	HERITAGE	Disturbance to known heritage features identified on-site and within 50m of the MR boundary.	Presence of heritage features within 500m of the MR, identified in the specialist study (Umlando, 2026)	Low-M	Low
POSITIVE	SOCIO-ECONOMIC				
	Employment	Economic benefits of direct and indirect employment		Med	Med
	Training	Improved job prospects as a result of personnel acquiring Portable Skills		Med	Med
	Procurement	Continued support for existing service providers		Med	Med

Notes:

- (A) The mine has been operational since the 1950s, hence the impact has been part of the landscape for over 50 years.
- (B) Current monitoring data is for day-time operations only. Should operational activities extend beyond sunset, additional monitoring will be required to confirm the impact ranking.
- (C) There is no monitoring data available to provide support to this ranking. Potential on-site pollution sources and theoretical probability of pollution have been considered.

The following aspects were not evaluated for the reasons given:

• Exhaust fumes / Tailpipe emissions	Gaseous emissions from vehicle exhaust were not quantified or modelled as the impacts from these sources are usually localized and unlikely to exceed health screening limits outside the project area.
• Odours	No concerns identified as the mining and related activities do not generate odours.

5.2.3 Decommissioning and Closure

A Mine Closure Risk Assessment is included in the 2010 EMPr, however impacts anticipated during decommissioning and closure are not evaluated here as these will be addressed under the Closure Plan required in terms of the Financial Provision Regulations (currently GN R1147). This approach is followed to avoid contradictory commitments in various authorisation documentation as a result of overlapping legislative requirements. As the Financial Provision Regulations require more frequent updates of the supporting information, these documents are likely to remain current and not become outdated, as would be the case in an EMPr (where updates are only undertaken when there are changes to activities on-site).

5.3 IMPACT MANAGEMENT OUTCOMES AND STATEMENTS

NEMA: considering **Section 24N (7)**
GN R982 of NEMA: **Appendix 4 (1)(1)(d)**

The approved EMPr was drafted in accordance with the Regulation 51 of GN R 527⁴⁶, prior to the requirements of the current EIA Regulations (2014), and prior to the requirements for 'Impact Management Outcomes' to be specified. Hence the approved documents included Objectives and not Outcomes. As part of the purpose of the amendment of the EMPr is to bring the document in line with NEMA (as noted in Section 1.1), Outcomes have been included [as required in terms of Appendix 4, Regulation (1)(d)].

The Outcomes* (the way a thing turns out; a consequence⁴⁷) presented are an extension of the Objectives* (a thing aimed at or sought⁴⁷) that were stated in the approved EMPr; they provide clarity in terms of implementation of the EMPr.

To provide the link between the impact identification and the Outcomes that have been set, Table 5-3 indicates what impacts (presented as aspects) are to be addressed by the achievement of the Outcome, and where the Outcomes relate / link to specific activities.

5.3.1 ► Operational Phase

Operational Phase Outcomes have been set considering the impacts identified (as presented in Table 5-2) and are provided in Table 5-3. As noted above, these have been guided by the Goals and Objectives that were set in the approved EMPr (2010).

Impact Management Statement (adapted from the approved EMPr)

Negative Impacts

When considering the entire mining operation, and not as individual activities associated with the mine, two (2) negative impacts were assigned a ranking of **HIGH** significance. Soil is assigned a high significance ranking as the EMPr area is predominantly categorised as an Ecological Support Area (ESA). Visual Impacts are also assigned a high significance ranking, as the entire plant and supporting service areas are visible from the R26 which runs adjacent to the site (see Figure 1-1 on page 1.2). Negative impacts of **MEDIUM-HIGH** and **MEDIUM** significance are identified as being associated with; changes to topography, dustfall, noise emissions, and impacts associated with surface water runoff and change to surface water quality. These impacts are an unavoidable result of the mining activities and will definitely occur; although the impacts can be mitigated and the significance ranking lowered.

The impacts of High significance are avoidable and the probability of reducing the significance ranking is minimal. The impacts with a Medium-high to Medium significance ranking require the greatest consideration when determining Outcomes and applying management actions. Although the impacts cannot be avoided, the implementation of management actions can reduce the probability and / or the consequence of the negative impact(s) (see Table 5-2 above).

Positive Impacts

The ongoing operation of the mine will result in positive socio-economic impacts such as the generation of aggregate products required for development of the region, adding to the local economy through its procurement needs, jobs (both directly and indirectly) and development through the implementation of its local economic development plan contained within its approved Social and Labour Plan (SLP).

⁴⁶ Promulgated in terms of the Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)

⁴⁷ Oxford Dictionary definition - * definition also included in the Glossary to Terms.

Continuation of the Mining Operation

Bethlehem Quarry is an existing mining operation with a remaining life of over 20 years based on 2020 Mine Works Programme (MWP) estimations. The impacts associated with transforming land to facilitate mining operations have already occurred (starting in the 1950's). The significance of the impacts associated with emissions from the site can be reduced through the routine implementation of management actions, although in most cases impacts cannot be avoided entirely.

5.3.2 Decommissioning and Closure

Outcomes have been set considering the Objectives in the 2010 EMPr, and presented in Table 5-4. As noted in Section 4.5, closure requirements are guided by specific legislation (currently GN R 1147⁴⁸), no further detail is included in order to avoid contradictions in commitments. As the documentation required in terms of the Financial Provision Regulations (2015) require regular updates, this information will remain relevant and current, while documentation in the EMPr is only likely to be updated periodically and hence may become outdated as new information becomes available and as the setting in which the mine is located evolves.

⁴⁸ Financial Provision Regulations, 2015

Table 5-3: Impact Management Outcomes for the OPERATIONAL Phase, and the impacts (expressed as aspects and activities) that will be addressed through mitigation and management.

Operational Phase Outcomes* (the way a thing turns out; a consequence) All Outcomes specified below apply to “mining and related activities” *, hence this phrase is not included in the wording of the Outcomes below.		Impacts→	Negative														Positive			
		Topography	Soil	Biodiversity	Visual	Vibration	Fly-rock	Air Quality	Noise	Illumination	Surface water (Volumes)	Surface Water (Wetland/s)	Surface Water (Quality)	Groundwater	Waste (Litter)	Heritage	Employment	Training	Procurement	
Aspect relating to Impacts→	Impact ranking →	M-H	H	M-H	H	L-M	L-M	M-H	M	L	M-H	L-M	M	L-M	L-M	L-M	M	M	M	
Operational Activities during the Operational Phase																				
Om-1.	No legal non-compliance notices are received in terms of environmental legislation*.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				
Om-2.	Environmental management documentation required in terms of the prevailing environmental legislation are valid (not expired) and accessible on-site.					X	X	X	X		X	X	X	X	X	X				
Om-3.	New activities requiring authorisation under prevailing legislation are not undertaken prior to application for and granting of said authorisation by the competent authority.							X	X		X	X	X	X	X	X				
Om-4.	Identified sensitive areas (including buffers) outside the final footprint are not physically disturbed through mining and related activities (excluding existing disturbance).			X				X	X		X	X	X	X	X	X				
Om-5.	In all areas where land clearing is required, the top layer of soil / overburden is removed and stored for concurrent rehabilitation / stored to be available for rehabilitation.	X	X	X																
Om-6.	Stored soil remains viable for use in rehabilitation (i.e. is not contaminated)		X	X																
Om-7.	Closure is not limited by mining practices	X	X																	
Om-8.	Areas of the site that are visible from off-site appear orderly.	X			X					X					X					
Om-9.	Fly-rock (from blasting) does not leave the mining right area.						X													
Om-10.	USBM ⁴⁹ limits are not exceeded at the sites of vibration measurement, when measuring off-site.					X														
Om-11.	No exceedances of the dustfall standards beyond permitted frequency.							X												
Om-12.	Sound level measurements on the mining right boundary, due to sound emissions from mining and related activities, do not to increase the background sound levels* by more than 7dB above the baseline.								X											
Om-13.	Identified heritage sites are not disturbed without legal permission.														X					
Om-14.	Municipal water sources are only used as process water (dust suppression) when no alternative water sources are available.										X									
Om-15.	Uncontrolled* release of ‘dirty’ water* from the EMPr area does not occur.			X							X		X	X						
Om-16.	Water discharged from EMPr area is “clean”.											X	X	X						
Om-17.	Storage of waste does not result in pollution of soils, surface or ground water.		X								X	X	X	X						
Om-18.	Sanitation holding tanks do not cause pollution of soils, surface or ground water.										X	X	X	X						
Om-19.	Only licensed / registered service providers are used for off-site waste management activities.														X					
Om-20.	Storage, handling, and use of hazardous liquids does not result in pollution* of soils, surface or ground water.										X	X	X	X						
Om-21.	Water from ‘hydrocarbon contamination risk areas’* does not flow over bare soils.		X								X	X	X	X						
Om-22.	‘Dirty’ water* containing hydrocarbons are collected at source and cleaned on-site.		X								X	X	X	X						
Om-23.	Staff and contractors are aware of their roles and responsibilities with regards to environmental management.																X	X		
Om-24.	Energy consumption will be managed according to ESG requirements.																		X	
Om-25.	Interested and affected parties (I&AP) complaints (received by the mine) are investigated, and the identified corrective actions implemented.																		X	
Concurrent Rehabilitation Activities during the Operational Phase																				
Om-26.	Stored overburden will be protected to remain viable for use in rehabilitation.	X	X	X																

⁴⁹ United States Bureau of Mines

Operational Phase Outcomes* (the way a thing turns out; a consequence) All Outcomes specified below apply to “mining and related activities” *, hence this phrase is not included in the wording of the Outcomes below.	Impacts→	Negative															Positive		
	Aspect relating to Impacts→	Topography	Soil	Biodiversity	Visual	Vibration	Fly-rock	Air Quality	Noise	Illumination	Surface water (Volumes)	Surface Water (Wetland/s)	Surface Water (Quality)	Groundwater	Waste (Litter)	Heritage	Employment	Training	Procurement
	Impact ranking →	M-H	H	M-H	H	L-M	L-M	M-H	M	L	M-H	L-M	M	L-M	L-M	L-M	M	M	M
Om-27. The AIS (vegetation) within the EMPr area is managed.			X	X															
Om-28. Where no further mining or related activities are planned to occur on exposed surfaces outside of the pit, these will be rehabilitated.		X	X	X															
Closure Aspects applicable to the Operational Phase																			
Om-29. During the operational phase of the mine, rehabilitation and closure requirements, as per the prevailing legislation, are adhered to.		X	X	X															

Table 5-4: Impact Management Outcomes for Decommissioning and Closure.

