mineral resources & energy

Department:
Mineral Resources and Energy
REPUBLIC OF SOUTH AFRICA

FINAL BASIC ASSESSMENT REPORT (BAR) AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT (EMPR)

FOR THE SOUTHERN FREE STATE (SOFS) MINING RIGHT FS 10005 HELD BY SIBANYE GOLD PROPRIETARY LIMITED (SIBANYE GOLD)

SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (MPRDA) (AS AMENDED)

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Final Basic Assessment Report and Environmental Management Programme Report for Southern Free State (SOFS) Mining Right FS 10005, held by Sibanye Gold Proprietary Limited

Report

Version -Final

14 January 2026

GCS Project Number: 25-0019

Client Reference: FS 10005 MR



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Final Basic Assessment Report and Environmental Management Programme Report for Southern Free State (SOFS) Mining Right FS 10005, held by Sibanye Gold Proprietary Limited

Version – Final

14 January 2026

DOCUMENT ISSUE STATUS

Report Issue	Final		
GCS Reference Number	25-0019		
Client Reference	FS 10005 MR		
Title	Final Basic Assessment Report and Environmental Management Programme Report for Southern Free State (SOFS) Mining Right FS 10005, held by Sibanye Gold Proprietary Limited		
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IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining "will not result in unacceptable pollution, ecological degradation or damage to the environment".

Unless an Environmental Authorisation (EA) can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of Section 16(3)(b) of the Environmental Impact Assessment (EIA) Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of Section 17 (1) (c) the competent authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an EA for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the EA being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The Environmental Assessment Practitioner (EAP) must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the Applicant.

Objective of the Basic Assessment Process

The objective of the Basic Assessment process is to, through a consultative process—

(a) determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;

(b) identify the alternatives considered, including the activity, location, and technology alternatives;

(c) describe the need and desirability of the proposed alternatives;

(d) the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on the these aspects to determine:

(i) the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and

(ii) the degree to which these impacts:

aa) can be reversed;

bb) may cause irreplaceable loss of resources; and

(cc) can be managed, avoided or mitigated;

(e) through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—

(i) identify and motivate a preferred site, activity and technology alternative;

(ii) identify suitable measures to manage, avoid or mitigate identified impacts; and

(iii) identify residual risks that need to be managed and monitored.

EXECUTIVE SUMMARY

Introduction

GCS Environment South Africa (Pty) Ltd (GCS) has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (BA) process for the proposed administrative amendment to the existing Southern Free State (SOFS) Mining Right (MR) (FS 10005 MR) in the Free State Province of South Africa. This process is being carried out in terms of the Environmental Impact Assessment (EIA) Regulations, 2014, promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), and is guided by the procedural requirements contained in Government Notice Regulation (GN R) 982.

The existing SOFS MR (FS 10005 MR) and existing Beatrix MR (FS 10047 MR (FS 081 MR)) are located in the Free State Province, within the Lejweleputswa District Municipality, and falls under the jurisdiction of both the Matjhabeng and Masilonyana Local Municipalities. The MR areas lies approximately 15–20 kilometres (km) south of Virginia, about 25–30 km southeast of Welkom, 20–25 km east of Hennenman, 25–30 km northeast of Theunissen, 40–45 km north of Winburg, 60–65 km northeast of Brandfort, 35–40 km southeast of Odendaalsrus, and roughly 45–50 km southwest of Ventersburg.

The existing SOFS MR (FS 10005 MR) is currently held by Witwatersrand Consolidated Gold Resources (Wits Gold) and the exiting Beatrix MR is currently held Sibanye Gold Proprietary Limited (Sibanye Gold). The listed activity that necessitates this BA is Activity 21(d) of Listing Notice 1 (GN R 983), which applies to any activity, including the continued operation of that activity, that requires an amendment or variation to a right or permit in terms of Section 102 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA).

Neo Uranium Resources South Africa (Neo Energy), a subsidiary of Neo Energy Metals, has received approval from the South African Reserve Bank to proceed with the acquisition of Sibanye Gold's Beatrix 4 Shaft (Beisa Project / Operation).

To implement this transaction, Sibanye-Stillwater is required to undertake a series of administrative actions, including:

- The transfer of ownership of the SOFS MR (FS 10005 MR), currently held by Wits Gold, to Sibanye Gold.
- The consolidation of a portion of the Sibanye Gold Beatrix MR (FS 10047 MR / FS 081 MR) area (Beatrix Area) into the SOFS MR (FS 10005 MR).
- The transfer of the remaining portion of the Beatrix MR (FS 10047 MR / FS 081 MR) (Beisa Area) from Sibanye Gold to Neo Energy.

Upon completion of these administrative actions, the consolidated SOFS MR (FS 10005 MR), will be held by Sibanye Gold, which is the subject of this application.

It is important to note that this application is purely administrative in nature and does not involve any changes to existing mining operations, expansions, or modifications of authorised activities. All operations associated with Beatrix 1, 2 and 3 Shafts, as well as the proposed future SOFS Operations, will continue as previously authorised under the approved Environmental Management Programmes (EMPrs) and related regulatory approvals. The amendment therefore concerns only the restructuring of mining rights to align ownership and legal standing with the approved transaction between Sibanye-Stillwater and Neo Energy.

The objective of this BA process is to ensure that the proposed administrative amendment is undertaken in full compliance with the applicable provisions of NEMA, the EIA Regulations, and other relevant environmental legislation. Furthermore, the process facilitates transparent consultation and engagement with the competent authority and all interested and affected parties, ensuring that stakeholders are provided an opportunity to review and comment on the proposed amendment. This approach ensures that decision-making remains informed, balanced, and accountable, while maintaining environmental governance, regulatory integrity, and public confidence in the EA system.

Project Overview

Existing Operations Beatrix Mine (1, 2, 3 Shaft and Associated Infrastructure)

Beatrix Mine is an established underground gold mining operation located in the southern Free State Goldfield and has been in production since 1983. The mine currently operates from Beatrix No. 1 and No. 3 Shafts, with ore from both shafts conveyed to the central metallurgical plant for processing. Beatrix No. 2 Shaft has been decommissioned and is no longer in use.

Gold is extracted from the Beatrix Reef, which occurs at depths ranging from approximately 500 m to over 2 100 m below surface. Mining is undertaken using conventional underground methods, including scattered stoping, on-reef raise development, and breast mining, supported by pneumatic and hydropower systems.

Ore is processed at the Beatrix metallurgical plant using crushing, milling, carbon-in-leach (CIL), elution, electrowinning, and smelting to produce gold bullion. Tailings are deposited at the active Beatrix No. 2 tailings storage facility, while excess water generated from tailings and underground workings is recycled through the return water dam system. Potable and process water is supplied by Vaal Central Water, and wastewater is treated at the on site Department of Water and Sanitation registered wastewater treatment works.

The mine is supported by established surface infrastructure including workshops, offices,

access roads, power supply systems, waste management facilities, and employee accommodation and recreational facilities. No new infrastructure development is currently planned at Beatrix.

Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

The De Bron Merriespruit (DBM) Project forms Phase 1 of the SOFS underground mining development. The project will extract gold-bearing conglomerate reefs at depths of approximately 480 m below surface using conventional narrow-reef underground stoping. The planned National Nuclear Regulator Act, 1999 (Act No. 47 of 1999) is approximately 19 years, with shaft sinking and initial underground development taking place before ramp up to full production.

To support the mining operation, a full suite of surface and underground infrastructure will be established. Key components include underground footwall and haulage development, ore handling systems, workshops, administration facilities, change houses, diesel and lubricants storage, and a metallurgical CIL processing plant. Power will be supplied via a new 132 kV line from Theseus Substation, while water needs will initially be met through municipal supply and later supplemented by mine dewatering and on site treatment. Tailings will be deposited at the permitted Harmony Merriespruit tailings storage facility (TSF), with return water recovery systems in place. Water management infrastructure will ensure clean and dirty water separation, supported by a lined Pollution Control Dam and brine storage facilities.

The project will generate employment and procurement opportunities in the region and will be implemented with ongoing environmental management, monitoring, and stakeholder engagement.

The proposed consolidation does not alter the approved operational design, production rate, or life of mine (LoM), which remains approximately 20 years, followed by a post closure monitoring period of at least five years.

Environmental Baseline and Sensitivities

The SOFS and Beatrix Operations are located within the central Free State Highveld, characterised by a semi-arid climate with summer-dominated rainfall and high evaporation rates. These conditions influence runoff, erosion potential, and water availability, requiring careful stormwater and water management.

The area comprises gently undulating plains with low relief, drained mainly by non-perennial systems linked to the Sand and Doring Rivers. Seasonal drainage lines, pans, and wetlands occur within the landscape and are sensitive to hydrological modification due to their shallow gradients and limited natural resilience.

Geologically, the site overlies shallow Karoo aquifers and deeper Witwatersrand formations

affected by long term mine dewatering. Groundwater quality is naturally saline, with localised mining related increases in sulphate and salinity occurring downgradient of residue facilities. Surface water quality impacts are generally localised, with evidence of natural attenuation downstream.

Ecologically, the area falls within the Endangered Vaal-Vet Sandy Grassland, which has been extensively transformed by mining and agriculture. Remaining grassland, riparian, and wetland areas retain ecological value and support Species of Conservation Concern, but are vulnerable to disturbance and invasive species.

Air quality and noise levels generally comply with regulatory standards, with occasional short-term dust exceedances linked mainly to seasonal climatic conditions. Overall, the environmental setting reflects a historically modified but manageable landscape, where ongoing water management, rehabilitation, and monitoring are critical to limiting residual and cumulative impacts during operations and closure.

Key Findings and Environmental Significance

The assessment concludes that the proposed amendment does not result in any increase in the significance of previously assessed impacts. All potential environmental effects—including those related to water management, air quality, waste generation, biodiversity, and socio-economic factors—remain low to medium in significance after mitigation.

The EMPr provides a robust management framework to ensure that all environmental risks continue to be managed through established mitigation measures, monitoring protocols, and reporting procedures. No new cumulative or transboundary impacts have been identified, and the mitigation hierarchy (avoid–minimise–rehabilitate) continues to guide all environmental management actions.

Socio-Economic Considerations

The continuation of the SOFS and Beatrix Operations will maintain direct employment, support local procurement and enterprise development, and contribute significantly to regional economic stability. The operations also fulfil commitments under the Social and Labour Plan, including investments in education, skills development, health, and infrastructure projects that benefit surrounding communities.

The consolidation of environmental authorisations ensures regulatory efficiency, improves oversight, and strengthens long term sustainability planning for both operations. The project will continue to provide critical socio-economic benefits to the Matjhabeng and Masilonyana Local Municipalities and the broader Free State region.

Environmental Management and Closure

The EMPr details the ongoing environmental management actions, monitoring programmes,

and rehabilitation commitments required to maintain compliance. Rehabilitation is undertaken progressively, with final closure aiming to achieve a safe, stable, non-polluting, and sustainable post-mining landscape. Financial provision for rehabilitation and closure is maintained in accordance with the Financial Provision Regulations, 2015, and is reviewed annually.

Post closure monitoring will continue for a minimum of five years to confirm that surface water, groundwater, and vegetation have stabilised, and that the site meets the criteria for closure certification under the MPRDA.

Conclusion and Recommendation

This Basic Assessment confirms that the proposed amendment to the SOFS and Beatrix authorisations is environmentally acceptable and will not result in any new or significant impacts. The project remains consistent with national and provincial environmental and development planning frameworks, and mitigation measures already in place are sufficient to ensure ongoing environmental protection.

In the opinion of the EAP, the project remains technically feasible, socially beneficial, and environmentally sustainable. It is therefore recommended that the existing Environmental Authorisation remain in force and be updated to reflect the consolidated rights under this amendment, subject to the continued implementation of the approved EMPr, compliance monitoring, and annual reporting to the Department of Mineral and Petroleum Resources.

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LIST OF ABBREVIATIONS

Abbreviation	Description
AEL	Atmospheric Emissions Licence
BA	Basic Assessment
BAR	Basic Assessment Report
BID	Background Information Document
BMAP	Biodiversity Management and Action Plan
BPG	Best Practice Guidelines
BR	Beatrix Reef
CA	Competent Authority
CBA	Critical Biodiversity Areas
CI	Conservation Important
CIL	Carbon-in-Leach
COP	Code of Practice
CRR	Comment and Response Report
CV	Curriculum Vitae
DBAR	Draft Basic Reports
DBM	De Bron Merriespruit
DFFE	Department of Forestry, Fisheries and the Environment
DMPR	Department of Mineral and Petroleum Resources
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EAPASA	Environmental Assessment Practitioners Association of South Africa
E&S	Environmental and social
EC	Electrical Conductivity
EI	Ecological importance
EIA	Environmental Impact Assessment
EIS	Ecological importance and sensitivity
EMPr	Environmental Management Programme
EMS	Environmental Management System
ES	Ecological sensitivity
ESA	Ecological Support Areas
ESG	Environmental, Social and Governance
FBAR	Final Basic Assessment Reports
GHS	Globally Harmonised System
GN	Government Notice
H	High (impact significance rating)
HDI	Historically Disadvantaged Individuals
HDSA	Historically Disadvantaged South Africans
HIV	Human Immunodeficiency Virus
HR	Human Resources
I&AP	Interested and Affected Party
IAP2	International Association for Public Participation
IUCN	International Union for Conservation of Nature
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
IFC	International Finance Corporation
IWUL	Integrated Water Use Licence
L	Low (impact significance rating)
LED	Local economic development
LoM	Life of mine
M	Medium (impact significance rating)
MR	Mining Right
MHSA	Mine Health and Safety Act, 1996 (Act 29 of 1996)
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002)
NAAQS	National Ambient Air Quality Standards
NBSAP	National Biodiversity Strategy and Action Plan
NDP	National Development Plan

Abbreviation	Description
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NNR	National Nuclear Regulator
NORM	Naturally occurring radioactive materials
NWA	National Water Act, 1998 (Act 36 of 1998)
NEMWA	National Environmental Management: Waste Act, 2008 (Act 59 of 2008)
NEMBA	National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004)
NEMAQA	National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWMS	National Waste Management Strategy
PAR	Performance Assessment Reports
PCD	Pollution control dams
PES	Present Ecological State
PGDS	Provincial Growth and Development Strategy
PM	Particulate matter
PPE	Personal Protective Equipment
PPP	Public participation process
ROM	Run-of-Mine
RQO	Resource Quality Objectives
RWD	Return Water Dam
SABS	South African Bureau of Standards
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANS	South African National Standard
SAPS	South African Police Service
SCC	Species of Conservation Concern
SEP	Stakeholder Engagement Plan
SLP	Social and Labour Plan
SME	Small and medium enterprises
SMME	Small, Micro and Medium Enterprises
SOFS	Southern Free State
TARP	Trigger Action Response Plan
TDS	Total Dissolved Solids
TSF	Tailings Storage Facility
WUL	Water Use Licence
WULA	Water Use Licence Application
WRD	Waste Rock Dump
WWTW	Wastewater Treatment Works

UNITS OF MEASUREMENT

Unit	Description
%	Percentage
°C	Degrees Celsius
Bq/m³	Becquerels per cubic metre
dB(A)	A-weighted decibels
days	Time duration in days
ha	Hectares
km	Kilometres
ℓ	Litres
ℓ/s	Litres per second
m	Metres
m²	Square metres
m³	Cubic metres
m³/day	Cubic metres per day
mg/ℓ	Milligrams per litre
mg/m²/day	Dust deposition rate
months	Time duration in months

Unit	Description
µg/ℓ	Micrograms per litre
µS/cm	Micro siemens per centimetre
pH	Measure of acidity or alkalinity
years	Time duration in years

CHEMICAL ELEMENTS

Symbol	Element / Parameter Name
Al	Aluminium
As	Arsenic
Au	Gold
Ca	Calcium
$CaCO_3$ / CaO	Lime
Cl^-	Chloride
CN^-	Cyanide
EC	Escherichia coli
Fe	Iron
F^-	Fluoride
HC	Hydrocarbons
K	Potassium
Mg	Magnesium
Mn	Manganese
Na	Sodium
NaOH	Caustic soda
NO_3^-	Nitrate
Rn	Radon
SO_4^{2-}	Sulphate
TDS	Total Dissolved Solids
TA	Total Alkalinity

PART A

SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

1 INTRODUCTION

GCS Environment South Africa (Pty) Ltd (GCS) has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment (BA) process for the proposed administrative amendment to the existing Southern Free State (SOFS) Mining Right (MR) (FS 10005 (MR)) in the Free State Province of South Africa. This process is being carried out in terms of the Environmental Impact Assessment (EIA) Regulations, 2014, promulgated under the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA), and is guided by the procedural requirements contained in Government Notice Regulation (GN R) 982.