ASPECT	OUTCOME
IMPACT RANKING	(THE WAY A THING TURNS OUT; A CONSEQUENCE)
Closure	Closure requirements as per the prevailing legislation are adhered to.
	Final landform is suitable for use by the landowner.
	Safety and health of humans and animals are safeguarded from hazards resulting from the mine closure activities.
	Aligned with the relevant Integrated Development Plan (IDP) at the time of closure.
	Input from I&AP are incorporated.
	Rehabilitate the land to, as far as is practicable, a state whereby it can be integrated with surrounding land use activities at the time of closure and does not represent a source of pollution.
	Materials are re-used or recycled during closure, i.e. salvage material where possible.
	The mine will be closed efficiently and cost effectively.
	The socio-economic impact resulting from mine closure is limited.

6 IMPACT MANAGEMENT AND REPORTING ON COMPLIANCE

NEMA: Section 24N (2)
GN R982 of NEMA: Appendix 4 (1)(1)(f) to (l)

6.1 IMPACT MANAGEMENT AND MONITORING

The management actions identified to achieve the outcomes associated with mining and related activities (as listed in Table 5-3) are presented in Table 6-2. An explanation of the column headings used and how they relate to requirements of GN R982 is presented below. Note that the colours presented in Table 6-1 are carried through into Table 6-2.

Table 6-1: Explanation of column headers used in Table 6-2.

Column Header		Legal reference *	Explanation
IMO Ref			Impact Management Outcome (IMO) reference number. Links to reference numbers in Table 5-2.
Impact Management Outcomes		Appendix 4(1)(d)	The desired state if the Impact Management Action (IMA) is successfully implemented.
NEMA Hierarchy		Appendix 4(1)(f)(i)	Avoid / Manage / Mitigate (see definitions below this table)
MA Ref			Management Action (MA) reference number – used when there is a link between Outcomes and / or Actions.
Impact Management Actions (to achieve the desired Outcomes)		Appendix 4(1)(f)	Actions to be implemented in order to achieve Impact Management Outcomes
Timeframe		Appendix 4(1)(j)	Time periods for implementation of Impact Management Actions
Compliance		Appendix 4(1)(f)(ii)	Environmental Management Standards / Practices
Method of -	monitoring implementation of Impact Management Actions	Appendix 4(1)(g)	Monitoring implementation of Impact Management Actions
Frequency of -		Appendix 4(1)(h)	
Responsible person for -		Appendix 4(1)(i)	
Mechanism for		Appendix 4(1)(k)	Monitoring compliance with Impact Management Actions
Reporting on compliance		Appendix 4(1)(l)	An indication as to where compliance with Impact Management Actions will be reported
			This section in Table 6-2 includes the documents / records that will be used as evidence if implementation and monitoring of implementation of IMA of during Audits. The means of reporting on compliance is described in Section 6.2.

Note: * As per Appendix 4(1)(1) of GN R982

Definitions

In order to provide clarity when reviewing the information presented in the report, the following definitions are applicable and are also presented in the Glossary of Terms at the beginning of this report.

Avoid: The potential impacts identified will not occur if the Impact Management Actions are implemented.

Manage: The severity of the potential impact will be reduced (for negative impacts) / enhance (for positive impacts) as a result of the implementation of the Impact Management Actions.

Mitigate: Impacts cannot be avoided or managed; however, the severity will be reduced by post impact actions. After an impact has occurred, the implementation of the Impact Management Actions will reduce the significance of the negative impact.

Sensitive areas / species⁵⁰: An ecological area (an area of natural resources) or species that is capable of registering or being affected by small changes which will adversely impact the ecology of the area or specific species within the area.

Plans referred to in the Impact Assessment and Management Tables

In the Impact Management Table (Table 6-2), reference is made to more detailed supporting information such as, but not limited to, Mine Plans, Procedures, Storm Water Management Plans, Rehabilitation Plans, etc.

These documents are not static and will be amended during the life of the mine as mining progresses, technology changes and lessons are learned. Although the current versions of some of the Plans are included in this EMP, it must be noted that where commitments refer to these Plans, it is meant that the most recent Plans are applicable. Where Plans must be approved by a competent authority other than the DMP, it is meant that the most recent approved plan applies.

However, it must be noted that if the final footprint of mine changes or if the changes to the Plans result in a significant change of impacts (to be determined by an independent EAP), the relevant authorisations must be obtained, depending on the legal requirements at the time of the change – see Management Actions for Outcome Om-3 (in Table 6-2).

Note: As the block plant is not part of the Bethlehem Quarry (refer to Section 1.1), Management Actions are not included for this operation in Table 6-2 –.

Notes for Table 6-2

Note: ★

- Reference is made to the applicable legislation at the time of drafting the EMP. When legislation changes after the approval of the EMP, the legislation applicable at the time will apply without the need to update the EMP.
- Full legal description for abbreviations used are provided on page iii.

Abbreviations for Monitoring and Reporting - Table 6-2

Abbreviation	Full Wording
AQO	Air Quality Officer
DFO	Dust Fallout
DMP	Dust Management Plan
EO	Environmental Officer
EXCO	Executive Committee
Ext. Adt.	External Auditor
Ext. SP	External Service Provider
MM	Mine Manager
PoS	Proof of Submission
SD	Sustainability Department
SDS	Safety Data Sheet
SHEQ-M	Safety, Health, Environment and Quality Manager
WUL	Water Use License

⁵⁰ Although the term “sensitive” is used throughout the Environmental legislation, no definition is provided in NEMA or NEM:BA. This definition has been developed from dictionary definitions to best explain its use in this report.

Table 6-2: OPERATIONAL PHASE Impact Management Outcomes, and Management Actions for identified impacts and risks, with reference to legal requirements, and monitoring the Implementation of the Impact Management Actions.

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance
					Method of	Frequency of	Responsible person for		
Operational Activities									
Om-1. No legal non-compliance notices are received in terms of environmental legislation*.	Avoid	MA-1. Confirm implementation of commitments of the approved EMPr, as outlined in this Table.	Life of Mine	NEMA	Internal Audit of EMPr commitments (this Table)	Quarterly	MM EO	Audit score	Internal audit reports
	Avoid	MA-2. Review / assess the conditions of / commitments in the authorisations listed below to ensure: - validity (i.e. they have not expired), - conditions are implemented, and - applicability to the activities being undertaken.						Evaluate if the commitments / conditions of the authorisations have been implemented successfully / achieved	Internal and / or External audit reports
		EMPr (serves as the EA in terms of NEMA)	Annually	NEMA - GN R326 [R34]	Environmental Performance Assessment / Audit	Every 2 years (Biennially)	EO Ext. Adt.		
		WUL (when issued)	As per WUL (Annually / Biennially)	NWA	Internal and External audits	As per WUL (Annually / Biennially)	EO Ext. Adt.		
		MA-3. Environmental Management activities will be guided by and documented in the Procedures (or equivalent documents).	Utilised during the Life of Mine		Review of Procedures	Biennially or after a reportable incident* and when there are applicable changes in legislation	Environmental officer with input from the Sustainability Department when required	Review of effectiveness of achieving the Objective of the Procedure, considering the incident records and monitoring results	Review record to be included in the relevant section of the Procedure.
Om-2. Environmental management documentation required in terms of the prevailing environmental legislation are valid (not expired) and accessible on-site.	Avoid	MA-4. Maintain a database of legal documents (including authorisations) in terms of environmental legislation, listing (as a minimum): - name of documentation, - purpose of documentation, - expiry date	Life of Mine	NEMA & SEMAs ⁵¹	Visual check that copies of authorisations are on file	Bi-annually	EO / Document Controller	Visual check that copies of relevant documentation are on file	Database
		MA-5. Maintain copies of the legal documentation (listed in the database MA-4) in terms of the environmental legislation. Minimum list to include (indicating if no longer applicable due to changes in activities or legislation): - EMPr - WUL / GA - WML (if applicable) - Financial Provision - Annual Rehabilitation Plan - Closure Plan - Waste Licenses of service providers (Om-23, on page 6.10) - Waste Transport Registration of service providers (Om-23, on page 6.10)	Life of Mine	NEMA & SEMAs					-

⁵¹ Specific Environmental Management Acts (that fall under the auspices of the overarching NEMA)

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance
					Method of	Frequency of	Responsible person for		
		MA-6. Confirm validity of the legal documents (listed above), taking corrective action if legal document(s) documentation is due to expire in the next year.	Annually	NEMA & SEMAs	Visual check that documents have not expired	Quarterly	EO	Visual check that documents have not expires	Internal and / or External audit reports
		MA-7. Update the following documentation as required in terms of legislation, keeping record of submission.	See per document/s below						
		- Financial Provision Calculations	Annually	NEMA [S24P]	Physical check that reports are generated and submitted	Annually	EO	Visual check that copies of relevant documentation are on file Documented proof of submission as per the “timeframe”	Submission of Annual Calculations
		Financial Provision Reports: - Annual Rehabilitation Plan ⁵²	Annually	MPRDA – GN R1147 ⁵³		Annually	EO		Submission of Financial Provision Reports
		- Decommissioning and Closure Plan							
		- Blasting Permissions	As per permission	MHSA ⁵⁴ [R4.16.2]	Although this permission is a H&S ⁵⁵ requirement, this permission is included as it relates to neighbouring I&AP – blasting within 500m of non-mining related structures – and this permission must be maintained.				Reporting as per Blasting Permission
Om-3. New activities requiring authorisation under prevailing legislation are not undertaken prior to application for and granting of said authorisation by the competent authority.	Avoid	MA-8. The internal Capex ⁵⁶ authorisation process must include environmental planning; such as (but not limited to) environmental risk identification and minimisation, and compliance with environmental legislation.	During each Capex project considered during the Life of Mine	NEMA [S2, 24, 28] SEMAs	Internal review of legal compliance requirements	During planning of Capex projects	MM SD EO	Environmental Authorisation evaluation, considering environmental legislation	Environmental Opinion (from internal / external Environmental Specialist)
					External Audit – review of any changes to activities	Every 2 years	EO Ext. Adt.	Evaluate changes in activities in relation to environmental legislative requirements	External audit reports
Om-4. Identified sensitive areas (including buffers) outside the final footprint are not physically disturbed through mining and related activities (excluding existing disturbance).	Avoid / Manage	MA-9. Develop a sensitivity map for the site, outlining sensitive areas where alternatives must be considered, when disturbance is planned in these areas. This must be consulted during planning to consider alternatives when sensitive features are impacted and / or adjusted authorisation will be required.	Available during the Life of Mine	NEMA [S2, 24, 28] & EIA Regulations, NWA & GN R704, NEM:BA	Compare GIS layers (or equivalent) of sensitivity map with expansion areas	Annually (or more frequently if pit expansions are planned for more frequently)	EO	Overlay future mining areas / proposed areas of disturbance on the sensitivity map to identify • when alternatives must be considered, and • when specialist input is required.	EXCO meeting minutes (and Sensitivity Map)
		Review and update if necessary	Reviewed annually			-	-		-
		MA-10. Where mining is planned in areas that have not previously been disturbed through anthropogenic activities, the need for specialist studies must be determined, and studies undertaken if necessary.	Considered when new ground is broken			Before new ground is broken	EO		Specialist study / opinion (from internal / external Environmental Specialist)
Om-5. In all areas where land clearing is required, the top layer of soil / overburden is removed and stored to be available for rehabilitation.	Manage / Mitigate	MA-11. When clearing land where topsoil is present, strip topsoil prior to clearing and store in a designated stockpile area or use as part of a concurrent rehabilitation project.	When land clearing is required	NEMA [S28]	Visual observations (documented)	During stripping	MM	Observe if topsoil has been added to the stockpile after clearing activities	No reporting on implementation. Non-compliance to be reported on the Afrimat Hub.

⁵² These documents will be drafted once G NR 765 (Draft regulations pertaining to Financial Provisioning for the Rehabilitation and Remediation of Environmental Damage caused by Reconnaissance, Prospecting, Exploration, Mining or Production Operations) are promulgated.

⁵³ At the time of drafting this EMP, relevant Regulations were pending implementation. It is assumed that these Regulations will come into effect.

⁵⁴ Mine Health and Safety Act, 1996 (Act No. 29 of 1996)

⁵⁵ Health and Safety

⁵⁶ Capital expenditure.

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance
					Method of	Frequency of	Responsible person for		
Om-6. Stored soil remains viable for use in rehabilitation (i.e. is not contaminated)		MA-12. Storage requirements are as follows: - Stockpile locations to be selected to avoid double handling. - Stockpile may only contain topsoil and no foreign matter. (If the topsoil layer is typically stony or contains boulders, then boulders removed with the soils during stripping may be stored in the topsoil stockpile) - No compaction of the stockpiled material is permitted (including driving on the stockpile) hence the height of the stockpile will be limited in this manner. - The stockpile must be covered with indigenous vegetation (to maintain organic matter in the soils and protect the surface from wind and water erosion). - Alien vegetation must be removed from the stockpile – see Outcome Om-27 and MA-53	During Life of Mine	NEMA [S28]	Visual inspections of topsoil stockpile (documented)	Quarterly	MM EO Ext. SP	Observations during walk abouts	No reporting on implementation. Non-compliance to be reported on the Afrimat Hub. Quarterly AIS report
Om-7. Mining practices do not limit closure options.	Manage / Avoid	MA-13. Mining planning to consider the Closure Plan	During Life of Mine	MPRDA [S62] NEMA, GN R1147	Internal review	Bi-annually	MM EO	Review of Mine Plan and Closure Plan	EXCO meeting minutes / Sustainability strategy meeting minutes
Om-8. Areas of the site that are visible from off-site will appear orderly.	Avoid	MA-14. Maintain good house-keeping within the mining area.	Daily	-	Visual inspection (documented)	Quarterly	MM EO	Review of incidents – to identify those relating to housekeeping	Record of inspection recorded on an inspection checklist / Internal Audit Incident records and corrective action requirements recorded on the Afrimat Hub
		MA-15. Report incidents (of poor house-keeping) on the Afrimat Hub.							
Om-9. Fly-rock (from blasting) does not leave the mining right area.	Avoid	MA-16. Blasting to be undertaken by a competent blaster.	Every blast	-	Video of blast	Every blast	Ext. SP MM SHEQ-M	Review video	Blasting report, including evaluation of measured results (records kept for 5 years)
Om-10. USBM ⁵⁷ limits are not exceeded at the sites of vibration measurement, when measuring off-site.	Avoid / Manage	MA-17. Vibration monitoring to be undertaken at selected sites representative of surrounding receptors. Blasting Procedure (indicates monitoring locations)	Every blast	-	Vibration monitoring		Ext. SP	Evaluation of monitoring results against USBM limits	
Om-11. No exceedances of the dustfall <u>standards</u> beyond permitted frequency.	Avoid / Manage	MA-18. Implement the approved Dust Management Plan (DMP). Fugitive dust suppression implemented at source, through one or more of the following methods (list provided for guidance but may be varied based on practicalities and experience): - using dust extractors on drill rigs - managing spills and fines in the Plant area - watering haul roads in use - speed control on haul roads in use - water sprays in the plant	Daily	NEM:AQA – GN R7335	Dustfall (DFO) monitoring	Continuous DFO monitoring Reporting monthly	Ext. SP MM EO	Evaluation of off-site DFO rates against standards in GN R7335	Monthly reporting on implementation of the DMP and DFO monitoring results - exceedances of the standards reported as incidents (based on permissible frequency). Repeated exceedances of the standard (considering permitted frequency of exceedance) to be reported to the AQO

⁵⁷ United States Bureau of Mines

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance
					Method of	Frequency of	Responsible person for		
		MA-19. Review the DMP as per legal requirements, keeping record of submission. This will include the review of the monitoring network.	Annually						Submission of DMP
Om-12. Sound level measurements on the mining right boundary, due to sound emissions from mining and related activities, do not increase the background sound levels* by more than 7dB above the baseline.	Manage	MA-20. DFO monitoring must be undertaken according to the DMP) The network layout must consider (at a minimum): - dominant wind directions - fugitive dust sources - receptors - historic monitoring points	Life of Mine	NEM:AQA – GN R7335					Monitoring Programme / Protocol documented in the DMP (see MA-19)
		The Monitoring Programme / DMP must document (at a minimum): - a motivation for site selections - co-ordinates of the sites - sampling methodology - frequency of sampling - evaluation criteria							
	Avoid / Manage	MA-21. Control Noise at source, by implementing one or more of the following:	Life of Mine		Record of noise related complaints (also see MA-22)	Monthly	MM EO	Evaluate noise related complaints during Safety Meeting	No record of evaluation as it is part of routine activities
		- Maintain all mobile equipment and machinery in good working order.	As per maintenance schedule		Maintenance schedule	Based on production hours of equipment	-	-	No compliance records
		- Maintain road surfaces (repairing potholes).	Operational hours		-	-	-	-	-
	- Avoid unnecessary idling of vehicles.	-		-	-	Idling monitoring programme	-		
		MA-22. Sound level monitoring must be undertaken according to a Monitoring Programme The network layout must consider (at a minimum): - noise sources (on- and off-site) - operating hours - receptors - historic monitoring points The Monitoring Programme must document (at a minimum): - a motivation / reason for site selections - co-ordinates of the sites - sampling methodology - frequency of sampling - evaluation criteria	Life of Mine	NEM:AQA [S34] ⁵⁸ SANS 10103	Boundary sound level / noise surveys – minimum of 15-minute monitoring at each site	Biennially or when there is a change in activities resulting in a change in sound emissions	Ext. SP MM SHEQ-M EO	Evaluation of sound level readings against applicable district rating levels in SANS 10103 (or equivalent)	Sound Level Report - reporting on measured sound levels after monitoring. Exceedances of the applicable guideline reported on the Afrimat Hub. External audit reports
		MA-23. Review the Sound level / Noise monitoring network	Life of Mine	-	Review	Annually	Ext. SP MM SHEQ-M EO	Review all aspects of the Monitoring Programme,	Monitoring Programme / Protocol External audit reports

⁵⁸ Draft Environmental Noise Standards were published in June 2024 – not yet promulgated at the time of drafting this EMP. These draft Environmental Noise Standards reference the South African Bureau of Standards (SABS) standard SANS 10103 (2008)