The existing SOFS MR (FS 10005 MR) (Figure 3-1) and exiting Beatrix MR (FS 10047 MR (FS 081 MR)) (Figure 3-2) are located in the Free State Province, within the Lejweleputswa District Municipality, and falls under the jurisdiction of both the Matjhabeng and Masilonyana Local Municipalities. The MR areas lies approximately 15–20 kilometres (km) south of Virginia, about 25–30 km southeast of Welkom, 20–25 km east of Hennenman, 25–30 km northeast of Theunissen, 40–45 km north of Winburg, 60–65 km northeast of Brandfort, 35–40 km southeast of Odendaalsrus, and roughly 45–50 km southwest of Ventersburg.

The existing SOFS MR (FS 10005 MR) is currently held by Witwatersrand Consolidated Gold Resources (Wits Gold) and the exiting Beatrix MR (FS 10047 MR (FS 081 MR)) is currently held Sibanye Gold Proprietary Limited (Sibanye Gold). The listed activity that necessitates this BA is Activity 21(d) of Listing Notice 1 (GN R 983), which applies to any activity, including the continued operation of that activity, that requires an amendment or variation to a right or permit in terms of Section 102 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA).

Neo Uranium Resources South Africa (Neo Energy), a subsidiary of Neo Energy Metals, has received approval from the South African Reserve Bank to proceed with the acquisition of Sibanye Gold's Beatrix 4 Shaft (Beisa Project / Operation), as illustrated in Figure 3-2.

To implement this transaction, Sibanye-Stillwater is required to undertake a series of administrative actions, including:

- The transfer of ownership of the SOFS MR (FS 10005 MR), currently held by Wits Gold, to Sibanye Gold.
- The consolidation of a portion of the Sibanye Gold Beatrix MR (FS 10047 MR (FS 081 MR)) area (Beatrix Area as illustrated in Figure 3-2) into the SOFS MR (FS 10005 MR) (Figure 3-3).
- The transfer of the remaining portion of the Beatrix MR (FS 10047 MR (FS 081 MR)) (Beisa Area as illustrated in Figure 3-2) from Sibanye Gold to Neo Energy.

Upon completion of these administrative actions, the consolidated SOFS MR (FS 10005 MR), as

illustrated in Figure 3-3, will be held by Sibanye Gold, which is the subject of this application.

It is important to note that this application is purely administrative in nature and does not involve any changes to existing mining operations, expansions, or modifications of authorised activities. All operations associated with Beatrix 1, 2 and 3 Shafts, as well as the proposed future SOFS Operations, will continue as previously authorised under the approved Environmental Management Programmes (EMPrs) and related regulatory approvals. The amendment therefore concerns only the restructuring of mining rights to align ownership and legal standing with the approved transaction between Sibanye-Stillwater and Neo Energy.

The objective of this BA process is to ensure that the proposed administrative amendment is undertaken in full compliance with the applicable provisions of National Environmental Management Act (Act 107 of 1998) (NEMA), the EIA Regulations, and other relevant environmental legislation. Furthermore, the process facilitates transparent consultation and engagement with the Competent Authority and all interested and affected parties (I&APs), ensuring that stakeholders are provided an opportunity to review and comment on the proposed amendment. This approach ensures that decision-making remains informed, balanced, and accountable, while maintaining environmental governance, regulatory integrity, and public confidence in the Environmental Authorisation (EA) system.

2 CONTACT PERSON AND CORRESPONDENCE ADDRESS

2.1 Details of the Applicant

The contact details of the Applicant are provided in Table 2-1.

Table 2-1: Applicant Details

Name of Applicant:	Sibanye Gold Proprietary Limited
Contact Person:	Kahmani Gounden
Tel Number:	+27 0718917114
Postal Address:	Private Bag X5 Westonaria 1780
Physical Address:	Libanon Business Park 1 Hospital Street (off Cedar Avenue) Libanon Westonaria 1780 South Africa

2.2 Details of the Environmental Assessment Practitioner

The contact details of the EAP are provided in Table 2-2 below.

Table 2-2: Contact Details of the Environmental Assessment Practitioner

Name of Environmental Assessment Practitioner:	Paula Jane Tolksdorff
Professional Affiliation / Registration:	Professional affiliation/registration: Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/509) South African Council for Natural Scientific Professions (SACNASP) (152904) International Association for Impact Assessment South Africa (1745) International Association Public Participation (IAP2SA014)

Company Name:	GCS Environment SA (Pty) Ltd
Physical Address:	63 Wessels Road, Rivonia, 2128
Postal Address:	P.O. Box 2597 Rivonia 2128
Telephone No.:	+27 (0)11 803 5726
Facsimile No.:	+27 (0)11 803 5745
Email Address:	paulat@gcs-sa.biz

2.3 Expertise of the Environmental Assessment Practitioner

This section provides the qualifications and experience of the EAP. The EAP's Curriculum Vitae and qualifications are attached in Appendix A.

2.3.1 The Qualifications of the Environmental Assessment Practitioner

Paula Tolksdorff holds the following qualifications:

- National Diploma: Civil Engineering, University of the Witwatersrand, 1993.
- National Higher Diploma: Civil Engineering, University of the Witwatersrand, 1994.
- Baccalaureus Technologiae (B-Tech), Engineering Civil, Urban and Rural Development, University of the Witwatersrand, 1997.
- MSc. Environmental Management, University of North-West (two years course work complete 2011/2012).

2.3.2 Summary of the Environmental Assessment Practitioner's Past Experience

Paula brings over 30 years of specialised experience in the environmental sector, working across various industries, including global industrial and mining clients, as well as commercial developments. Her career has taken her through significant projects across Africa, where she has gained a deep understanding of how environmental and social licences to operate impact both operations and project outcomes.

With a strong foundation in sustainability, Paula applies her expertise to integrate and maintain effective, sustainable practices across a wide range of operational contexts. As an EAP and Professional Natural Scientist, her skills are both robust and multifaceted. She excels in conducting environmental and social (E&S) impact assessments and in developing comprehensive E&S management programmes tailored to the specific needs of each project. Her work includes crafting and implementing E&S management systems for both construction and operational phases, ensuring they adhere to international standards, as well as local regulatory requirements.

Paula is also highly experienced in stakeholder engagement, ensuring clear communication and collaboration across all parties involved in a project. Her capabilities extend to due diligence and compliance auditing, where she provides critical oversight to ensure regulatory compliance and operational integrity. Additionally, she has extensive experience managing water and waste resources, promoting responsible and sustainable practices.

Through her well-honed project management skills, Paula effectively leads complex projects, consistently ensuring that sustainability goals are met. Her career and diverse background demonstrate a deep commitment to advancing environmental stewardship and sustainable development across challenging and diverse environments.to advancing environmental stewardship and sustainable development across challenging and diverse environments.

Professional Affiliations:

- Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/509).
- South African Council for Natural Scientific Professions (SACNASP) (152904).
- International Association for Impact Assessment South Africa (1745).

International Association Public Participation (IAP2SA014).

2.4 Expertise of the Project Team

The expertise of the project team is tabulated below in Table 2-3, which outlines each team member's name, role, qualifications, years of experience, and professional registrations (where applicable).

Table 2-3: Expertise of the Project Team

Name	Title	Qualifications	Experience
Luyanda Macheke	Environmental Consultant	Postgraduate Diploma in Integrated Water Management, University of the Free State (2024) BSc in Geography and Geology, University of Johannesburg (2021)	2+ years
Anelle Lotter	Stakeholder Engagement Practitioner	National Diploma: Journalism	25+ years
Sibongile Bambisa-Moropodi	Stakeholder Engagement Practitioner	Honours: Anthropology	15+ years

3 LOCATION OF THE OVERALL ACTIVITY

The future SOFS MR (FS 10005 MR) (Figure 3-3) is located in the Free State Province, within the Lejweleputswa District Municipality, and falls under the jurisdiction of both the Matjhabeng and Masilonyana Local Municipalities. The MR areas lies approximately 15–20 km south of Virginia, about 25–30 km southeast of Welkom, 20–25 km east of Hennenman, 25–30 km northeast of Theunissen, 40–45 km north of Winburg, 60–65 km northeast of Brandfort, 35–40 km southeast of Odendaalsrus, and roughly 45–50 km southwest of Ventersburg.

3.1 Locality Map

The future SOFS MR (FS 10005 MR), which is the subject of this application, will consist of Beatrix 1, 2 and 3 Shaft and the proposed SOFS Operation, as shown in Figure 3-3.

3.2 Location and Farm Portions

Table 3-1 details the location of the overall activity, including the details of the farm portions included in the application as illustrated in Figure 3-4.

Table 3-1: Proposed Project Locality Details

Farm name	Farm Name	Farm No.	Portion
	Mond van Doornrivier	38	Remaining Extent
	Mond van Doornrivier	38	Portion 2
	Leeuwfonteinswerft	51	Remaining Extent
	Leeuwbult	52	Remaining Extent
	Welgelegen	64	Remaining Extent
	Yatala	73	Remaining Extent
	Annex Welgelegen	76	Remaining Extent
	Leeuwvlei	115	Portion 1
	Leeuwvlei	115	Remaining Extent
	Goedemoed	143	Remaining Extent
	Goedemoed	143	Portion 3
	Excelsior	147	RE/Portion 1
	Excelsior	147	Remaining Extent
	Lekkerlewe	166	Portion 1
	Leeuwaarden	171	Remaining Extent
	Leeuwaarden	171	Portion 1
	Schoolsite	178	Remaining Extent
	Mooivlakte	199	Portion 1
	Mooivlakte	199	Portion 3
	Mooivlakte	199	Remaining Extent
	Rondehoek	200	Portion 3
	Rondehoek	200	Portion 1
	Rondehoek	200	Remaining Extent
	Annex Mooivlakte	208	Remaining Extent
	Kalkoenkrans	225	Portion 15
	Kalkoenkrans	225	Portion RE\8
	Kalkoenkrans	225	Portion 9
	Kalkoenkrans	225	Portion 10
	Kalkoenkrans	225	Portion 11
	Kalkoenkrans	225	Portion 12
	Kalkoenkrans	225	Portion 13
	Kalkoenkrans	225	Portion 14
	Kalkoenkrans	225	Portion 3
	Grusde	229	Remaining Extent
	Kovno	235	Remaining Extent
	Doorndeel	236	Remaining Extent
	Doorndeel	236	Portion 1
	Doornriver	330	Portion 1
	Doornriver	330	Portion 2
	Doornriver	330	Remaining Extent
	Doornriver	330	Portion 18
	Doornriver	330	Portion 17
	Doornriver	330	Portion 16
	Doornriver	330	Portion 15
	Doornriver	330	Portion 14
	Doornriver	330	Portion 19
	Doornriver	330	Portion 5
	Doornriver	330	Portion 10
	Doornriver	330	Portion 20
	Doornriver	330	Portion 11
	Doornriver	330	Portion 6
	Doornriver	330	Portion 7
	Doornriver	330	Portion 21
	Doornriver	330	Portion 11

	Doornriver	330	Portion 23
	Vlakpan	358	Portion 1
	Vlakpan	358	Portion 3
	Vlakpan	358	Portion 2
	Vlakpan	358	Remaining Extent
	Welgelegen	382	Portion 26
	Welgelegen	382	Portion 21
	Welgelegen	382	Remaining Extent
	Monstari	398	Portion 1
	Dicier	404	Portion 1
	Weltevreden	443	Portion 9
	Weltevreden	443	Portion 2
	Weltevreden	443	Portion 14
	Annex grusde	474	Remaining Extent
	Annex Glen Ross	562	Remaining Extent
	Annex Glen Ross	562	Portion 1
	Annex Glen Ross	562	Portion 7
	Annex Glen Ross	562	Portion 6
	Annex Glen Ross	562	Portion 4
	Annex Glen Ross	562	Portion 5
	Annex Glen Ross	562	Portion 8
	Annex Glen Ross	562	Portion 10
	Annex Glen Ross	562	Portion 2
	Annex Glen Ross	562	Portion 3
	Harmonie	579	Remaining Extent
	Harmonie	579	Portion 1
	Leeuwbult	580	Remaining Extent
	Middelplaas	583	Remaining Extent
	Digito	642	Remaining Extent
	Lekkerlewe	643	Remaining Extent
	Hakkies	695	Portion 17
	Hakkies	695	Portion 1
	Hakkies	695	Portion
	Hakkies	695	Portion 14
	Stille Woning	703	Remaining Extent
	Glen Ross	734	Portion 20
	Glen Ross	734	Portion 17
	Glen Ross	734	Portion 18
	Glen Ross	734	Portion 19
	Glen Ross	734	Portion 22
	Glen Ross	734	Portion 23
	Glen Ross	734	Remaining Extent
	Glen Ross	734	Portion 21
	Glen Ross	734	Portion 7
	Glen Ross	734	Portion 8
	Glen Ross	734	Portion 9
	Glen Ross	734	Portion 10
	Glen Ross	734	Portion 11
	Glen Ross	734	Portion 12
	Glen Ross	734	Portion 13
	Glen Ross	734	Portion 15
	Glen Ross	734	Portion 16
	Glen Ross	734	Portion 14
	Glen Ross	734	Portion 5
	Glen Ross	734	Portion 6
	De Dam	27	Remaining Extent
	Wintershoek Zuid	28	Remaining Extent
	Wintershoek Zuid	28	Portion 1
	Wintershoek Zuid	28	Portion 2
	Wintershoek Zuid	28	Portion 3
	Wintershoek Zuid	28	Portion 4
	Wintershoek Zuid	28	Portion 5