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance		
					Method of	Frequency of	Responsible person for				
	Mitigate	MA-24. All complaints and noise related incidents* noted by mine personnel will be recorded in an incident register.	When complaints are received		See MA-21						
Om-13. Identified heritage sites are not disturbed without legal permission.	Manage / Avoid	MA-25. Develop a Chance Find Protocol	Life of Mine	NHRA			SD SHEQ-M EO	Evaluation of recorded volumes against production – confirming no significant increases in ℓ / m³ used per tons produced (when water is used as process water)	No compliance records Water Use / Readings spreadsheet / Water Balance / Water reticulation diagram		
Om-14. Municipal water sources are only used as process water (such as dust suppression) for processing when no alternative water sources are available.	Avoid / Manage	MA-26. Municipal water use is recorded	When used	NWA	Municipal Bill consumption volumes	Monthly	MM				
		MA-27. All leaks are to be reported and rectified	Report on the same day as they are identified Repairs within a week of leak having been reported	NWA [S22]	Visual observations (by all personnel) during daily activities	Daily	All personnel (reporting) MM (corrective action)			Reported on the Afrimat Hub	Corrective action requirements recorded as job cards
		MA-28. All reported leaks are to be and rectified									
		See training requirements for Outcome Om-23 on page 6.10									
Om-15. Uncontrolled* release of 'dirty' water'* from the EMPr area does not occur.	Avoid	MA-29. Establish a formal SWMP. At a minimum the SWMP must be designed to: - divert 'clean' storm water away from 'dirty' areas - contain 'dirty' water on-site - direct storm water around hydrocarbon contamination risk areas Also, SWMP to be updated routinely as: - mining progresses - problem areas are identified	Develop the SWMP by end of 2027 Implement the SWMP during Life of Mine	NWA [S19(2)], NWA – GN R704 [4, 7], WUL	Visual inspection of storm water control structures (documented)	Monthly prior to the start of the rainy season (Aug) and weekly during the raining season (Sep to Apr)	MM EO	Evaluate inspection records	Internal Audit report (Quarterly) SWMP Checklist		
		MA-30. Water quality monitoring must be undertaken according to a Monitoring Programme, established to determine if the water that is likely to flow off-site is suitable for discharge At a minimum this network must include monitoring of locations may change based on WUL):	As per Monitoring Programme	NWA NEMA				Evaluation of data against (WUL):			

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance
					Method of	Frequency of	Responsible person for		
		a. Discharge water quality (preferably from the point of release, but if this is not possible, from the source of this water). This includes storm water release points if the release is from a containment area.	Life of Mine	NWA	Chemical analysis of water quality samples	Bi-annually ⁵⁹	Ext. SP MM EO	• Historic data Discharge water quality • SAWQG ⁶⁰ – TWQR ⁶¹ for Aquatic Ecosystems	Water quality reports
		b. Discharge water from the oil separator / Water in the last chamber of the oil separator (if it is reused or discharged to an off-site receiving environment).		NWA NWA – GN R665	SOG concentrations			• Historic data if water is used on-site • GN R665 Discharge Limits if water is released to an off-site receiving environment	
		The Monitoring Programme must document (at a minimum): - a motivation for site selections (guided by the details above) - co-ordinates of the sites - sampling methodology - frequency of sampling - a motivation for the determinants list per site - evaluation criteria	Life of Mine	-	Review	Annually	Ext. SP MM EO	Review all aspects of the Monitoring Programme, considering water quality monitoring results, pollution sources and receptors	Monitoring Programme / Protocol External audit reports
Om-16. Water discharged from EMPr area is “clean”	Manage	See MA-29 and MA-30							
Om-17. Storage of waste does not result in pollution of soils, surface or ground water.	Avoid	MA-31. Waste storage containers must be suitable for the type of waste they are to contain i.e. - liquid waste containers must not leak, - waste that can be blown away must be stored in a container with a "lid", - waste with odours or that can attract vermin must be in a sealed container. Containers must be stored in a manner that prevents accidental spillages or leakages	Daily	NEM:WA [S16, 21]	Visual inspections of waste area (documented): - Routine inspections - Internal Audits	Weekly Quarterly	EO	Evaluate inspection records	Record of inspection Checklist Quarterly Internal Audit
		MA-32. Waste containers to be emptied before spillage / overflow occurs	Life of Mine	-	-	-	-	-	-
Om-18. Sanitation holding tanks do not cause pollution of soils, surface or ground water.	Avoid	MA-33. Monitor the level of sewage in the sanitation holding tank, ensuring it is emptied before there is the potential for overflow	Monthly	-	Visual inspection	Monthly	MM EO	-	No record of inspections. Lack of incident logged on the Afrimat Hub will be an indication of action achieved

⁵⁹ May change based on the requirements of the WUL

⁶⁰ South African Water Quality Guidelines

⁶¹ Target Water Quality Range

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance
					Method of	Frequency of	Responsible person for		
Om-19. Only licensed / registered service providers are used for off-site waste management activities.	Manage	MA-34. Waste may only be collected, transported, held and handled for final waste management by a company who is authorised to do so. Examples of where authorisation / registration is required include (but is not limited to and will vary depending on the Sections of the legislation enacted at the time): - Waste transporter - Waste storage / transfer - Final Waste Management	Life of Mine	NEM:WA [S16, 24, 25]	Evaluate Authorisations	Annually	MM EO	Confirm authorisations are valid and applicable for the waste being taken	Waste Authorisations (filed in Waste Management File / Afrimat Hub)
		MA-35. Keep a record of waste manifests for all waste removed from site. This will include (but is not limited to): - record of volume of waste removed from site - proof of disposal at an authorised facility	Life of Mine		Waste Manifest	When waste is removed	MM EO	Evaluation of Waste Manifest against waste register to ensure correct disposal	Waste Management File
Om-20. Storage, handling, and use of hazardous liquids does not result in pollution* of soils, surface or ground water.	Avoid / Manage / Mitigate	MA-36. All hydrocarbons ⁶² (new, in use in the plant, and used) to be stored within a bunded facility that has the following specifications/ properties: - has the capacity to contain 110% of the volume stored (for large single storage vessels) or 110% of the largest container in the storage area (calculations must consider the loss of volume due to storage vessels in bunded area). - constructed of impervious material - be free of cracks - have an outlet that is closed by a locked valve (Also applicable for on-site transformers.)	Life of Mine	NWA SANS 10089-1	Visual inspections of bund facility (documented)	Quarterly	MM	Checklist confirming specifications listed in the IMA column are in place	Internal Audit report (Quarterly) Corrective action requirements recorded on job cards
		MA-37. Undertake inspection of vehicles before they are used, to identify (but not limited to) hydrocarbon leaks.	Daily	-	Completing a vehicle pre-start checklist (documented)	Daily	Drivers	Evaluation of pre-start checklists to ensure concerns identified are being addressed	Pre-start checklists Corrective action requirements recorded on job cards
		MA-38. Inspect work area after working with hydrocarbons (e.g. oil changes within the plant). Any spills will be cleaned up immediately (as per MA-39) and incidents to be reported on the Afrimat Hub.	Upon completion of a task	MPRDA - GN R527 [R70] NWA [S19]	Visual inspection of work area	Upon completion of a task	Personnel working with hydrocarbons	-	Lockout book (noted under housekeeping section)
		MA-39. Hydrocarbon spillages to be dug up and polluted soils to be either - disposed as hazardous waste or - undergo bioremediation treatment Incidents to be reported on the Afrimat Hub.	Clean up within a day of spillage being reported	NEMA NWA	-	-	-	-	-
		MA-40. Equipment (spill kits) must be readily / easily available to clean up spills of potentially polluting substances (such as hydrocarbons).	Life of Mine		Visual inspection	Monthly	MM EO	Checklist Check SDS are on file for all hazardous	Internal Audit (Quarterly) Checklist

⁶² Excluding fuel in the vehicles

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance
					Method of	Frequency of	Responsible person for		
		MA-41. Maintain an SDS ⁶³ file for all potentially polluting substances.	Life of Mine		Review	Annually	MM SHEQ-M EO	substances used / stored on-site	SDS File
Om-21. Water from 'hydrocarbon contamination risk areas'* does not flow over bare soils.	Avoid	MA-42. Vehicle servicing to take place in a designated concreted area where spilled hydrocarbons can be washed to the oil separator. If servicing takes place over bare soils, spillages to be managed as per MA-39	Daily during the Life of Mine	NWA [S19(2)] NWA – GN R665 NEMA [S28]	Visual observations	Monthly	Workshop personnel	Evaluation on the Afrimat Hub	Checklist (Afrimat Hub records are evidence of non-conformance)
		MA-43. Washing of vehicles is undertaken in a wash bay where water flows to an oil separator.							
		MA-44. Drains leading to the oil separator must be free flowing.							
		MA-45. If clean water from the oil separator is to be reused or discharged to the environment, it must be fit for the purpose (determined through routine water quality tests – see MA-30b). <i>Note:</i> If the quality of the water is shown not to be fit for reuse or discharge, the water must be pumped out and disposed of as hazardous waste. Measures must be taken to clean out the separation facility until monitoring results indicate its functioning effectively.	Daily during the Life of Mine		Water quality monitoring	Bi-annually	EO & Ext. SP	Comparison of water quality results to GN R665 Soap, Oil and Grease Discharge Limit	Monitoring reports
		MA-46. If pollution incidents are identified (see MA-41)	When incidents occur	NWA [S19(2)] NEMA [S28]	-	-	All personnel	Evaluation on the Afrimat Hub	No record of compliance. (Afrimat Hub records are evidence of non-conformance)
Om-22. 'Dirty' water'* containing hydrocarbons are collected at source and cleaned on-site.		Implement MA-36 to MA-41.							
Om-23. Staff and contractors are aware of their roles and responsibilities with regards to environmental management.	Manage	MA-47. Undertake Environmental Awareness Training for all staff and contractors.	As per Section 7 of the EMPr	NEMA - [S28]	-	-	EO MM SHE-Q	-	Record of training material and attendance registers.
		MA-48. Undertake emergency drills that include environmental incidents, such as (but not limited to): - large scale hydrocarbon spills, - fire - incorrect waste storage / disposal - large scale water leaks	Quarterly		Record response time of personnel to incident	Annually		Compare response time to incident with predetermined target response times (will vary per incident)	Record of drill response.
Om-24. Energy consumption will be managed according to ESG requirements.	Manage	MA-49. Reduce use of diesel through one or more of the following methods (list provided for guidance but may be varied based on practicalities and experience): - engineering solutions within the plant, - turning off lights when not in use / use of motion sensors - other energy saving initiatives	Life of Mine		Diesel usage monitoring	Monthly	MM EO	Evaluation of monthly diesel usage against production	ESG Reporting

⁶³ Safety Data Sheet

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance
					Method of	Frequency of	Responsible person for		
Om-25. Interested and affected parties (I&AP) complaints (received by the mine) are investigated, and the identified corrective actions implemented.	Manage	MA-50. Keep record all complaints. Evaluate the cause of the complaint, identify corrective measures, and implement these. Close out the complaint.	As and when complaints are received	NEMA – [S28]	Evaluate complaints logged	Monthly	MM / EO	Discuss during Safety Meeting	No record of evaluation.
Concurrent Rehabilitation Activities									
Om-26. Stored topsoil will be protected to remain viable for use in rehabilitation.	Manage / Mitigate	MA-51. Refer to MA-12.	During Life of Mine	NEMA [S28]	Visual inspections of topsoil stockpile (documented)	Quarterly	MM EO Ext. SP	Observations during walk abouts	No reporting on implementation. Non-compliance to be reported on the Afrimat Hub. Quarterly AIS report
		MA-52. Topsoil stockpiles to be marked / labelled as “Topsoil” on Plans available during planning meetings.	Life of Mine		Update	When stockpiles are created / expanded			Site layout map / Sensitivity map
Om-27. The AIS (vegetation) within the MR area is managed.	Manage	MA-53. Develop, implement, and maintain an alien vegetation control programme which identifies areas of concern and the proposed plan for systematic control programme (including follow-up controls) and management of the areas. (It is recommended that the schedule begin with the areas least infested.)	Implementation as per Plan Annual AIS Plan update	NEMA [S28] CARA – GN R1048] NEM:BA [S75] NEM:BA – GN R1020, R1003] NEMA – GN R1147	Alien clearing progress reports including map of areas cleared and remaining infested areas	Quarterly	Ext. SP	Comparison of mapped areas against previous records	AIS Progress reports
Om-28. Where no further mining or related activities are planned to occur on exposed surfaces outside of the pit, these will be rehabilitated.		MA-54. Develop and impended a Ten (10) year Rehabilitation plan ⁶⁴ .	Every ten (10) years	NEMA – GN R1147					
Due to the nature of aggregate mining, the opportunities for concurrent rehabilitation to be implemented during the Life of Mine are very limited. Rehabilitation opportunities within the pit are ONLY possible at the END of Life of Mine (not while the mine is operational). This is because future mining in the pit includes opening up the benches on the southern faces, with access in and out of the pit on the western and southern faces. Although no expansion of the pit is planned to the north and east, no rehabilitation is possible as this may result in safety risks in the base of the pit below these faces. More detailed Concurrent Rehabilitation measures are not included in the EMP as they will form part of the Annual and Ten-Year Rehabilitation Plan (as required in terms of GN R1147). This document will include an explanation as to what rehabilitation activities would be implemented if premature closure was to take place within five years of the date of the report. These are not activities that must be implemented during the Life of Mine, but it demonstrates to the DMPR that the operation knows what activities would be required if premature closure occurs.									

⁶⁴ These documents will be drafted once G NR 765 (Draft regulations pertaining to Financial Provisioning for the Rehabilitation and Remediation of Environmental Damage caused by Reconnaissance, Prospecting, Exploration, Mining or Production Operations) are promulgated.

Impact Management Outcomes	NEMA Hierarchy	Impact Management Actions (to achieve the desired Outcomes)	Timeframe	★ Compliance	Monitoring the implementation of IMA			Mechanism for monitoring compliance	Reporting on compliance
					Method of	Frequency of	Responsible person for		
Closure Aspects – during the Operational Phase									
Om-29. During the operational phase of the mine, rehabilitation and closure requirements, as per the prevailing legislation, are adhered to.		MA-55. Implement Closure preparedness and planning as per legal requirements. Currently this includes (see MA-7) ⁶⁵ : - Annual Rehabilitation Plan - Decommissioning and Closure Plan - Environmental Risk Report	As per legal requirements	NEMA – GN R1147	To avoid contradictions in legal obligations (as Regulations relating to Closure are currently changing), details are not included as commitments in the EMPr.				

⁶⁵ These documents will be drafted once G NR 765 (*Draft regulations pertaining to Financial Provisioning for the Rehabilitation and Remediation of Environmental Damage caused by Reconnaissance, Prospecting, Exploration, Mining or Production Operations*) are promulgated.

6.2 PROGRAMME FOR REPORTING ON COMPLIANCE

NEMA:

GN R982 of NEMA: **Appendix 4 (1)(1)(l)**

The achievement of / compliance with the Outcomes (Table 6-2) will be evaluated by an independent Auditor every two (2) years (as is currently the legal requirement), or as per the time frames of the applicable legislation at the time. The Audit Programme is presented below in Table 6-3.

Table 6-3: EMPr Audit Programme

OBJECTIVE	Determine level of compliance with EMPr commitments; Impact Management Outcomes and Impact Management Actions (Table 5-3 and Table 6-2).
SCOPE	EMPr area
TIMELINES / FREQUENCY	Within one (1) year of approval of the EMPr, followed by every two (2) years (as is currently the legal requirement), or as per the time frames of the applicable legislation at the time
AUDITOR REQUIREMENTS	An independent environmental Auditor with more than five years' auditing experience
CRITERIA	Outcomes specified in Table 5-3 (applicable to existing mining and related activities) - Achievement of the Outcomes will be determined through the evaluation of the implementation of the Impact Management Actions as per Table 6-2 (applicable to existing mining and related activities) - Achievement / compliance will be guided by the monitoring records and / or documentation listed under the Monitoring and Reporting columns of Table 6-2. It must be recognised that the names of these records may change over time. Variation in the record will not be considered a non-compliance should an alternate record of achievement of the Outcome be available.
METHODOLOGY	- Physical site inspection - Documentation review - Interview of personnel
REPORTING	As per Appendix 7 of the EIA Regulation, 2014 (GN R 982), or applicable legislation at the time
SUBMISSION	To the competent authority (currently the DMPr), as per the EIA Regulation, 2014 (GN R 982), or applicable legislation at the time

7 ENVIRONMENTAL AWARENESS PLAN

NEMA: Section 24N (3)(c)
GN R982 of NEMA: Appendix 4 (1)(1)(m)

The ***purpose*** of this section of the report is to provide guidance regarding the topics to be included in the annual training matrix, and / or the routine training (where topics are based on topical events). This section does not include the material to be used for training.

Afrimat recognises the importance of making all employees aware of the known environmental sensitivities of the site, the potential environmental impacts that could result from conducting their jobs, and how impacts can be avoided or minimised through the implementation of management actions (communicated via effective training).

Bethlehem Quarry conducts “training” through various channels and media that are routinely adapted and enhanced in order to improve the effectiveness of communication and increase awareness of environmental aspects. Environmental training is also undertaken in conjunction with Health and Safety (H&S) Training as there are common lessons to be learned in these two areas.

Below is a list of the channels of communication currently being used at Bethlehem Quarry. However, these will vary with time as training methodologies are updated and amended to improve the transfer of knowledge. The frequency listed below is the frequency of the “training” not the frequency with which environmental topics are covered as this will vary depending on incidents recorded and the need to training in both H&S and Environmental topics.

TRAINING	INITIATIVE	FREQUENCY
• Overall awareness training	• Induction	• Annual
• Physical training	• Emergency drills	• Quarterly
• Shared experiences	• Flash reports	• As and when relevant incidents occur
• Day-to-day discussions	• Toolbox Talks	• Weekly

The Environmental Training Programme will be run to achieve the following objectives:

OBJECTIVE	ACHIEVED THROUGH
• Support National priorities / ESG principles	• Induction considers National priorities, such as (but not limited to); ○ Energy / Electricity ○ Water ○ Waste
• Learn lessons from experiences	• Day-to-day discussions will follow incidents that are reported on the management system (within a week of the incident, if applicable to the area). • Serious incidents at other mining operations will be discussed to avoid similar incidence at Bethlehem Quarry.

8 SPECIFIC INFORMATION REQUESTED BY COMPETENT AUTHORITY

<i>NEMA:</i>	Section 24N (5)
<i>GN R982 of NEMA:</i>	Appendix 4 (1)(1)(n)

No specific information has been requested by the competent authority – the DMPR.

If any information is requested after the submission of the Application documents, this will be included here.

9 REFERENCES

References indicated with an * are cited in the approved EMPr and / or Addendums.
References indicated with an • are cited in the specialist studies.

Dihlabeng Local Municipality, 2025: Integrated Development Plan (IDP) 2024/2025.

DM, 1978 *: Geological Series (1: 250 000) 2528 Pretoria, produced by the Department of Mines.
Government Printers, Pretoria.

Edwards, 1983•: A broad-scale structural classification of vegetation for practical purposes. Bothalia 14:
705-712.

EMPr, 2010: Revised Environmental Management Programme Report
WG Wearne Limited – Bethlehem Quarry
Compiled by DT Enviro Management Consultants CC January 2010

Feathers EA, 2021: Avifaunal Assessment for the Water Use License Application (WULA) Erf Number 4038
Farm Wolhuterskop 670. November 2021

Umlando, 2026: Heritage Survey of Afrimat Bethlehem Quarry. May 2026

King, G., 1998•: Hydrogeological Map Series of the Republic of South Africa. Durban 2928, First Edition.

Limnosella, 2021: Aquatic Biodiversity Assessment for Afrimat Bethlehem Quarry, Bethlehem, Free-State
Province. October 2021

Limnosella, 2026: Aquatic Biodiversity Assessment for Afrimat Bethlehem Quarry, Bethlehem, Free-State
Province. May 2026

MB Botanical Surveys, 2026: Botanical Impact Assessment – Afrimat Bethlehem Quarry
May 2026

Midgley D.C., Pitman W.V. and Middelton B.J. 1994a •: Surface Water Resources of South Africa 1990,
Book of Maps Volume I. Compiled by The Water Research Commission, WRC Report No.
298/2.2/94.

Midgley D.C., Pitman W.V. and Middelton B.J. 1994b •: Surface Water Resources of South Africa 1990,
Volume I Appendices. Compiled by The Water Research Commission, WRC Report No.
298/2.1/94.

Seymour, A., and Seward, P., 1996•: Groundwater harvest potential of the republic of South Africa.