	Steenbokspruit	148	Farm
	Palmietfontein	229	Remaining Extent
	Doornrivier	330	Remainder of Portion 3 (Spes Bona)
	Welgelegen	382	Portion 1
	Welgelegen	382	Remaining Extent of Portion 2 (De Rust)
	Welgelegen	382	Remaining Extent of Portion 4 (Bloemhoek)
	Welgelegen	382	Remaining Extent of Portion 5 (Spoordraai)
	Welgelegen	382	Remaining Extent of Portion 6 (Euodla)
	Welgelegen	382	Remaining Extent of Portion 10
	Welgelegen	382	Remaining Extent of Portion 11
	Welgelegen	382	Portion 12 (Optavit)
	Welgelegen	382	Portion 20
	Welgelegen	382	Remaining Extent of Portion 22
	Welgelegen	382	Remaining Extent of Portion 24 (Moedersgift)
	Welgelegen	382	Portion 27
	Welgelegen	382	Portion 28
	Welgelegen	382	Portion 29
	Pedamar	402	Remaining Extent
	Weltevreden	443	Portion of Remaining Extent
	Weltevreden	443	Portion 1
	Weltevreden	443	Portion 2
	Weltevreden	443	Portion 9
	Weltevreden	443	Portion 14
	Chirstiana	452	Remaining Extent
	Bloemhoek	509	Remaining Extent
	Bloemhoek	509	Remainder of Portion 1 (Elm)
	Bloemhoek	509	Remainder of Portion 2
	Bloemhoek	509	Portion 3
	Bloemhoek	509	Portion 4
	Bloemhoek	509	Portion 5
	Bloemhoek	509	Portion 6
	Florida	633	Portion 1
	Florida	633	Portion 4
	Hakkies	695	Remaining Extent of Portion 2 (Kondowa)
	Hakkies	695	Remaining Extent of Portion 3 (Engela)
	Hakkies	695	Remaining Extent of Portion 5
	Hakkies	695	Portion 6
	Hakkies	695	Portion 7
	Hakkies	695	Portion 8
	Kriegers Kraal	708	Remaining Extent
	Kriegers Kraal	708	Portion 1
	Le Roux	717	Portion 1
	Glen Ross	734	Portion of Remaining Extent
	Glen Ross	734	Portion 1
	Glen Ross	734	Portion 2
	Glen Ross	734	Portion 3
	Glen Ross	734	Portion 4
	Glen Ross	734	Portion of Portion 5
	Glen Ross	734	Portion of Portion 23
	Glen Ross	734	Portion 24
	Glen Ross	734	Portion 25
	Hakkies	742	Portion of Remaining Extent
	Hakkies	742	Portion of Portion 1
	Le Roux	766	Portion of Remaining Extent
	Le Roux	766	Remaining Extent of Portion 1
	Le Roux	766	Portion 2
	Biddulph	329	Farm
	Stilte	138	Remainder

	Stilte	138	Portion 1
	Stilte	138	Portion 6
	Stilte	138	Portion 7
	Stilte	138	Portion 8
	Stilte	138	Portion 9
	Stilte	138	Portion10
	Stilte	138	Portion 11
	Stilte	138	Portion 14
	Stilte	138	Portion 15
	Stilte	138	Portion 18
	Stilte	138	Portion 19
	Stilte	138	Portion 22
	Stilte	138	Portion 25
	Stilte	138	Portion 28
	Stilte	138	Portion 29
	Dora	287	Remainder
	Mooiuitzig	352	Portion of Remainder
	Mooiuitzig	352	Portion 1
	Schoonheid	540	Portion of Remainder
	Kaallaagte	562	Portion of Remainder

Refer to Figure 3-4 for the Sketch Plan as prescribed by Regulation 2(2) of the Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002).

Application area (ha)	Approximately 27 249 ha
Magisterial district	Situated Free State Magisterial District of Ventersburg, Theunissen and Winburg.
Distance and direction from nearest town	Approximately 15–20 km south of Virginia, about 25–30 km southeast of Welkom, 20–25 km east of Hennenman, 25–30 km northeast of Theunissen, 40–45 km north of Winburg, 60–65 km northeast of Brandfort, 35–40 km southeast of Odendaalsrus, and roughly 45–50 km southwest of Ventersburg.

21. digit Surveyor General Code for each farm portion

Farm Name	Farm No.	Portion	SG Codes
Mond van Doornrivier	38	Remaining Extent	F03300000000003800000
Mond van Doornrivier	38	Portion 2	F03300000000003800002
Leeuwfonteinswerft	51	Remaining Extent	F03300000000005100000
Leeuwbult	52	Remaining Extent	F03300000000005200000
Welgelegen	64	Remaining Extent	F03300000000006400000
Yatala	73	Remaining Extent	F03500000000007300000
Annex Welgelegen	76	Remaining Extent	F03300000000007600000
Leeuwvlei	115	Portion 1	F03300000000011500001
Leeuwvlei	115	Remaining Extent	F03300000000011500003
Goedemoed	143	Remaining Extent	F03300000000014300000
Goedemoed	143	Portion 3	F03300000000014300003
Excelsior	147	RE/Portion 1	F03300000000014700001
Excelsior	147	Remaining Extent	F03300000000014700000
Lekkerlewe	166	Portion 1	F03300000000016600000
Leeuwaarden	171	Remaining Extent	F03300000000017100000
Leeuwaarden	171	Portion 1	F03300000000017100001
Schoolsite	178	Remaining Extent	F03300000000017800000
Mooivlakte	199	Portion 1	F03300000000019900001
Mooivlakte	199	Portion 3	F03300000000019900003
Mooivlakte	199	Remaining Extent	F03300000000019900000
Rondehoek	200	Portion 3	F03300000000020000003
Rondehoek	200	Portion 1	F03300000000020000001
Rondehoek	200	Remaining Extent	F03300000000020000000
Annex Mooivlakte	208	Remaining Extent	F03300000000020800000
Kalkoenkrans	225	Portion 15	F03300000000022500015
Kalkoenkrans	225	Portion RE\8	F03300000000022500008
Kalkoenkrans	225	Portion 9	F03300000000022500009
Kalkoenkrans	225	Portion 10	F03300000000022500010
Kalkoenkrans	225	Portion 11	F03300000000022500011

Kalkoenkrans	225	Portion 12	F03300000000022500012
Kalkoenkrans	225	Portion 13	F03300000000022500013
Kalkoenkrans	225	Portion 14	F03300000000022500014
Kalkoenkrans	225	Portion 3	F03300000000022500003
Grusde	229	Remaining Extent	F03300000000022900000
Kovno	235	Remaining Extent	F03300000000023500000
Doorndeel	236	Remaining Extent	F03300000000023600000
Doorndeel	236	Portion 1	F03300000000023600001
Doornriver	330	Portion 1	F03300000000033000001
Doornriver	330	Portion 2	F03300000000033000002
Doornriver	330	Remaining Extent	F03300000000033000000
Doornriver	330	Portion 18	F03300000000033000018
Doornriver	330	Portion 17	F03300000000033000017
Doornriver	330	Portion 16	F03300000000033000016
Doornriver	330	Portion 15	F03300000000033000015
Doornriver	330	Portion 14	F03300000000033000014
Doornriver	330	Portion 19	F03300000000033000019
Doornriver	330	Portion 5	F03300000000033000005
Doornriver	330	Portion 10	F03300000000033000010
Doornriver	330	Portion 20	F03300000000033000020
Doornriver	330	Portion 11	F03300000000033000011
Doornriver	330	Portion 6	F03300000000033000006
Doornriver	330	Portion 7	F03300000000033000007
Doornriver	330	Portion 21	F03300000000033000021
Doornriver	330	Portion 11	F03300000000033000011
Doornriver	330	Portion 23	F03300000000033000023
Vlakpan	358	Portion 1	F03300000000035800001
Vlakpan	358	Portion 3	F03300000000035800003
Vlakpan	358	Portion 2	F03300000000035800002
Vlakpan	358	Remaining Extent	F03300000000035800000
Welgelegen	382	Portion 26	F03300000000038200026
Welgelegen	382	Portion 21	F03300000000038200021
Welgelegen	382	Remaining Extent	F03300000000038200000
Monstari	398	Portion 1	F03300000000039800001
Dicier	404	Portion 1	F03300000000040400001
Weltevreden	443	Portion 9	F03300000000044300009
Weltevreden	443	Portion 2	F03300000000044300002
Weltevreden	443	Portion 14	F03300000000044300014
Annex grusde	474	Remaining Extent	F03300000000047400000
Annex Glen Ross	562	Remaining Extent	F03300000000056200000
Annex Glen Ross	562	Portion 1	F03300000000056200001
Annex Glen Ross	562	Portion 7	F03300000000056200007
Annex Glen Ross	562	Portion 6	F03300000000056200006
Annex Glen Ross	562	Portion 4	F03300000000056200004
Annex Glen Ross	562	Portion 5	F03300000000056200005
Annex Glen Ross	562	Portion 8	F03300000000056200008
Annex Glen Ross	562	Portion 10	F03300000000056200010
Annex Glen Ross	562	Portion 2	F03300000000056200002
Annex Glen Ross	562	Portion 3	F03300000000056200003
Harmonie	579	Remaining Extent	F03300000000057900000
Harmonie	579	Portion 1	F03300000000057900001
Leeuwbult	580	Remaining Extent	F03300000000058000000
Middelplaas	583	Remaining Extent	F03300000000058300000
Digito	642	Remaining Extent	F03300000000064200000
Lekkerlewe	643	Remaining Extent	F03300000000064300000
Hakkies	695	Portion 17	F03500000000069500017
Hakkies	695	Portion 1	F03500000000069500001
Hakkies	695	Portion	F03500000000069500004
Hakkies	695	Portion 14	F03500000000069500014
Stille Woning	703	Remaining Extent	F03500000000070300000
Glen Ross	734	Portion 20	F03300000000073400020
Glen Ross	734	Portion 17	F03500000000073400017

	Glen Ross	734	Portion 18	F03500000000073400018
	Glen Ross	734	Portion 19	F03500000000073400019
	Glen Ross	734	Portion 22	F03500000000073400022
	Glen Ross	734	Portion 23	F03500000000073400023
	Glen Ross	734	Remaining Extent	F03500000000073400000
	Glen Ross	734	Portion 21	F03500000000073400021
	Glen Ross	734	Portion 7	F03500000000073400007
	Glen Ross	734	Portion 8	F03500000000073400008
	Glen Ross	734	Portion 9	F03500000000073400009
	Glen Ross	734	Portion 10	F03500000000073400010
	Glen Ross	734	Portion 11	F03500000000073400011
	Glen Ross	734	Portion 12	F03500000000073400012
	Glen Ross	734	Portion 13	F03500000000073400013
	Glen Ross	734	Portion 15	F03500000000073400015
	Glen Ross	734	Portion 16	F03500000000073400016
	Glen Ross	734	Portion 14	F03500000000073400014
	Glen Ross	734	Portion 5	F03500000000073400005
	Glen Ross	734	Portion 6	F03500000000073400006
	De Dam	27	Remaining Extent	F03500000000002700000
	Wintershoek Zuid	28	Remaining Extent	F03500000000002800000
	Wintershoek Zuid	28	Portion 1	F03500000000002800001
	Wintershoek Zuid	28	Portion 2	F03500000000002800002
	Wintershoek Zuid	28	Portion 3	F03500000000002800003
	Wintershoek Zuid	28	Portion 4	F03500000000002800004
	Wintershoek Zuid	28	Portion 5	F03500000000002800005
	Steenbokspruit	148	Farm	F03500000000014800000
	Palmietfontein	229	Remaining Extent	F04200000000022900000
	Doornrivier	330	Remainder of Portion 3 (Spes Bona)	F03300000000033000003
	Welgelegen	382	Portion 1	F03300000000038200001
	Welgelegen	382	Remaining Extent of Portion 2 (De Rust)	F03300000000038200002
	Welgelegen	382	Remaining Extent of Portion 4 (Bloemhoek)	F03300000000038200004
	Welgelegen	382	Remaining Extent of Portion 5 (Spoordraai)	F03300000000038200005
	Welgelegen	382	Remaining Extent of Portion 6 (Euodla)	F03300000000038200006
	Welgelegen	382	Remaining Extent of Portion 10	F03300000000038200010
	Welgelegen	382	Remaining Extent of Portion 11	F03300000000038200011
	Welgelegen	382	Portion 12 (Optavit)	F03300000000038200012
	Welgelegen	382	Portion 20	F03300000000038200020
	Welgelegen	382	Remaining Extent of Portion 22	F03300000000038200022
	Welgelegen	382	Remaining Extent of Portion 24 (Moedersgift)	F03300000000038200024
	Welgelegen	382	Portion 27	F03300000000038200027
	Welgelegen	382	Portion 28	F03300000000038200028
	Welgelegen	382	Portion 29	F03300000000038200029
	Pedamar	402	Remaining Extent	Not found
	Weltevreden	443	Portion of Remaining Extent	F03300000000044300014
	Weltevreden	443	Portion 1	F03300000000044300014
	Weltevreden	443	Portion of Portion 2	F03300000000044300002
	Weltevreden	443	Portion of Portion 9	F03300000000044300009
	Chirstiana	452	Remaining Extent	F03500000000045200000
	Bloemhoek	509	Remaining Extent	F03300000000050900000

Bloemhoek	509	Remainder of Portion 1 (Elm)	F03300000000050900001
Bloemhoek	509	Remainder of Portion 2	F03300000000050900002
Bloemhoek	509	Portion 3	F03300000000050900003
Bloemhoek	509	Portion 4	F03300000000050900004
Bloemhoek	509	Portion 5	F03300000000050900005
Bloemhoek	509	Portion 6	F03300000000050900006
Florida	633	Portion 1	F03500000000063300001
Florida	633	Portion 4	F03500000000063300004
Hakkies	695	Remaining Extent of Portion 2 (Kondowa)	F03500000000069500002
Hakkies	695	Remaining Extent of Portion 3 (Engela)	F03300000000069500003
Hakkies	695	Remaining Extent of Portion 5	F03300000000069500005
Hakkies	695	Portion 6	F03300000000069500006
Hakkies	695	Portion 7	F03300000000069500007
Hakkies	695	Portion 8	F03300000000069500008
Kriegers Kraal	708	Remaining Extent	F03500000000070800000
Kriegers Kraal	708	Portion 1	F03500000000070800001
Le Roux	717	Portion 1	F03500000000071700001
Glen Ross	734	Portion of Remaining Extent	F03500000000073400000
Glen Ross	734	Portion 1	F03500000000073400001
Glen Ross	734	Portion 2	F03500000000073400002
Glen Ross	734	Portion 3	F03500000000073400003
Glen Ross	734	Portion 4	F03500000000073400004
Glen Ross	734	Portion of Portion 5	F03500000000073400005
Glen Ross	734	Portion of Portion 23	F03500000000073400023
Glen Ross	734	Portion 24	F03500000000073400024
Glen Ross	734	Portion 25	F03500000000073400025
Hakkies	742	Portion of Remaining Extent	F03300000000074200000
Hakkies	742	Portion of Portion 1	F03500000000074200001
Le Roux	766	Portion of Remaining Extent	F03500000000076600000
Le Roux	766	Remaining Extent of Portion 1	F03500000000076600001
Le Roux	766	Portion 2	F03500000000076600002
Biddulph	329	Farm	F03500000000032900000
Stilte	138	Remainder	F03500000000013800000
Stilte	138	Portion 1	F03500000000013800001
Stilte	138	Portion 6	F03500000000013800006
Stilte	138	Portion 7	F03500000000013800007
Stilte	138	Portion 8	F03500000000013800008
Stilte	138	Portion 9	F03500000000013800009
Stilte	138	Portion10	F03500000000013800010
Stilte	138	Portion 11	F03500000000013800011
Stilte	138	Portion 14	F03500000000013800014
Stilte	138	Portion 15	F03500000000013800015
Stilte	138	Portion 18	F03500000000013800018
Stilte	138	Portion 19	F03500000000013800019
Stilte	138	Portion 22	F03500000000013800022
Stilte	138	Portion 25	F03500000000013800025
Stilte	138	Portion 28	F03500000000013800028
Stilte	138	Portion 29	F03500000000013800029
Dora	287	Remainder	F03500000000028700000
Mooiuitzig	352	Portion of Remainder	F03500000000035200000
Mooiuitzig	352	Portion 1	F03500000000035200001

	Schoonheid	540	Portion of Remainder	F03500000000054000000
	Kaallaagte	562	Portion of Remainder	F03500000000056200000

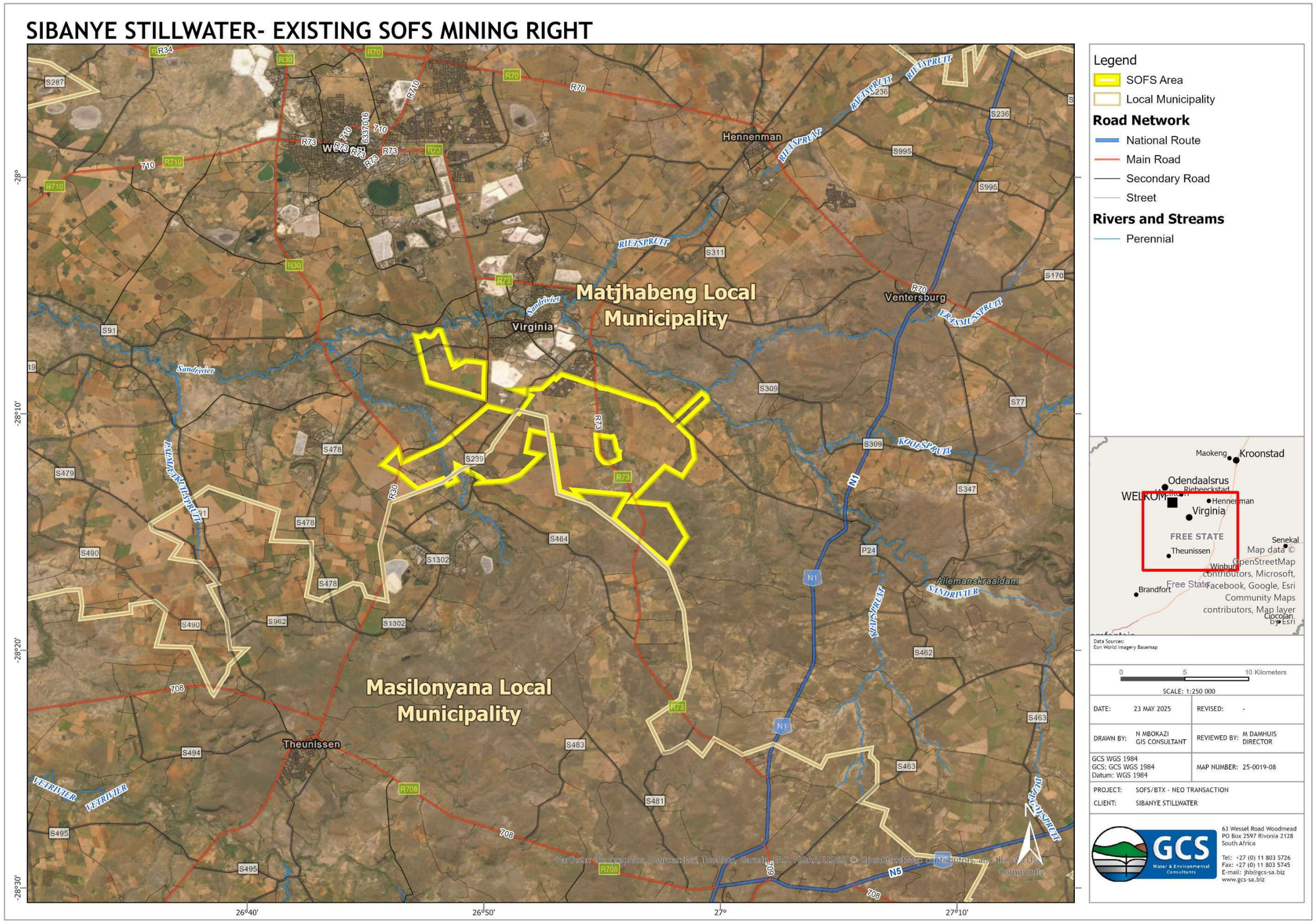


Figure 3-1: Regional Locality of the Existing Southern Free State (SOFS) Mining Right FS 10005 MR

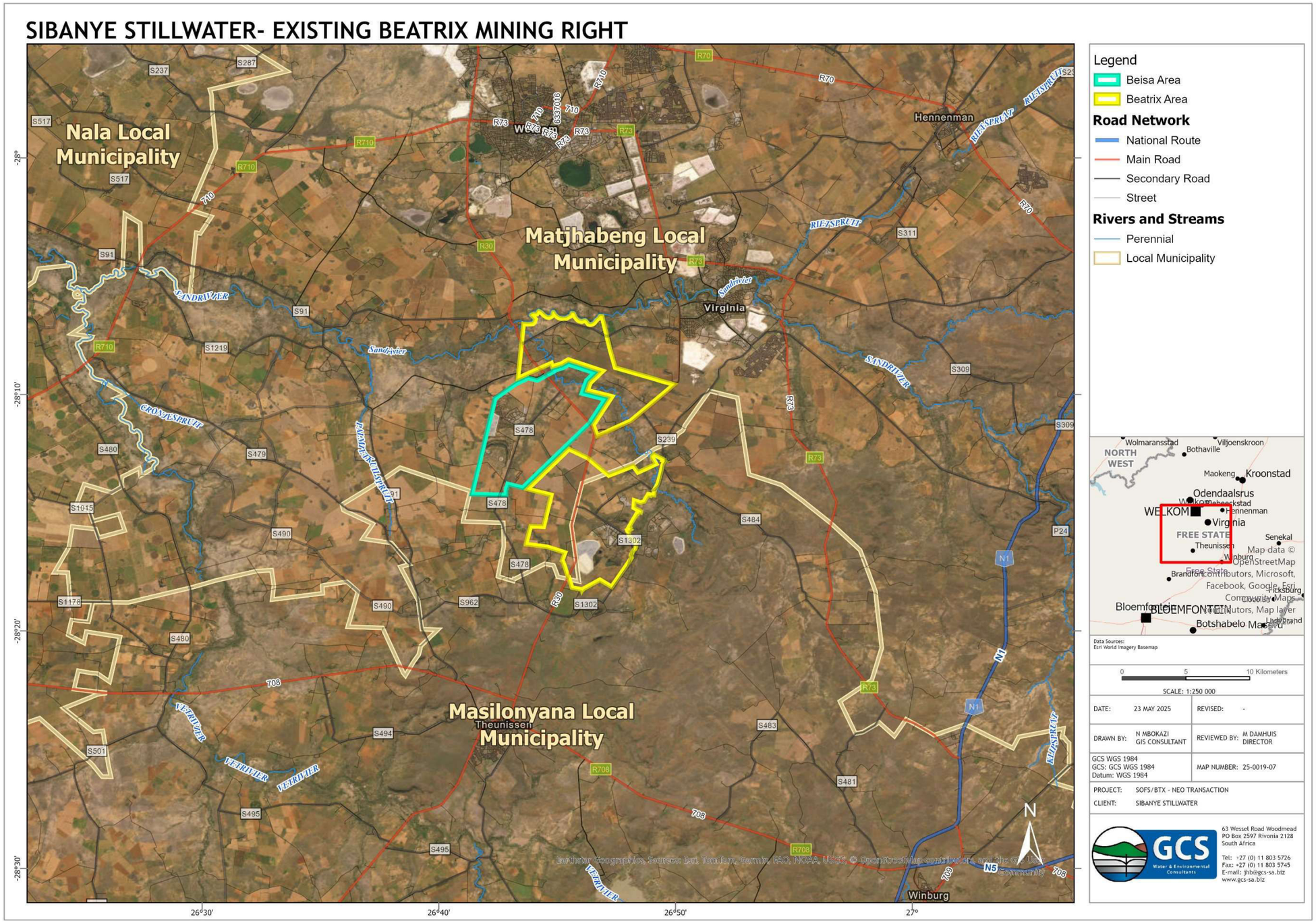


Figure 3-2: Regional Locality of the Existing Beatrix Mining Right (Beisa and Beatrix Areas) (FS 10047 MR (FS 081 MR))

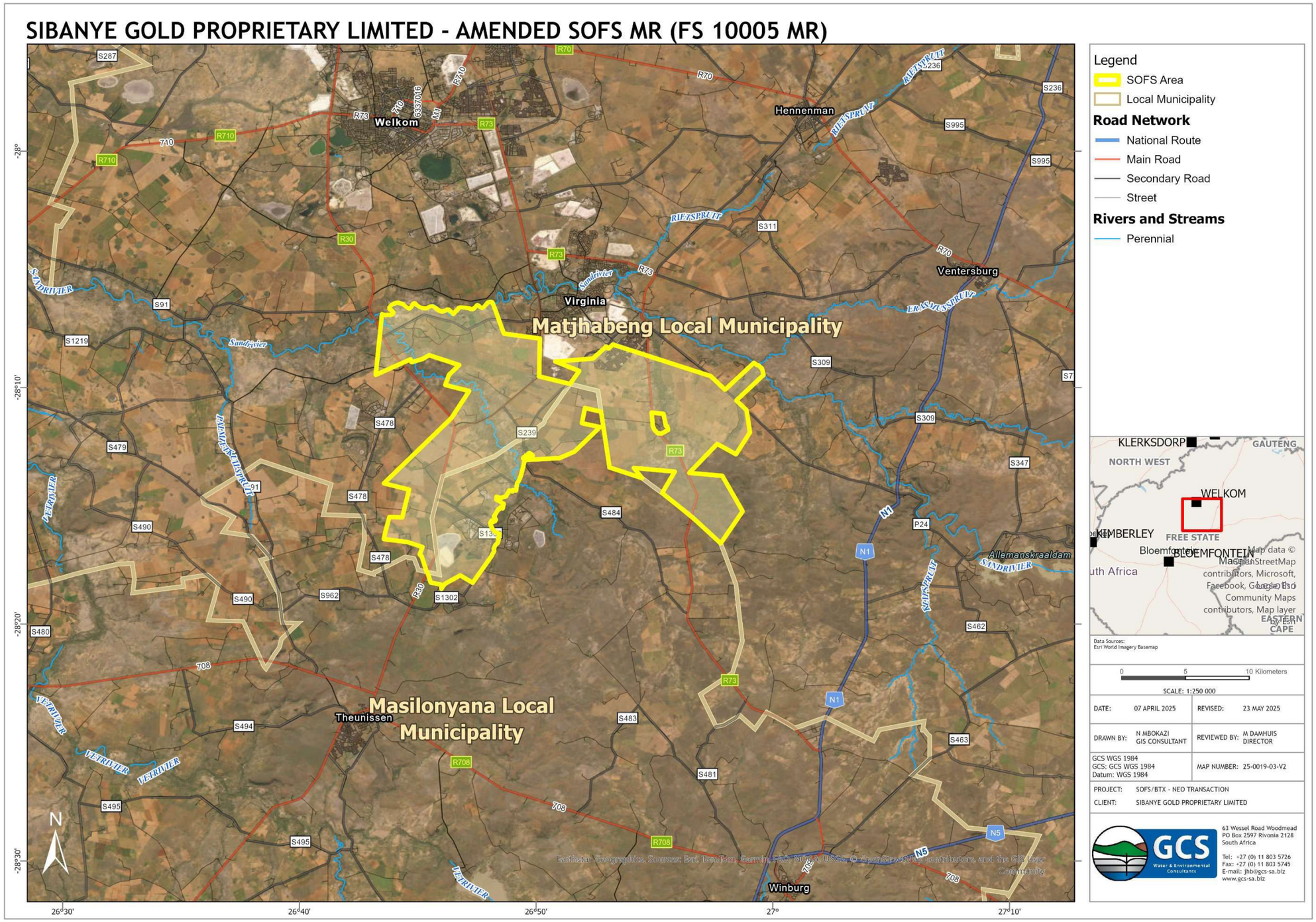


Figure 3-3: Regional Locality of the Future Southern Free State (SOFS) Mining Right FS 10005 MR