Vegter, J. R., 1995•: Groundwater resources of the Republic of South Africa. Sheet 1.

Vegter, J. R., 1995•: Groundwater resources of the Republic of South Africa. Sheet 2.

Waste Aside, 2026: Air Quality Impact Assessment for Afrimat Bethlehem Quarry.
Report No. WA-01-AFBTH March 2026

Water Without Frontiers, 2026: Review of the 2021 Geohydrological Impact Assessment for the Bethlehem
Quarry to Determine its Continued Applicability in Supporting the Proposed Amendment of the
Environmental Management Programme (EMPr).
Report No. 2026009 April 2026

References used to develop the Sensitivity Map

Applicable References used to generate the Sensitivity map - Figure 2-32 (on page 2.39).

BGIS LUDS tool: <http://bgis.sanbi.org/MapView>

10 APPENDICES

- ⇒ Previous Approvals of the EMPr
- ⇒ Experience and Expertise of EAP
- ⇒ Confirmation of the subdivision of Portion 1 of Erf 4038 Bethlehem
- ⇒ Waste Inventory
- ⇒ Geohydrological Impact Assessment, 2026
- ⇒ Avifaunal Impact Assessment, 2021 and Confirmation Letter, 2026
- ⇒ Aquatic Biodiversity Assessment, 2026
- ⇒ Air Quality Impact Assessment, 2026
- ⇒ Environmental Perimeter Noise Monitoring 2023 And 2025
- ⇒ Botanical Impact Assessment, 2026
- ⇒ Heritage Survey, 2026
- ⇒ Stormwater Management Plan, 2026
- ⇒ Environmental Impact Assessment Methodology

10.1 PREVIOUS APPROVALS OF THE EMPR

10.1.1 EMPr – January 2010



the dme

Department:
Minerals and Energy
REPUBLIC OF SOUTH AFRICA

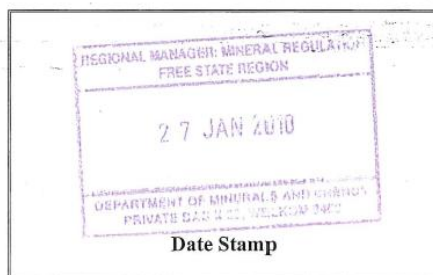
DME 12

Private Bag x 33, Welkom, 9459
Tel: (057) 391 1300, Fax (057) 357 1241/6003

Date: 27/01/2010	File nr: (FS) 30151126159 ME
Applicant: WG WEARNIE LTD BETHLEHEM QUARRY	Received by: K.E.F.

Subject: ACKNOWLEDGEMENT OF RECEIPT OF THE SCOPING REPORT/EMP REPORT

This copy serves to confirm submission of the above-mentioned documents to the Department of Mineral Resources on this date:



Date Stamp

You are kindly requested to keep this copy safely as a proof of submission.

Yours faithfully

REGIONAL MANAGER: MINERAL REGULATION
FREE STATE REGION

DATE: 27/01/2010

[Signature]

[Signature]
27/01/10

Minerals and Energy for Development and Prosperity

10.2 EXPERIENCE AND EXPERTISE OF EAP

10.2.1 Lead Consultant

Curriculum Vitae **Ashleigh Vorster**

PERSONAL DETAILS:

Full names: Ashleigh Vorster (*nee. Cokart*)
Telephone: 072 640 4908 / 011 791 3389
E-mail: ashleigh@umhlaba.co.za

EDUCATION:

FORMAL:

- **National Senior Certificate (2016)**– Curro Private School (Durbanville), RSA.
- **B.A Psychology and Environmental Management (graduated 2020)** – North West University, Potchefstroom, RSA.
- **B.Sc. Honours Environmental Science (graduated 2022)** - North West University, Potchefstroom, RSA.
- **M.Sc. Environmental Management (graduated 2024)** - North West University, Potchefstroom, RSA.

PROFESSIONAL MEMBERSHIPS:

- **SACNASP**: application in process.

TRAINING: COURSES, WORKSHOPS AND SEMINARS ATTENDED:

- **Waste Treatment Sustainable Water Safety Planning and Management**
2024 (February) – Two-day course presented by DWS
- **Practical Implementation of Environmental Auditing and Monitoring**
2025 (April) – Two-day course presented by Lynn Jones (Umhlaba Environmental Consulting CC)

EMPLOYMENT HISTORY:

***Environmental Consultant* Umhlaba Environmental Consulting CC**

March 2025 – Present

My role at the company is as a junior consultant collaborating on projects involving new applications for, or the amendment / renewal of, environmental authorisations (EA) in terms of NEMA EIA Regulations. I have experience in compiling water use licenses and undertake projects assessing environmental compliance (audits of EA's), environmental risk (due diligence), environmental liability (financial provisioning), environmental monitoring networks (dust fallout and water quality) and environmental rehabilitation.

***Environmental Officer* Afrimat Ltd**

July 2021 – February 2025

Spearheaded the acquisition of Water Use Licenses and General Authorisations, ensured seamless progression from initiation to approval. Implemented Environmental Management Programmes, aligning with legal compliance. Performed thorough Environmental Performance Assessments, formulating Rehabilitation Plans and Financial Provisions. Managed rezoning applications, balancing land use with environmental and business objectives. Developed Environmental Management Systems to enhance organizational ecoefficiency. Led environmental awareness campaigns, providing training to cultivate a culture of sustainability. Executed quarterly environmental audits, upholding Environmental Management Programme standards. Authored technical environmental reports, demonstrating expertise in environmental documentation. Facilitated stakeholder engagement, promoting cooperative environmental decision-making. Initiated recycling programmes, significantly reducing waste and conserving resources. Maintained environmental compliance across multiple operations, meeting industry benchmarks.

LIST OF EIAs IN LAST FIVE YEARS:

Afrimat Aggregates (KZN) Pty Ltd:

- Assistant EAP for EMPr amendment process at Martizburg Quarry

Afrimat Aggregates (KZN) Pty Ltd:

- Assistant EAP for Section 102 amendment process for mining right extension at Scottburgh Quarry
-

LIST OF OTHER PROJECTS IN LAST FIVE YEARS:

Afrimat Aggregates (KZN) Pty Ltd:

- Water Use License Applications (x6)
- Land rezoning applications (x6)
- Rehabilitation and Financial Provisions (x10)
- Annual Environmental Audits (x10)

Raumix Aggregates (Pty) Ltd:

- Environmental Audit of the EMPr for aggregate operations(x4)

Wonderstone Ltd:

- Environmental Audit of the EMPr for opencast mining

PUBLICATIONS / PRESENTATIONS:

Waste Management in the Small Surface Mining sector – presentation at Annual ASPASA Environmental Meeting, 2022

Practical Waste Management Practices – presentation at Annual Institute of Quarrying Conference, 2024

AWARDS AND ACKNOWLEDGEMENTS:

- **Outstanding Commitment Award (2022)** – Issued by ASPASA at the Annual Institute of Quarrying South Africa awards evening
- **Outstanding Commitment Award (2023)** – Issued by ASPASA at the Annual Institute of Quarrying South Africa awards evening
- **Best Young Professional Award (2024)** – Issued by IQSA at the Annual Institute of Quarrying South Africa awards evening

Curriculum Vitae

Lynn Merle Whittington-Jones

PERSONAL DETAILS:

First names	Lynn Merle	I have a B.Sc. Honours in Geology and a M.Sc. in Zoology, which has been followed by various courses, concentrating on environmental monitoring and environmental legal requirements. I have been working in the field of Environmental Consulting since 2000 and am a registered Professional Natural Scientist (Pr.Sci.Nat.) in the fields of Environmental Management and Zoology. I started my career in air quality management and dust fallout monitoring, progressing into more general consulting primarily in the mining and related industries.
Surname	Whittington-Jones (nee Randell)	
Contact details:	(011) 791 3389 lynn@umhlaba.co.za	
Home language	English	
Other languages	Afrikaans	

My professional career has concentrated on project management of Environmental Authorisations (EA), environmental auditing (as lead or assistant auditor), and environmental monitoring. My auditing experience is both legally required audits of EA and auditing as part of a SHEQ team for international companies. In the monitoring arena, I have designed and managed long-term dust fallout and water quality monitoring networks and specialised in the interpretation of the results in order that they serve as a constructive tool for environmental management.

I have a passion for making a difference and am driven by my personal goal to improve the way in which we all operate within our society regardless of the magnitude of the impact. Every little bit counts – in the word of Mohandas K. Gandhi. “*There is sufficient in the world for man's need but not for man's greed*”.

EDUCATION AND TRAINING:

DEGREES:

BSc (1993-1995).	1996 – Rhodes University, Grahamstown, RSA.
BSc Hon Geology (1996).	1997 – Rhodes University, Grahamstown, RSA.
MSc Zoology (1997-1999).	2000 – Rhodes University, Grahamstown, RSA.

REGISTRATIONS & MEMBERSHIPS:

SACNASP (since 2005): Registered with the South African Council for Natural Scientific Professionals.
Registration No.: *Pr.Sci.Nat 400076/05*

IAIASa (since 2004): International Association for Impact Assessments, South Africa

LaRSSA (since 2019): Land Rehabilitation Society of South Africa

FURTHER TRAINING:

Wetland Legislation

September 2024 – Presented and co-ordinated by the Centre for Wetland Research and Training (WetRest), Pretoria.

Smarter monitoring and auditing for more effective implementation

September 2022 – Presented by Charlotte Bingham, Defne Arisoy and Bryony Walmsly, co-ordinated by the International Association for Impact Assessment (IAIA), presented on-line.