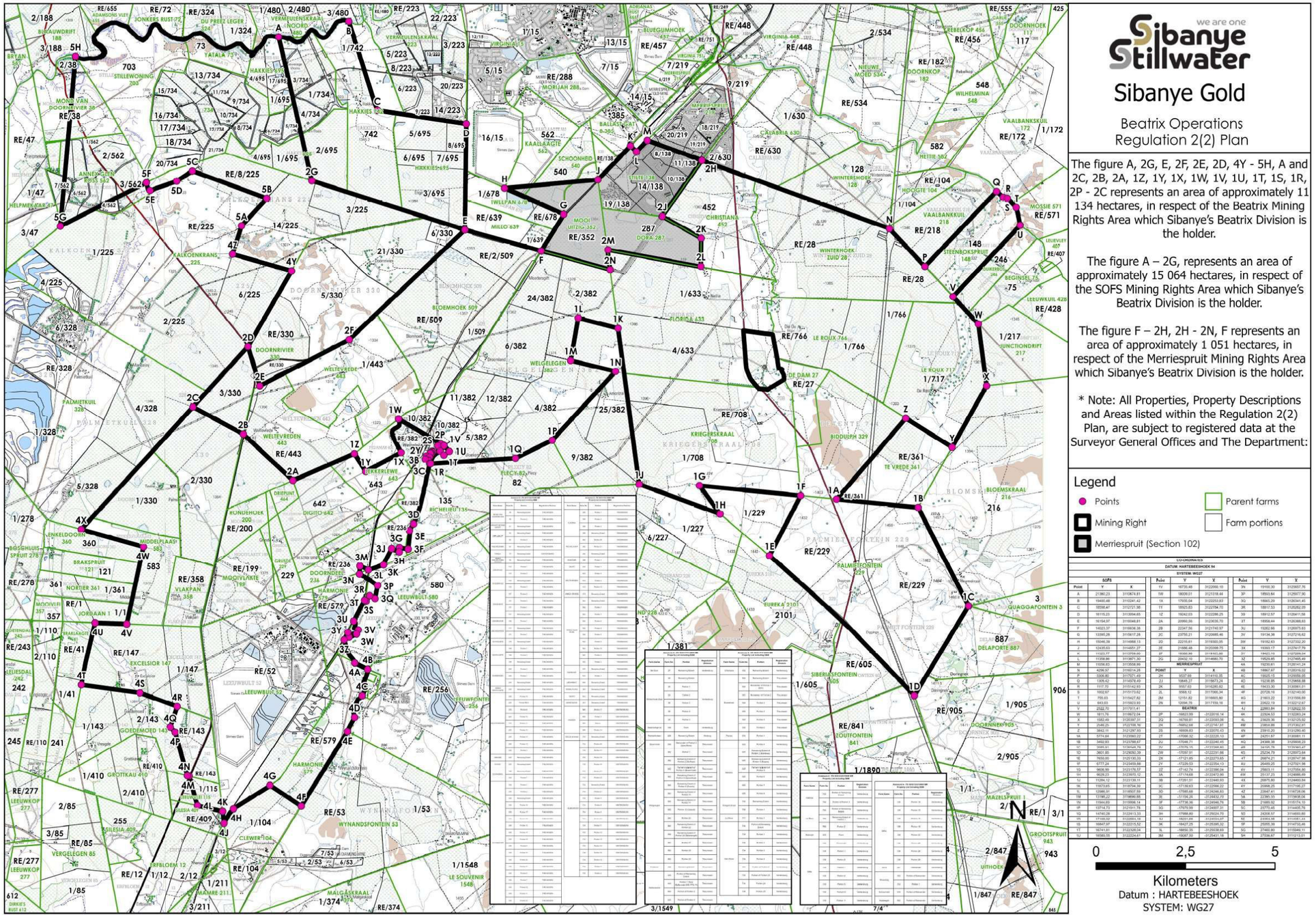


Figure 3-4: Farm Portions that comprise of the Future Southern Free State (SOFS) Mining Right FS 10005 MR

4 DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY

4.1 Existing Authorisations

The table below summarises the existing environmental and operational authorisations applicable to the SOFS MR (FS 10005 MR) and the Beatrix MR (FS 10047 MR (FS 081 MR)).

Table 4-1: Summary of Existing Authorisations Applicable to the Beatrix Mining Right and Southern Free State Mining Right

Beatrix MR (FS 10047 MR / FS 081 MR)	Southern Free State (SOFS) MR (FS 10005 MR)
Mining Right: Beatrix MR (FS 10047 MR / FS 081 MR).	Mining Right: SOFS MR (FS 10005 MR).
	Environmental Authorisation: DEA/EIA/00001449/2012 and 14/12/16/3/3/3/58 – Issued 4 July 2014. First Amendment: FS 30/5/1/2/2 (10005) EM – Issued 13 November 2024.
Water Use Licence (WUL): 08/C42K/AEFJG/8739 – Issued 31 October 2018; amended in 2021.	
Atmospheric Emissions Licence (AEL): LDM/AEL/LRC/004 – Issued 5 November 2018.	
Waste Permit (Oryx): 16/2/7/C404/C6/Z1/P328 – Issued 21 August 2000.	
Waste Permit: 16/2/7/C404/C4/Z1/P89 – Issued 7 June 2005.	
Waste Management Licence (WML): FS 30/5/1/2/3/2/1/81 EM – Issued 5 June 2018.	

4.2 Required Authorisations

In terms of the NEMA, read together with the EIA Regulations, 2014, an EA is required for the following listed activity:

- GN R 983 (Listing Notice 1), Activity 21D: Any activity including the operation of that activity which requires an amendment or variation to a right or permit in terms of Section 102 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity contained in this Listing Notice or in Listing Notice 3 of 2014, required for such amendment.

As such, a BA process must be undertaken in accordance with the procedures set out in the EIA Regulations, 2014.

4.3 Listed and Specified Activities

Table 4-2 below provides details of the listed activity that forms the basis of this application for authorisation.

Table 4-2: Listed Activity to be Authorised under the National Environmental Management Act, 1998

Name of Activity	Aerial Extent of Activity (hectares (ha) or square metres (m^2))	Listed Activity	Applicable Listing Notice	Listed Activity Description as per Regulations / Notice
An amendment is required to the Mining Right FS	Approximately 5914.10 ha	Activity 21 D	Listing Notice 1 (GN R 983)	Any activity including the operation of that activity which requires an amendment

Name of Activity	Aerial Extent of Activity (hectares (ha) or square metres (m^2))	Listed Activity	Applicable Listing Notice	Listed Activity Description as per Regulations / Notice
10047 MR (FS 081 MR)				or variation to a right or permit in terms of Section 102 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity contained in this Listing Notice or in Listing Notice 3 of 2014, required for such amendment.

5 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

5.1 Existing Operations Beatrix Mine (1, 2, 3 Shaft and Associated Infrastructure)

Beatrix Mine is a shallow to intermediate-level underground gold operation that has been producing gold since 1983 in the southern portion of the Free State Goldfield. Mining activities at Beatrix Mine include the processing of material from Beatrix No. 1 Shaft, Beatrix No. 3 Shaft, and the Beatrix metallurgical gold plant. Beatrix No. 2 Shaft has been decommissioned, and no plant is associated with it. Material from Beatrix No. 1 and No. 3 Shafts is transported via conveyor to the ore storage silos at Beatrix Mine for processing.

5.1.1 Extent of Activities

Beatrix Mine consists of two main operational areas, namely:

- Beatrix Operations (comprising Beatrix No. 1, No. 2 and No. 3 Shafts), as depicted in Figure 5-1.
- The Wolvepan / Rietpan Evaporation Dam System, which is not currently in use by Beatrix Mine, as depicted in Figure 5-2.

5.1.2 Key Activity-Related Processes and Products

5.1.2.1 Mine Products

The products of economic interest at Beatrix Mine are primarily gold mineralisation and associated by-products, including silver and osmiridium.

5.1.2.2 Mineral Deposit

The gross structure of Beatrix Mine has been imaged through a three-dimensional seismic survey, and numerous underground boreholes have been drilled to delineate the structure and sample the reefs. Gold exploitation at Beatrix Mine takes place within the Beatrix Reef (BR), which occurs on an unconformity surface preserved beneath the Eldorado Formation.

5.1.2.3 Mineral Deposits at Beatrix

The BR is largely undeformed, except along the western periphery of the No. 1 Shaft area, close to

the Stuurmanspan Fault. In this area, numerous closely spaced, northerly trending normal faults divide the reef into a discontinuous set of narrow, north-trending strips. Generally, the reef dips shallowly to the north and northeast at angles between 4° and 5° but steepens to approximately 9° toward the northern portion of the mine property.

Mineralisation within the BR occurs at depths ranging from 500 metres (m) below surface to approximately 2 100 m in the deepest parts of the MR area.

5.1.2.4 Mining Method

Both pneumatic (compressed air) and hydropower energy systems are used during mining operations at Beatrix Mine. The mining methods practised include:

- Scattered stoping by means of drilling, blasting, and digging at depths of 540 m to 1 200 m below surface.
- On-reef raise development of between 200 m and 500 m between levels.
- Conventional breast mining.

5.1.3 Mineral / Ore Processing

The ore processing and gold recovery processes at Beatrix Mine consist primarily of the following:

- Ore sorting.
- Crushing and grinding.
- Classification and concentration.
- Thickening.
- Cyanidation / leaching.
- Filtration / washing / solvent extraction.
- Precipitation and smelting.

Apart from the final product drying stage, all recovery processes require water use.

5.1.4 Mineral Processing at Beatrix

The Beatrix metallurgical gold plant is located between Beatrix No. 1 and No. 2 Shafts. The ore storage silos can hold approximately 18 000 tonnes of dry ore. The plant is equipped with four Run-of-Mine (ROM) mills, each with an installed capacity of 3 megawatts (MW). The downstream process is matched to the milling capacity of 260 000 tonnes per month and includes three 60 m diameter thickeners and twelve mechanically agitated carbon-in-leach (CIL) tanks with a combined volume of 18 000 cubic metres (m^3).

The elution circuit is designed to elute 20 tonnes of carbon per day, using steam generated by the main boilers as a heat source. Carbon regeneration is performed in one of two rotary kilns. Bulk reagent storage facilities within the plant include dry lime, sodium cyanide solution, caustic soda

solution, hydrochloric acid, and liquid oxygen.

The metallurgical plant receives ore from Beatrix No. 1 and No. 3 Shafts, which is transported via conveyors to the ore storage silos. From the silos, ore is conveyed to three mill feed silos. Spillages from conveyor head and tail ends are contained within bunded areas.

Ore is milled to 75% minus 74 microns in three semi-autogenous grinding mills operating in closed circuit with hydrocyclones. The pulp is thickened to reduce the water-to-solids ratio and to recover process water for reuse in the milling circuit. Lime is added to maintain protective alkalinity. Spillages within the milling area are contained and recycled back into the mills. Underground water is used as make-up water in the circuit.

A CIL process is used to recover gold. Gold is dissolved using cyanide (supplied as calcium cyanide) and then absorbed onto activated carbon. The gold is eluted from the carbon using a 2.5% sodium hydroxide solution at 130°C and recovered by electrowinning. The eluted carbon is regenerated in a rotary kiln and treated with 5% hydrochloric acid to remove calcium build-up. Spillages in this section are contained within bunded areas. No raw materials are transported from the plant, and gold bullion is airlifted to the Rand Refinery.

5.1.5 Residue Disposal

The tailings residue is pumped via plastic and steel columns to the tailings storage facility (TSF) complex for disposal. The Beatrix TSF complex consists of TSF 1 and TSF 2, with material currently only deposited into TSF 2. All TSFs are managed in accordance with operational controls, including rate of rise, freeboard levels, piezometer levels, and drainage systems/paddocks, to ensure compliance with applicable legislation.

Historically, waste rock material was disposed of onto several waste rock dumps (WRDs) situated at Beatrix. Currently, no disposal occurs at the WRDs, as several have been remined. All material entering the processing plant is therefore disposed of at the active Beatrix No. 2 TSF.

Seepage from the TSF complexes and WRDs is collected in cut-off trenches and toe paddocks and directed to the Beatrix Return Water Dam (RWD), where contaminated water is reused in processing. Excess process water and low-quality fissure water not reused are disposed of at the Beatrix Evaporation Dam System. Historically, excess water was also disposed of at the Wolvepan / Rietpan Evaporation Dam System; however, mine personnel have confirmed that this practice has ceased. Any excess water intercepted on route to the Wolvepan / Rietpan system is now managed by Harmony Gold.

5.1.6 Activity Life Description

Beatrix Mine is expected to remain operational beyond 2025, depending on future economic conditions, gold prices, and cost projections.

5.1.7 Activity Infrastructure Description

5.1.7.1 Surface Infrastructure

No new infrastructure is planned, required, or under construction at the mine. The following major surface infrastructure components are associated with Beatrix Mine:

- Metallurgical Plant: One metallurgical gold plant processes all material mined at Beatrix.
- Power Supply: Electricity is supplied by Eskom Free State Region. The main power line extends from the northwestern boundary of the mine to the substation at Beatrix No. 1 Shaft, then to the substation at Beatrix No. 2 Shaft. The Grootvlei–Nestor–Perseus line supplies Beatrix No. 3 Shaft.
- Railways: The Johannesburg–Bloemfontein Spoornet line extends along the eastern boundary of the property. A narrow-gauge internal railway network connects the shafts to the mine stores, workshops, and explosive magazines.
- Roads: Access to mine infrastructure (offices, plants, shafts, workshops, substations, stores, and yards) is via internal tarred and public roads. A network of gravel and sand roads provides access to boreholes, monitoring points, evaporation dams, WRDs, and TSFs.
- Water Supply: Potable and process water are supplied by Vaal Central Water from Balkfontein, using filtration, settling, and chlorination of water from the Vaal River. The supply line extends from the northwest boundary of Beatrix Mine towards Joel Mine in the east, and to the Leeubult Reservoirs in the south.
- Solid Waste Disposal: Industrial and domestic waste is disposed of onto a permitted facility, behind a WRD for wind protection. These sites lie within the mine's effluent management system. Daily disposal occurs in designated areas, and waste is covered weekly with soil, clay, waste rock, or boiler ash.
- Wastewater Treatment Works (WWTW): One Class C Department of Water and Sanitation (DWS)-registered WWTW is located on the northeastern boundary of the mine property. Effluent is treated to comply with DWS standards before being discharged into the Theronspruit.
- WRDs: Three WRDs (Nos. 1, 2, and 3) are associated with Beatrix. As noted, no disposal currently occurs, and the dumps are dormant. Several WRDs have been remined, while others are earmarked for future remining.
- Stormwater Management: Stormwater diversion measures (trenches, berms, and toe paddocks) are implemented at all operational areas to separate clean and dirty water. The "Titanic" Diversion and Interception System intercepts subsurface seepage from the TSF complex and evaporation dams, returning contaminated water to the evaporation system.
- Workshops and Administration Buildings: Workshops, administrative offices, medical

stations, hostels, mine stores, timber yards, and salvage yards are located near the shaft areas.

5.1.7.2 Housing, Recreation, and Other Facilities

Unskilled and semi-skilled employees are accommodated in hostels on the mine property, each with kitchen and dining facilities. Skilled employees reside in Welkom, Virginia, Theunissen, Meloding, and Masilo. Recreational facilities available to employees include soccer fields, rugby fields, boxing, cycling, athletics, and mine-provided transport for sporting events. Additional facilities include a supermarket, taxi rank, covered parking, flats, braai areas, and playgrounds.

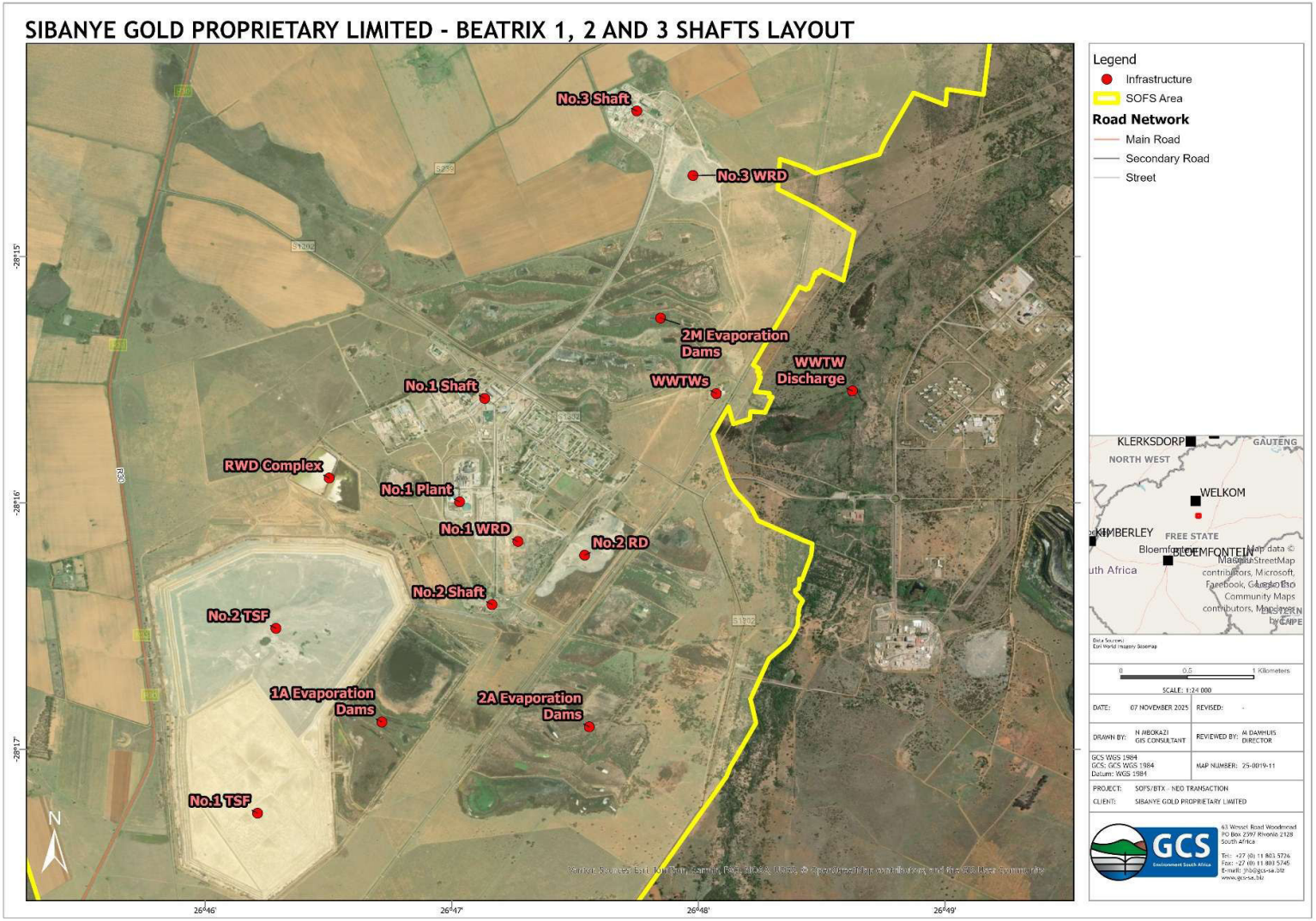


Figure 5-1: Layout map of Beatrix Mine (1, 2, 3 Shaft and Associated Infrastructure)



Figure 5-2: Layout map of the Wolvepan / Rietpan Evaporation Dam

5.2 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

Phase 1 SOFS Mining Operation, known as the De Bron Merriespruit (DBM) Project, represents the first stage of a long term underground gold mining development.

5.2.1 Mining Approach, Method, and Schedule

The DBM Project is designed as a deep-level underground gold mine, with the ore body occurring at depths starting at approximately 480 m below surface. Mining will target multiple Witwatersrand-type conglomerate reef horizons, including the Leader, Beatrix, and Kalkoenkrans reefs.

The preferred mining method is conventional narrow-reef breast stoping, a labour-intensive but proven method used extensively across South Africa's goldfields. Stoping will proceed on strike with the ore body, supported by carefully planned pillars and gully systems to ensure stability. The ore will be accessed via a combination of vertical shaft and trackless decline systems, designed to provide safe, efficient transport of men, materials, and ore.

Support infrastructure below ground will comprise trackless footwall development situated beneath the Leader Reef, which will accommodate vehicle haulage, service installations, and ventilation lines. Although the use of trackless footwall development is less common in narrow-reef gold operations, it provides significant operational advantages in terms of flexibility, reduced development time, and improved ventilation and access.

The overall mine design life is estimated at 19 years, based on current resource models and extraction plans. Initial shaft sinking and underground development will take approximately 47 months, after which production will ramp up to steady-state output. Decline and footwall development will advance at approximately 90 m per month, while on-reef and stope development will proceed at around 30 m per month. Mining panels will generally be about 30 m in length, with a controlled dilution allowance of 0.2 m to ensure consistent ore grade control.

5.2.2 Surface Infrastructure

The surface infrastructure of the DBM Project has been designed to provide all essential facilities for mining, administration, ore processing, and support services. The layout (see Figure 5-3 and Figure 5-4) ensures safe separation between clean and dirty water systems, optimised logistics flow, and provision for progressive rehabilitation at closure. Infrastructure allowed for includes:

- Water Systems:
    - Municipal supply connection (initial phase).
    - Bulk water supply and storage (three 2.4 Ml galvanised tanks).
    - Surface water reticulation network.
    - Underground service-water and dewatering systems.
    - Dirty water containment, pumping, and settling infrastructure.
    - Stormwater management (clean/dirty separation, berms, diversion drains, and

culverts).

- Sewage treatment plant (modular, 3 × 200 kl/day units).
- Water treatment plant for potable and process water reuse.
- Pollution Control Dam (68 Ml, lined, with treatment integration).
- Brine storage dams (six triple-lined, phased construction).

- Power Supply:
  - 132 kV bulk supply line from Theseus Substation (Eskom).
  - 35 MVA 132/11 kV substation on site.
  - Surface electrical reticulation and substations.
  - Underground electrical reticulation and power distribution.
  - Standby diesel generator systems for essential services.
- Surface Infrastructure:
  - Administration offices and meeting facilities.
  - Workshops (electrical, mechanical, boilermaking, rigging, hydropower, instrumentation, light vehicles).
  - Change houses, lamp room, and ablution facilities.
  - Medical clinic and first aid room.
  - Stores, salvage yard, and fuel depot (self-bunded tanks, 183 kl capacity).
  - Core shed for sample logging and storage.
  - Fire detection and suppression systems.
  - Sewage treatment and disposal network.
  - Access and internal roads (tarred and gravel), including stormwater channels.
  - Ice plant and cooling towers.
  - Metallurgical (CIL) process plant and elution/smelting area.
  - TSF and RWD.
  - Waste rock dump and laydown areas.
  - Bioremediation facility for hydrocarbon-contaminated soil.

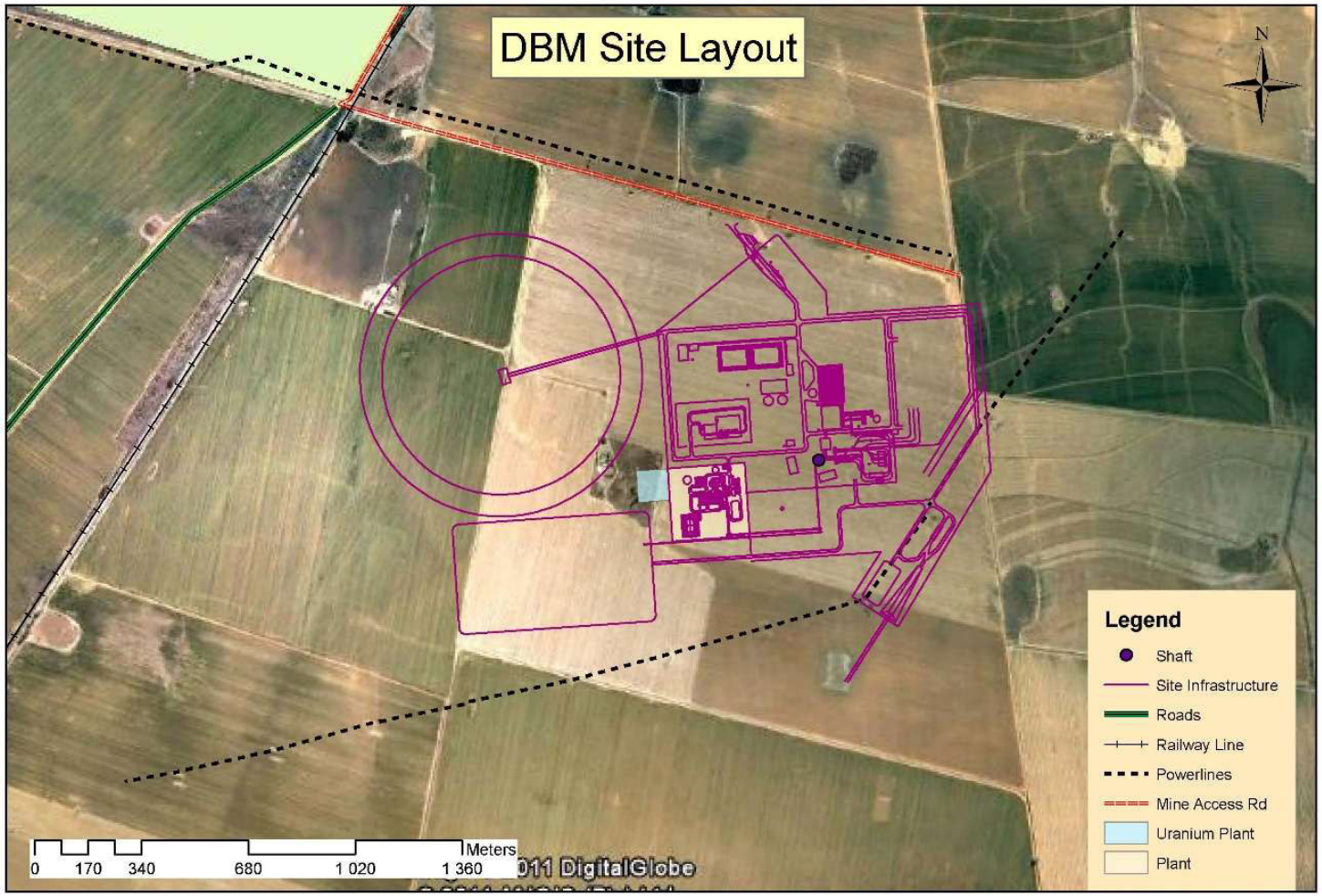


Figure 5-3: Locality Map with the proposed surface infrastructure for the DBM Project

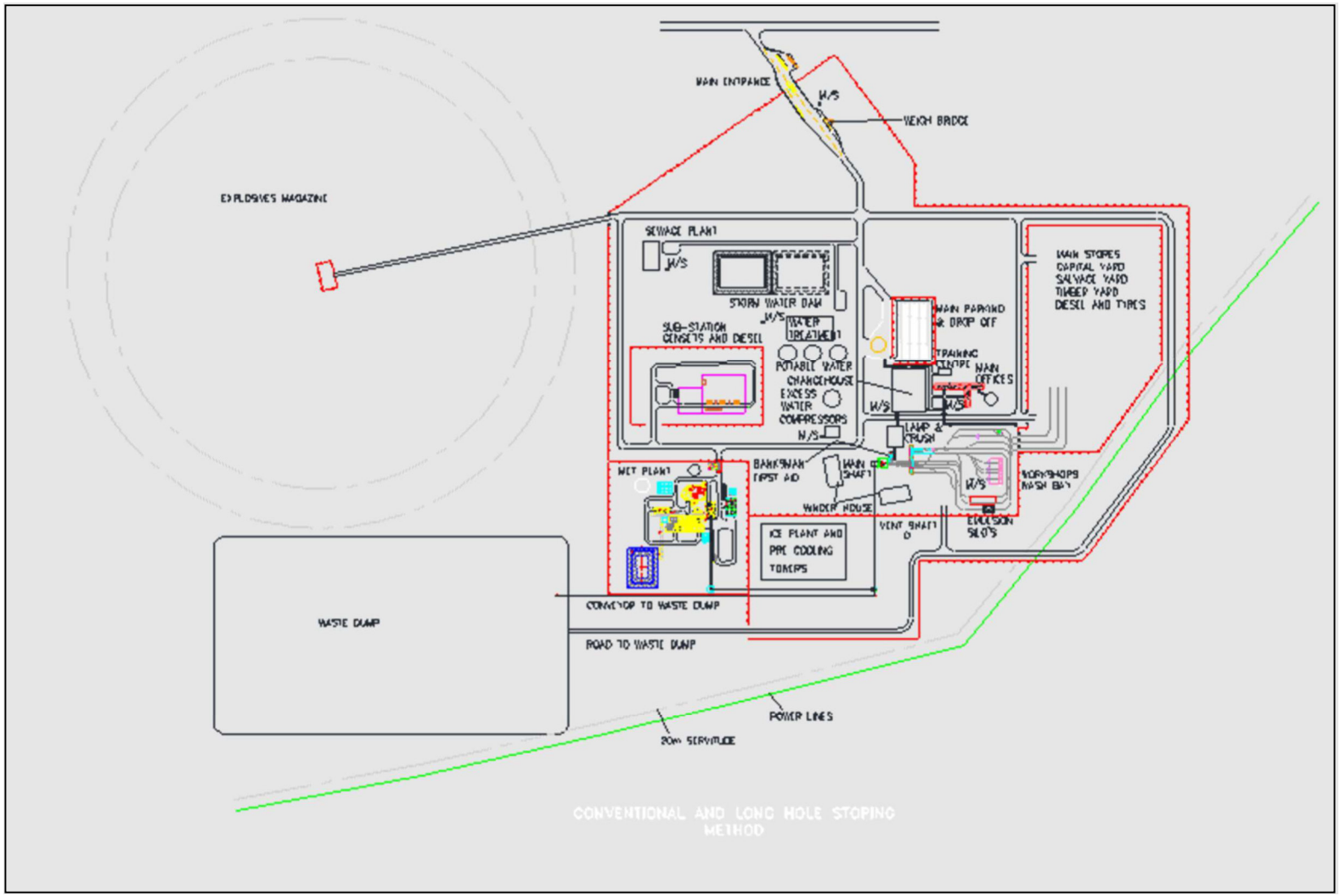


Figure 5-4: Proposed Surface Infrastructure Layout for the DBM Project Gold Plant

5.2.2.1 Workshops

A central workshop complex will support maintenance of mining and surface equipment. The complex will house workshops for electrical, mechanical, boilermaking, rigging, hydropower repair, instrumentation, and light-vehicle maintenance, as well as a skip gantry for shaft conveyance maintenance. The workshops will be of steel-frame construction with corrugated galvanised cladding and roofing, mounted on a 435 m^3 reinforced concrete pad. Lean-to extensions will accommodate foremen's offices and storage rooms. The entire complex will be modular and dismantlable, allowing relocation or decommissioning at mine closure. Construction will be completed by Year 6 of operations.