Surface Water Management in Mining

March 2022 – Presented by Bruce Randell (iLanda Water Services), co-ordinated by Water Business Academy, Pretoria

Environmental Legal Compliance Auditing and Monitoring

November 2021 – Presented by Janice Tooley, co-ordinated by Business Success Solutions, Johannesburg

Resource Efficient and Cleaner Production

March 2021– Presented by Environmental and Sustainability Solutions CC (on-line)

Environmental Law and Compliance

March 2021– Presented by Janice Tooley (on-line); Hosted by Business Success Solutions

Environmental Law Update Workshop

November 2019 – Presented by Imbewu Sustainability Legal Specialists (Pty) Ltd, Johannesburg

ASPASA Environmental Conference

July 2019 – Presented by ASPASA, Johannesburg

Short Course in Air Quality Management: Dustfall Monitoring and Reporting

October 2017 – Presented by Gondwana Environmental Solutions, Johannesburg

Financial Provision Regulations and Mine Closure Requirements Workshop

July 2016 – Presented by Imbewu Sustainability Legal Specialists (Pty) Ltd, Johannesburg

GN R704 Regulations Workshop

February 2016 – Presented by Imbewu Sustainability Legal Specialists (Pty) Ltd, Johannesburg

Environmental Law for Environmental Managers

August 2014 – Presented by Centre for Environmental Management, North West University, Potchefstroom Campus

Mining Law Workshop

May 2013 – Presented by Imbewu Sustainability Legal Specialists (Pty) Ltd, Johannesburg

Contaminated Land Workshop

October 2012 – Presented by Imbewu Sustainability Legal Specialists (Pty) Ltd, Johannesburg

Workshop – Using Google Geo Tools in Conservation

November 2011 – Presented by MAPA and the Endangered Wildlife Trust, Johannesburg

A Cross-cutting and integrated EIA Training Workshop

March 2011 – Presented by Imbewu Sustainability Legal Specialists (Pty) Ltd, Johannesburg

Air Quality Awareness Raising Workshop

August 2009 – Presented by Imbewu Sustainability Legal Specialists (Pty) Ltd, Durban

Environmental Law

June 2008 – Rhodes University, Grahamstown

Writing and Reviewing Environmental Impact Assessments and Environmental Management Programmes

August 2006 – IAIAsa Conference, Pilanesberg, North West Province

Environmental Monitoring and Reporting

July 2005 – University of Witwatersrand, Johannesburg

Short Course in Wetland Training – Background to wetlands, delineation and impact assessments.

September 2005 – University of Pretoria, Pretoria

Minerals and Petroleum Resources Development Act (MPRDA) – In Operation

July 2004 – Johannesburg

Department of Mineral and Energy, Workshop on Implementation of the MPRDA

May 2004 – Pretoria

Air Quality Management and Pollution Control in South Africa.

August 2002 – Matrix and University of the Witwatersrand CEE, Johannesburg.

Environmental Management System (ISO 14001) Implementation and Internal Auditor Training.

May 2002 – Walmsley, Johannesburg.

Short Course on the Role and Use of Aquatic Bio-monitoring.

February 2001 – Rhodes University, Grahamstown.

EMPLOYMENT HISTORY:

ENVIRONMENTAL CONSULTANT

Umhlaba Environmental Consulting CC

January 2004 to present

I am one of the Founding Members of Umhlaba and my general environmental work includes:

- Environmental Auditing of EMPr, Environmental Authorisations (such as NEMA Authorisations, WUL and WL) and Environmental component of SHEQ Audits.
- Compiling Environmental Management Plans / Programme.
- Establishment and management of monitoring networks, including exceedances reporting.
- Part of a team undertaking Environmental Impact Assessments for the mining industry.
- Liaison with government departments, on behalf of the clients.
- Co-ordinating specialist assessments.

Other projects undertaken by Umhlaba where I gave assistance included:

- Risk Assessments.
- Financial Provisions.
- Due Diligence
- Rehabilitation Plans.
- Closure Applications for the mining industry.

ENVIRONMENTAL CONSULTANT

Blue Swallow Environmental Services (Pty) Ltd.

March 2003 to December 2003

I was appointed as the Projects Manager to co-ordinate all projects undertaken by the company as well as run my own projects. The majority of my work focussed on mining activities.

ENVIRONMENTAL CONSULTANT

Matrix Environmental Consultants cc

June 2000 to February 2003

I began working for Matrix after I graduated. While employed with Matrix, our work focused on mining and industry, with my tasks primarily included dustfall monitoring reporting and assisting with Air Quality Management Plans and Air Quality Specialist Studies for EIA's.

WORK EXPERIENCE:

ENVIRONMENTAL AUDITING:

- ⇒ Environmental component of the Safety Health and Environmental (SHE) Audits
 - Part of the International Audit Team for SC Johnson since 2015 (South Africa and Kenya)
 - Part of the International Audit Team for Kellogg's between 2010 and 2018 (South Africa)
- ⇒ Water Use License compliance Audits
 - AfriSam (South Africa) Properties (Pty) Ltd – various aggregate and cement operations
 - Everite – Sky Sand (Pty) Ltd
 - Gold One – New Kleinfontein Gold Mine, Modder East Operation
 - PPC – various aggregate operations
 - Xxx Aggregates (Pty) Ltd – various aggregate operations
- ⇒ Environmental Management Program report compliance Audits
 - AfriSam (South Africa) Properties (Pty) Ltd – various aggregate and cement operations
 - Bundu Mining – aggregate operation
 - Drift SuperSand – various aggregate operations locally
 - Everite – Sky Sand (Pty) Ltd
 - Gold One – New Kleinfontein Gold Mine, Modder East Operation
 - Gomes Sand – aggregate operation
 - PPC – various aggregate operations
 - Xxx Aggregates (Pty) Ltd – various aggregate operations

MONITORING:

- ⇒ Co-ordinating and Managing Environmental Monitoring Programmes
- ⇒ Compiling monthly and annual Environmental Monitoring Reports
- ⇒ Drafting of Dust Management Plan in response to exceedances of the dust fallout standard
- ⇒ Sample collection (dust fallout and water quality)
- ⇒ Hosting an Environmental Monitoring and Management Workshop.
- ⇒ Compiling a Generic Monitoring Framework (report and workshop).
- ⇒ Co-ordination of an Emissions Inventory and Dust Suppression Trial.
- ⇒ Managing PM₁₀ monitoring campaigns.

MANAGEMENT PLANS:

- ⇒ Environmental Management Program report
- ⇒ Dust Management Plans
- ⇒ Alien Invasive Species Management Plans (flora)
- ⇒ Concurrent Rehabilitation Plans

TRAINING:

- ⇒ Training Courses (2 days)
 - Practical Implementation of Environmental Auditing and Monitoring (2024)
- ⇒ Workshops for SHE personnel and / or Senior Management
 - Waste Management – Maintaining Legal Records (2023, 2024)
 - Bridging the Gap between Audit Findings and Environmental Management (2015, 2024)
 - Environmental Monitoring and Management Workshops (2007, 2008, 2012, and 2024)
- ⇒ Training of site personnel
 - Water Use License awareness training (2022 and 2023)

OTHER:

- ⇒ Category 2 Alien Invasive Species Applications
- ⇒ Reporting in Alien Invasive Species removal
- ⇒ Drafting Environmental Management Procedures.
- ⇒ Waste Inventories and Management Plans
- ⇒ Co-ordinating Fauna and Flora Specialist Studies

PRESENTATIONS, PUBLICATIONS, LECTURING AND SEMINARS:

FORMAL PRESENTATIONS / SCIENTIFIC PUBLICATIONS

- WHITTINGTON-JONES, L.M. August 2023. Let us Flatten the Tabletop – Adapting an EMPr / Authorisation letter / Audits into the roaring 2020's. Presented at the International Association for Impact Assessment annual conference, August 2023.
- JONES, L.M. September 2013. Bridging the Gap between Specialists and Developers. Presented at the International Association for Impact Assessment annual conference September 2013.
- JONES, L.M. August 2012. Use of Environmental Monitoring Results – A Motivation to Drink Alcohol. Presented at the International Association for Impact Assessment annual conference August 2012.
- JONES, L.M. April 2012. The Importance of Environmental Monitoring – Why do we Bother? Presented at the Institute of Quarries annual conference April 2012.
- NICHOLSON, A.N, RANDELL, L.M. and ALLISON H. August 2006. When are mining related industries regulated by the New NEMA EIA Regulation and not by the MPRDA? Presented at the International Association for Impact Assessment annual conference August 2006.
- RANDELL, L M. October 2002. The Impact of Air Pollution on Vegetation – What is Happening? Presented at the National Association for Clean Air annual conference October 2002.
- RANDELL, L M. August 1999. Mini television documentary on my M.Sc. thesis: A possible solution to the problem of Common Duiker, *Sylvicapra grimmia*, on chicory farms, with reference to their behaviour in agriculturally disturbed areas
- RANDELL, L M. July 1998. The common duiker, *Sylvicapra grimmia*, – Nocturnal behaviour in an agricultural environment. Presented at the Zoology Society of Southern Africa's annual conference, July 1998.

GUEST LECTURERS

University of Johannesburg, School of Mining Engineering

October 2007

Lecturing to the second year Environmental Management students. lecture title "Environmental Management for the Mining Industry".

University of the Witwatersrand, School of Mining Engineering

September 2005 & May 2006

Lecturing for the MSc course "Introduction to Environmental Impact Assessment", lecture title "The Integration of Environmental Impact Assessments and Environmental Management Programmes for Mining".

University of the Witwatersrand, School of Mining Engineering

April 2005

Lecturing for the MSc course "Mining and the Environment", lecture title "The Minerals and Petroleum Resource Development Act and the Environment".

Vista University

August 2003

Lecturing to the third year Environmental Management students to provide an overview of environmental consulting, focussing on sustainable development and related environmental issues

10.3 CONFIRMATION OF THE SUBDIVISION OF PORTION 1 OF ERF 4038 BETHLEHEM

10.4 WASTE INVENTORY

Note: The below Waste Inventory is an example of what is used to record waste volumes for Bethlehem Quarry.