5.2.2.2 Administration Offices and Support Facilities

The administration offices will be prefabricated buildings designed for durability, thermal efficiency, and ease of maintenance. Structures will comprise galvanised steel frames with insulated wall panels made from 9 mm fibre board and a 40 mm polystyrene core, finished internally with 12.5 mm Rhino Board. Roofs will consist of galvanised corrugated sheeting on timber trusses, while internal partitions will be drywall systems with sound insulation. Total footprint area is approximately 1 609 m^2, including meeting rooms, kitchens, ablutions, and corridors. Offices will be fully established by Year 6.

Adjacent to the offices, a change house and lamp room will provide ablution and locker facilities for underground employees. The buildings will be galvanised steel structures with insulated Chromadek panels, natural ventilation via roof-mounted whirlybirds, and no ceiling (to prevent condensation). The total footprint will be 1 475 m^2, installed in two modules (Year 1 and Year 7).

5.2.2.3 Stores, Salvage Yard, and Fuel Depot

The stores building will be a 483 m^2 steel structure with a 145 m^3 concrete foundation. It will contain general consumables, lubricants, and spare parts. A fuel storage facility within the stores area will service both surface vehicles and standby generators.

Fuel requirements are estimated at 1.4 kl/day for vehicles, 2.9 kl/day for generators, and 16.5 kl/day for underground machinery. Eight self-bunded fuel tanks (46 kl each) will provide 183 kl of total capacity, equivalent to seven days' supply at 60 % operating diversity. Tanks will include overfill protection, anti-siphon valves, access manholes, flow metres, and level indicators. The fuel depot will be operational by Year 3.

A core shed of similar design to the workshops will be constructed on a 450 m^3 concrete base in Year 1 for geological sampling and storage.

Comprehensive fire detection and suppression systems—comprising fire water tanks, hydrants, hose reels, and extinguishers—will cover all major facilities, supplemented by a light diesel fire fighting vehicle for veld fire response.

5.2.3 Access Roads, Power Supply, and External Services

5.2.3.1 Roads and Access

Primary access to the site will be obtained from the S239 Provincial Road. The current informal access will be upgraded and formalised to accommodate heavy traffic. A 2 km-long, 10 m-wide tarred access road will connect the mine entrance to the provincial road network. The design includes dual 150 mm G7 roadbed layers, a 200 mm stabilised sub-base, a 150 mm base layer, and a bituminous surface with side drains and culverts.

An additional 9 km of compacted gravel internal roads will facilitate movement of personnel and service vehicles within the mine property. The access network links directly to major regional routes—R30, R73, and Jan Hofmeyer Street—ensuring efficient logistics for deliveries, product transport, and emergency access.

5.2.3.2 Power Supply

Electrical power will be supplied by Eskom via a 132 kV transmission line constructed from the Theseus Substation to the mine site using an existing servitude. A 35 MVA, 132/11 kV substation will be installed on site to step down voltage for mine distribution. The internal reticulation will operate at 11 kV for both surface and underground loads, with diesel generators providing standby power for essential services.

5.2.3.3 Water Supply

During early operations, water will be supplied by the Vaal Central Water via a metered connection. Once the underground workings reach steady-state pumping, mine dewatering will replace municipal supply as the primary process water source. A water treatment plant will purify recovered mine water to potable quality for domestic and industrial use.

5.2.4 Underground Infrastructure and Mine Development

The footwall development system will be established approximately 30 m below the lowest reef horizon, developed along strike at a 4.8 m × 4.5 m cross-section. Crosscuts will connect the footwall drives to the reefs every 180 m, serving as access routes for men and materials.

Ore will be transferred through two ore passes per stope, developed by mechanised drop-raising methods and equipped for centre loading to facilitate truck haulage. Each ore pass will penetrate multiple reef horizons to enable efficient material flow.

Mechanised equipment will include electro-hydraulic drill rigs, load-haul-dump units, and 30 t haul trucks, supported by auxiliary vehicles for construction and maintenance. Underground facilities will feature first aid stations, rescue chambers, fire detection systems, pump stations, and stores. The layout is designed for safety, accessibility, and efficient material flow between working areas and surface.

5.2.5 Ore Processing and Metallurgical Plant

The processing plant will treat approximately 120 000 tonnes of ore per month, employing a ROM milling and CIL process. This configuration is consistent with neighbouring gold plants such as Beatrix Mine and Joel Plant, chosen for its efficiency, lower capital cost, and proven performance.

Process route summary:

- Milling: ROM ore with a top size of 400 mm will be fed directly into mills, eliminating the need for primary crushers.
- Classification: Mill discharge will be cycloned; coarse fractions will be returned for regrinding.
- Leaching and Adsorption: Cyanide leaching in CIL tanks will dissolve gold, which will then adsorb onto coconut-shell activated carbon.
- Elution and Recovery: Gold will be stripped from carbon via the Zadra process using caustic cyanide eluate at 120 °C, followed by electrowinning on steel-wool cathodes.
- Smelting: Calcined cathode material will be mixed with fluxes and smelted into bullion bars containing approximately 90 % gold.
- Carbon Regeneration: Spent carbon will be reactivated in a kiln at ~750 °C, acid-washed, and returned to the circuit.

Cyanide destruction is not currently included, as tailings will be deposited on the permitted Harmony Merriespruit TSF, which already complies with regulatory standards. Should requirements change, the design allows for integration of a cyanide detoxification circuit.

5.2.6 Tailings and Waste Management

The TSF will receive thickened slurry discharged through multiple delivery stations to form controlled beaches sloping away from the embankments. Pool management will be critical to ensure stability, minimise seepage, and recover water efficiently.

The facility has been designed for a 50-year, 24-hour storm event (≈ 111 000 m^3). Water decanted through penstocks will flow into the RWD, sized to comply with GN 704 under the NWA. Recovered water—approximately 120 000 m^3/month—will be pumped back to the plant, maintaining a deficit water balance that limits stored volumes and evaporation losses.

Domestic waste generated on site will be collected by a licensed contractor for disposal at an authorised landfill. Hazardous waste (oils, filters, contaminated rags) will be stored temporarily in a bunded facility and periodically removed to a permitted hazardous waste site. Hydrocarbon-contaminated soils will be treated at an on site bioremediation facility using aeration and nutrient-enhancement techniques.

5.2.7 Water Management and Sewage Systems

5.2.7.1 Stormwater and Dirty Water Separation

Stormwater systems are designed to prevent contamination and comply with the 1-in-50-year design standard. Clean and dirty areas will be separated by berms, diversion channels, and culverts. Clean water will be diverted around operational zones into natural drainage lines, while dirty water will be contained and reused for dust suppression or processing.

5.2.7.2 Pollution Control Dam

The pollution control dams (PCD), with a storage capacity of ≈ 68 ML, will collect runoff from dirty areas. It will be HDPE-lined to prevent seepage and designed to spill less than once every 50 years under extreme rainfall conditions. A water balance simulation confirms that this capacity, coupled with a treatment throughput of ≈ 139 000 m^3/month, provides sufficient buffer against storm surges and operational inflows.

5.2.7.3 Sewage Treatment

A modular sewage treatment plant will process 600 kl/day of wastewater generated by approximately 3 300 employees. The system will be installed in three phases (200 kl/day each) during Years 1, 5, and 7. Effluent will be treated to DWS irrigation standards, while stabilised sludge will be transported to the municipal works for disposal.

5.2.8 Potable and Process Water

Total potable water demand is estimated at ≈ 202 Ml/month, comprising 65 Ml for domestic consumption and 137 Ml for the ice plant cooling systems. Storage will be provided in three galvanised steel tanks (2.4 Ml each) located north of the shaft, phased for installation in Years 1, 6, and 7.

Process water management will focus on recycling. Clarified mine water in excess of underground requirements will be treated to potable quality for reuse, with surplus discharges authorised under water use licencing conditions. Residual brine from treatment will be contained in six triple-lined storage dams, built in pairs in Years 1, 8, and 15.

5.2.9 Logistics and Personnel Transport

Personnel will access underground workings through the vertical shaft. Initially, workers will travel on foot or via trackless man-carriers; as the mine expands, chairlifts will be installed along inter-level raises.

Materials will be packed into standard cassettes and pallets in the surface marshalling yard, hoisted via the shaft, and distributed underground by flatbed utility vehicles. Empty containers will be returned to surface for reuse. This system reduces manual handling, enhances safety, and maintains efficient turnaround.

5.2.10 Project Phasing and Closure Readiness

Infrastructure will be developed progressively to align with operational needs and to enable eventual decommissioning and rehabilitation. Key milestones include:

- Year 1: Construction of core shed, initial change house module, first sewage module, and first two brine dams.
- Year 3: Commissioning of stores and fuel depot.
- Year 6: Completion of workshop and administrative offices.
- Year 7: Installation of second change house and third sewage module.
- Year 8: Commissioning of second set of brine dams.
- Year 15: Construction of final brine dams and commencement of progressive closure works.

All structures are modular or demountable, allowing relocation or removal during closure. Progressive rehabilitation, particularly of road shoulders and laydown areas, will commence once areas become inactive.

5.2.11 Water Balance

The water- and salt balance inputs were derived primarily from the Turgis Mining Consultants (2011) report and associated diagrams, supplemented by preliminary water balance spreadsheets provided by Turgis. The overall process configuration used for the balances is shown in Figure 5-5.

The wet and dry water balances for the SOFS (Phase 1—DBM Project) Mining Operation are presented in Figure 5-6 and Figure 5-7, respectively. The corresponding wet and dry salt balances are provided in Figure 5-8 and Figure 5-9.