 WASTE MANAGEMENT INVENTORY										Revision nr. 2		Jan 2026		
Plant Name:		Bethlehem Quarry												
Year:		2026												
INSPECTIONS MUST BE DONE ON THE FOLLOWING:														
ALL ITEMS LISTED BELOW IN SOUND CONDITION:														
1. Waste manifest in place			2. Adequate waste bins provided						3. Waste area demarcated					
4. Signage for different waste			5. Waste procedure in place and up to date						6. Waste permits of landfill sites in place					
Waste item	Disposal Company	Recycling Company (if applicable)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Used Oil (L)														
Oil rags and filters(KG)														
Contaminated Soil (KG)														
General Waste(KG)														
Fluorescent tubes(KG)														
Scrap metal(KG) Steel														
Batteries (KG)														
Rubber (KG)														
Medical waste (KG)														
Manganise/Lead (KG)														
Paper (KG)														
Printer Cartridges														
Sewage (L)														
DATE:														
COMPLETED BY:														

10.13 ENVIRONMENTAL IMPACT ASSESSMENT METHODOLOGY

The Umhlaba Impact Ranking Tool (hereafter referred to as “the IRTTool”) is a quantitative manner of investigating, assessing and evaluating the potential impacts / risks resulting from the activities associated with the proposed / existing activity on the receiving environment; i.e. the biophysical, social and cultural heritage.

10.13.1 Legal Requirements

The IRTTool has been developed taking cognisance of the requirements of the 2014 EIA Regulations⁶⁶ to the NEMA⁶⁷; where Appendix 3(3)(j) of GN 982 stipulates that the “assessment of each identified potentially significant impact and risk, including –

- (i) **cumulative** impacts,
- (ii) the **nature**, significance and consequence of the impact and risk,
- (iii) the **extent** and **duration** of the impact and risk,
- (iv) the **probability** of the impact and risk occurring,
- (v) the **degree** to which the impact and risk can be **reversed**,
- (vi) the **degree** to which the impact and risk may cause **irreplaceable loss of resources**; and
- (vii) the **degree** to which the impact and risk can be **mitigated**”.

10.13.2 Definitions

The terms “environment”, “activity”, “aspect” and “impact” will be used technically throughout this document. Hence, it is necessary to provide an explanation / definition for each term in the context of the Impact Assessment and IRTTool.

Environment (as defined in NEMA): The surroundings within which humans exist and that are made up of;

the land, water and atmosphere of the earth;

micro-organisms, plant and animal life;

any part or combination of the above, and the interrelationships among and between them; and

the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing;

Activity: This is a specific deed, action or function, that takes place at the Operation, such as (but not limited to);

Stockpiling

Vehicle movement on site

Breaking up concrete foundations.

Aspect: Considered to be a direct effect / consequence of an *activity*, which has an influence on the *environment* (and is neither categorised as positive or negative), such as;

Stockpiling of product results in noise, the noise being the *aspect* of the *activity*.

Impact: The end-result of an *aspect* that occurred due to an *activity*, resulting in an influence on the *environment*, which is either categorised as positive or negative (a subjective categorisation), such as;

Stockpiling of product results in noise (*aspect*) which can be a nuisance to surrounding I&AP (the *impact*).

10.13.3 Criteria Considered when Determining Significance

The ranking of impacts / risks (also known as determination of significance) is estimated using two criteria, namely *Consequence* and *Probability*. These consider the contributing factors / criteria listed in the legislation. The definitions of each are provided below.

The **Consequence** of an impact resulting from an aspect is expressed as a combination of:

- Nature of impact: An indication of the degree of the damage (negative impacts) or benefit (positive impacts) the impact inflicts on biophysical, cultural, and/or social functions (the *environment*).
- Extent of impact: A spatial extent of the impact / are impacted (i.e. how far from activity the impact is realised).

⁶⁶ GN 982 (also commonly referred to as GN 326)

⁶⁷ National Environmental Management Act, 1998 (Act No. 107 of 1998) as amended

- **Duration** of impact: A temporal indication of how long the effects of the impact will persist, assuming the activity creating the impact ceases. For example, the impact of noise is short lived (impact ceases when activity ceases) whereas the impact of removing topsoil exists for a much longer period of time.
- **Frequency** of the aspect occurring: An indication of how often an *aspect*, as a result of a particular *activity*, is likely to occur. Note that this does not assess how often the impact occurs. It applies only to the *aspect*. For example, blasting takes place monthly and haulage daily while the resultant frequency of the impacts occurring will vary based on a number of factors.

The **Probability** of an impact resulting from an *aspect* is expressed as:

- **Probability** of impact occurring: An estimated indication of the potential for an impact to occur. Note, this is not the potential for an *aspect* to occur, but rather the potential for the resultant *impact* to occur.

10.13.4 Ranking of Environmental Impacts / Risks Identified

Step 1:

The *Significance Ranking* is an indication of how serious a negative impact is anticipated to be or how beneficial a positive impact may be. Scores are assigned to each the criteria listed in the legislation (and defined above) as outlined in Table 10-1, overleaf. (The scoring range in the table has been selected to represent the scale in which varying impacts may occur.)

Step 2:

The Significance Ranking then goes on to considers additional factors (as shown in Table 10-3), which will increase the score:

- **Impacts / Issues raised by Interested and Affected Parties:** For new and existing operations, I&AP will be consulted, either during the compilation of the impact assessment (for new operations) or part of an existing / on-going consultation process (for existing operations). During this consultation process, I&AP will identify concerns relating to impacts resulting from activities associated with the operation. Impacts identified by I&AP's will be assigned additional scoring.
- **Cumulative Impacts:** Cumulative Impacts will be considered where an off-site activity (not related to the operation being evaluated) will result in the same impact at the receptors being considered.

Step 3:

The final Significant Ranking considers both the initial scoring (for criteria Table 10-1) and the additional factors (listed in Table 10-3).

Using the Score, the Significance Ranking is then categorised as per Table 10-2 with ranking being colour coded for ease of reference - High, Medium-High, Medium, Low-Medium or Low. These bands have been determined through experience within the mining industry, considering monitoring data for existing operations, our interactions with I&AP at existing operations and Umhlaba personnel's experience of over 20 years in the mining industry.

Table 10-1: Significance Ranking criteria - IRTool.

CONSEQUENCE	<u>Nature</u> of Impact:		
	Low	environment in such a way that natural, cultural and / or social functions and processes ...	are not affected.
	Low-Medium		are affected insignificantly.
	Medium		are altered.
	Medium-High		are severely altered.
	High		will temporarily or permanently cease.
	<u>Extent</u> of Impact:		
	On-site	Impact occurs on-site (within the boundary of the mine).	
	Neighbouring	Impact occurs within a 5km radius of the site.	
	Local	Impact occurs within a 20km radius of the site.	
	Regional	Impact occurs within a 100km radius of the site.	
	National	Impact occurs within South Africa.	
	<u>Duration</u> of Impact:		
	Very Short-term	The impact will cease within 1 week if the activity is stopped.	
	Short-term	The impact will cease within 1 year if the activity is stopped.	
	Medium-term	The impact will cease within 5 years if the activity is stopped.	
	Long-term	After the operational life of the operation.	
	Permanent	Where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.	
	<u>Frequency</u> of occurrence of the activity:		
	Annually or less	Activity occurs	at least once in a year or less frequently.
	6 months		at least once in 6 months.
	Monthly		at least weekly to once a month.
	Weekly		on operational days.
	Daily		daily.
PROBABILITY	<u>Probability</u> of potential occurrence of the impact:		
	Improbable	The possibility of the impact materialising is ...	very low either because of design or historic experience
	Low		low either because of design or historic experience
	Medium	There is a possibility that the impact will occur.	
	High	There is a distinct possibility that the impact will occur.	
	Definite	The impact will occur regardless of any prevention measures.	

Table 10-2: Additional factors that influence the Final Ranking.

External Factor	Description
Concern raised by I&AP	Unresolved Impact raised as a concern by an I&AP
Cumulative impact	Impact can be considered cumulatively with off-site impacts

Table 10-3: Impact Ranking descriptions.

Low	Management actions may not be necessary, but in some instances are encouraged to ensure that the impact remains of Low significance.
Low-Medium	Management actions are usually encouraged to ensure that the impacts remain of Low-Medium significance.
Medium	Management actions are required to ensure, at minimum, the significance of the impact does not increase.
Medium-High	Management actions are required to reduce the significance of the impact to, at least, Medium significance.
High	Impact should be avoided, or if not possible, managed to reduce the significance of the impact to, at least, Medium significance (where possible).

10.13.5 Criteria Considered that do not Influence the Significance Ranking

After completing the determination of significance of an impact, there are additional factors, in terms of NEMA, which need to be considered. NEMA stipulates that the impact assessment must consider the following for “each identified potentially **significant impact**”; namely;

- “the degree to which the impact can be reversed”,
- “the degree to which the impact may cause irreplaceable loss of resources”, and
- “the degree to which the impact can be mitigated.”

The IRTTool regards a “significant impact” as one with an initial ranking of Medium significance or higher.

Although these factors are important when considering the impacts ranking / significance, they are more specifically applicable to new developments and only applicable for existing sites where new activities / changes in impacts are expected. When considering these additional criteria, the following is considered:

Degree to which the Impact can be Reversed: An indication to the degree to which the impact can be reversed will be provided, using one of the categories defined below:

- **Not possible:** Once the impact has occurred it will be permanent and cannot be reversed.
- **Potentially:** With appropriate Management Actions or Mitigation Measures, there is a potential the impact can be reduced / reversed.
- **Likely:** With appropriate Management Actions or Mitigation Measures, likelihood that the impact can be reduced / reversed is high.

Degree to which the Impact can be Mitigated: This requirement is essentially achieved by determining significance before consideration of controls (i.e. Management Actions) and then the significance after the consideration of controls. The difference in the Significance Ranking WITHOUT and WITH controls is an indication of the “degree to which the impact can be mitigated”.

Degree to which the Impact may cause Irreplaceable Loss of Resources: Aspects that need to be considered in terms of irreplaceable loss of resources should be discussed at the beginning of the impact assessment. An example is the destruction of habitat.

As stated above, these are applied for new developments or where there are changes to existing operations that result in changes in the Impact Ranking.