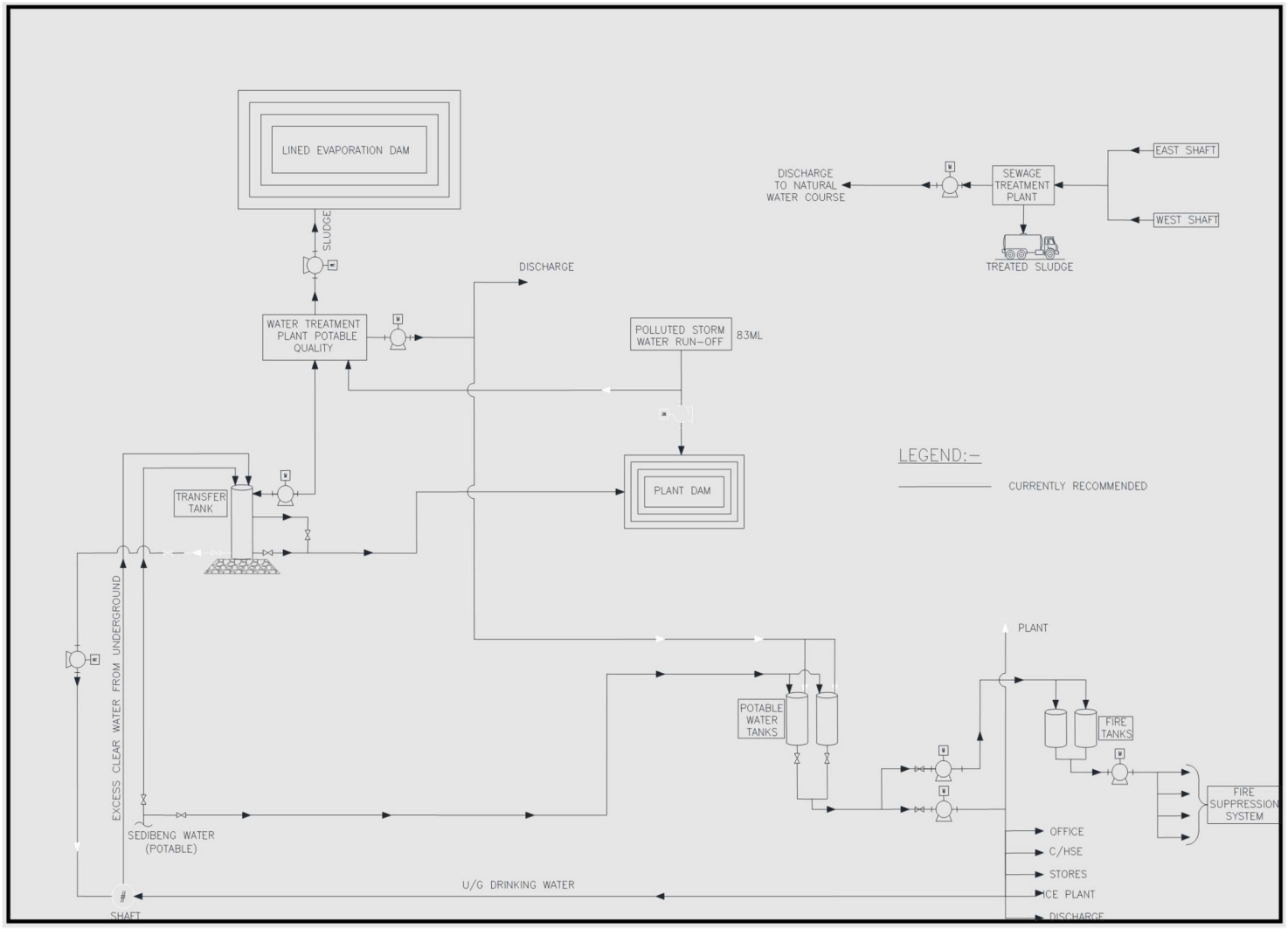


Figure 5-5: Water reticulation diagram

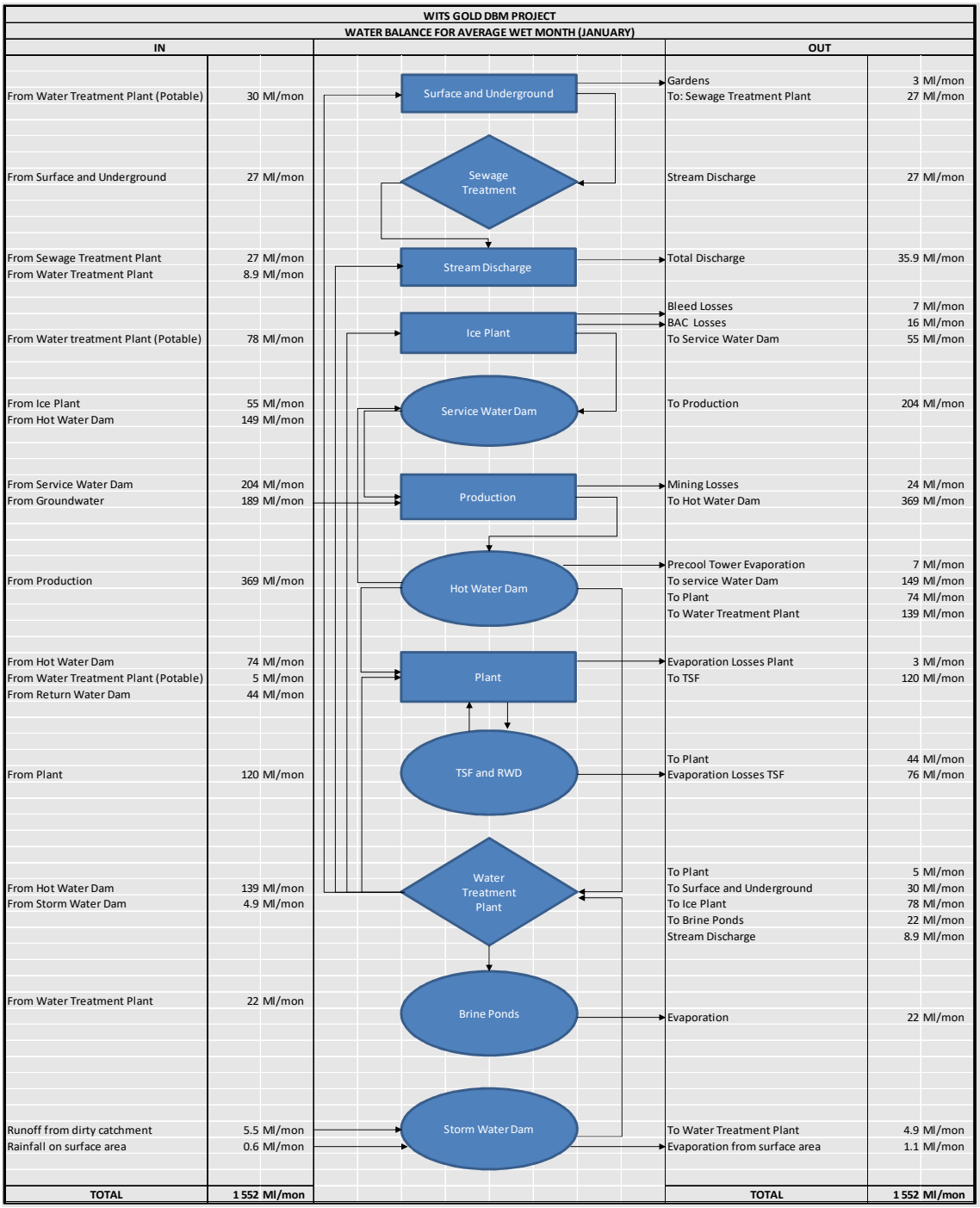


Figure 5-6: Wet water balance

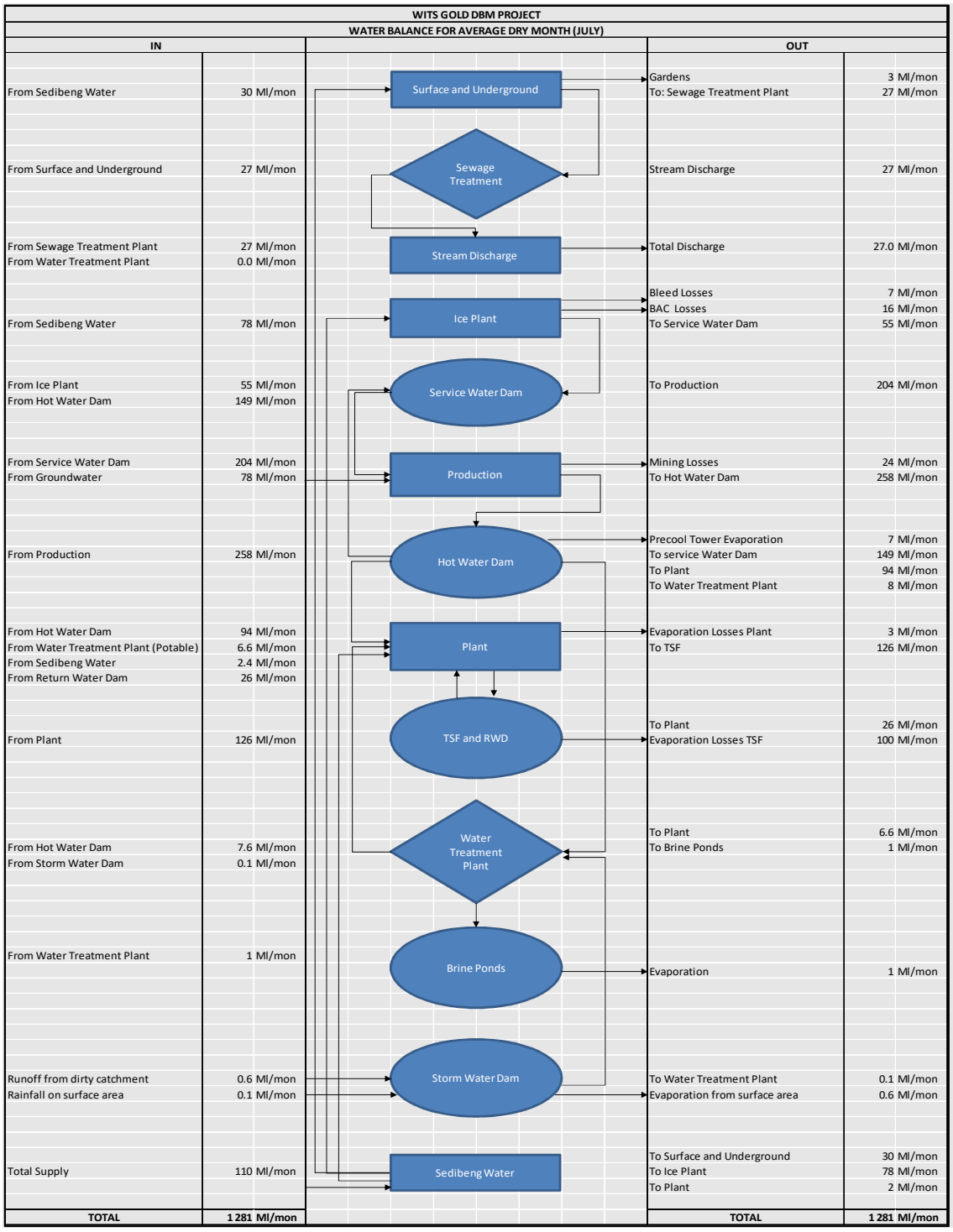


Figure 5-7: Dry water balance

WITS GOLD DBM PROJECT
SALT BALANCE FOR AVERAGE WET MONTH (JANUARY)

IN			OUT	
From Water Treatment Plant (Potable)	0.30 ton/mon	Surface and Underground	Gardens	0.03 ton/mon
			To: Sewage Treatment Plant	0.27 ton/mon
From Surface and Underground	0.27 ton/mon	Sewage Treatment	Stream Discharge	0.27 ton/mon
From Sewage Treatment Plant	0.27 ton/mon	Stream Discharge	Total Discharge	0.36 ton/mon
From Water Treatment Plant	0.09 ton/mon			
			Bleed Losses	0.07 ton/mon
		Ice Plant	BAC Losses	0.16 ton/mon
From Water treatment Plant (Potable)	0.78 ton/mon		To Service Water Dam	0.55 ton/mon
From Ice Plant	0.55 ton/mon	Service Water Dam	To Production	710.47 ton/mon
From Hot Water Dam	709.92 ton/mon			
From Service Water Dam	710.47 ton/mon			
From Groundwater	103.95 ton/mon	Production	To Hot Water Dam	1 674.52 ton/mon
Additional Salt	860.10 ton/mon			
From Production	1 674.52 ton/mon	Hot Water Dam	To service Water Dam	709.92 ton/mon
			To Plant	335.81 ton/mon
			To Water Treatment Plant	628.79 ton/mon
From Hot Water Dam	335.81 ton/mon			
From Water Treatment Plant (Potable)	0.01 ton/mon	Plant	To TSF	379.82 ton/mon
From Return Water Dam	44.00 ton/mon			
			To Plant	44.00 ton/mon
From Plant	379.82 ton/mon	TSF and RWD	Deposited	335.82 ton/mon
			To Plant	0.05 ton/mon
From Hot Water Dam	628.79 ton/mon	Water Treatment Plant	To Surface and Underground	0.30 ton/mon
From Storm Water Dam	3.01 ton/mon		To Ice Plant	0.78 ton/mon
			To Brine Ponds	630.58 ton/mon
			Stream Discharge	0.09 ton/mon
From Water Treatment Plant	630.58 ton/mon	Brine Ponds	Deposited	630.58 ton/mon
Runoff from dirty catchment	3.00 ton/mon	Storm Water Dam		
Rainfall on surface area	0.01 ton/mon		To Water Treatment Plant	3.01 ton/mon
TOTAL	**6 087 ton/mon**		**TOTAL**	**6 087 ton/mon**

Figure 5-8: Wet salt balance

WITS GOLD DBM PROJECT
SALT BALANCE FOR AVERAGE DRY MONTH (JULY)

IN			OUT	
			Gardens	0.03 ton/mon
From Sedibeng Water	0.30 ton/mon	Surface and Underground	To: Sewage Treatment Plant	0.27 ton/mon
From Surface and Underground	0.27 ton/mon	Sewage Treatment	Stream Discharge	0.27 ton/mon
From Sewage Treatment Plant	0.27 ton/mon	Stream Discharge	Total Discharge	0.27 ton/mon
From Water Treatment Plant	0.00 ton/mon			
			Bleed Losses	0.07 ton/mon
			BAC Losses	0.16 ton/mon
From Sedibeng Water	0.78 ton/mon	Ice Plant	To Service Water Dam	0.55 ton/mon
From Ice Plant	0.55 ton/mon	Service Water Dam	To Production	710.47 ton/mon
From Hot Water Dam	709.92 ton/mon			
From Service Water Dam	710.47 ton/mon			
From Groundwater	42.90 ton/mon	Production	To Hot Water Dam	1 170.80 ton/mon
Add Salt	417.43 ton/mon			
From Production	1 170.80 ton/mon	Hot Water Dam	To service Water Dam	709.92 ton/mon
			To Plant	426.57 ton/mon
			To Water Treatment Plant	34.31 ton/mon
From Hot Water Dam	426.57 ton/mon			
From Water Treatment Plant (Potable)	0.07 ton/mon	Plant	To TSF	453.06 ton/mon
From Sedibeng Water	0.02 ton/mon			
From Return Water Dam	26.40 ton/mon			
			To Plant	26.40 ton/mon
From Plant	453.06 ton/mon	TSF and RWD	Deposited	426.66 ton/mon
			To Plant	0.07 ton/mon
From Hot Water Dam	34.31 ton/mon	Water Treatment Plant	To Brine Ponds	34.57 ton/mon
From Storm Water Dam	0.33 ton/mon			
From Water Treatment Plant	34.57 ton/mon	Brine Ponds	Deposited	34.57 ton/mon
Runoff from dirty catchment	0.33 ton/mon	Storm Water Dam	To Water Treatment Plant	0.33 ton/mon
Rainfall on surface area	0.00 ton/mon			
			To Surface and Underground	0.30 ton/mon
Total Supply	1.10 ton/mon	Sedibeng Water	To Ice Plant	0.78 ton/mon
			To Plant	0.02 ton/mon
TOTAL	**4 031 ton/mon**		**TOTAL**	**4 031 ton/mon**

Figure 5-9: Dry salt balance

5.2.12 Project Planning Phases and Associated Activities

Phase 1 SOFS Mining Operation, DBM Project, will be implemented in distinct phases—construction, operational, and decommissioning/closure. Each phase involves specific activities that may influence the biophysical and socio-economic environment. The sections below outline the primary activities, potential impacts, and management considerations associated with each phase.

5.2.12.1 Construction Phase

The construction phase will involve the establishment of the physical infrastructure required to support mining operations. Key activities will include the construction of service and access roads, installation of power supply infrastructure, and the development of clean and dirty water systems. Additional works will encompass the construction of shaft access, ancillary support facilities, and pollution control structures designed to manage surface runoff and prevent contamination of natural watercourses.

During this phase, site preparation will entail clearing vegetation, removing topsoil, and levelling ground surfaces for infrastructure placement. These activities may temporarily disturb natural habitats and increase the potential for soil erosion, dust generation, and sedimentation of nearby wetlands and drainage lines. Compaction of soils could occur from the movement of heavy machinery, while topsoil and subsoil stockpiles may contribute to windblown dust if not stabilised.

Construction activities therefore have the potential to affect the biophysical environment—including soils, vegetation, and surface water systems—as well as the social environment, through noise, dust, and increased construction traffic. Mitigation will include phased clearing, dust suppression, erosion control measures, and careful demarcation of construction zones to minimise disturbance.

5.2.12.2 Operational Phase

The operational phase will involve full-scale underground mining, ore processing, and associated support activities. Mining will occur via underground stoping, with ore transported to surface for processing in the metallurgical plant.

During this phase, potential environmental impacts may arise from ongoing ground disturbance, soil erosion, and dust generation associated with material handling and surface operations. The management of clean and dirty water systems will be critical to prevent contamination of nearby watercourses and groundwater resources. Regular maintenance of stormwater infrastructure, PCD, and containment areas will be required to ensure compliance with water use authorisations.

Operational waste—such as sewage, domestic refuse, and hazardous materials (e.g., hydrocarbons, process residues)—will be managed through established waste handling procedures and licensed disposal facilities. Ancillary facilities such as workshops, storage yards, and administrative buildings will continue to generate domestic effluents and general waste, which will be managed in accordance with the approved EMPr.

Socially, this phase will generate local employment and procurement opportunities while also

increasing traffic and service demand in surrounding communities. Continuous stakeholder engagement and compliance monitoring will be undertaken to ensure alignment with E&S obligations.

5.2.12.3 Decommissioning and Closure Phase

The decommissioning and closure phase will commence once mining operations cease and the resource is depleted or no longer economically viable. The main objective of this phase will be to ensure that the site is rehabilitated to a stable, safe, and environmentally sustainable condition, consistent with post-mining land use objectives.

Key closure activities will include the removal of saleable infrastructure, demolition of remaining surface structures, and ripping and amelioration of compacted surfaces to restore natural soil function. All disturbed areas—including WRDs, tailings footprints, and haul roads—will be re-profiled to blend with the natural topography, followed by topsoil replacement and revegetation using indigenous species to promote ecological succession.

Post closure management will focus on maintenance of re-vegetated areas, weed control, and monitoring of environmental indicators such as soils, vegetation cover, groundwater quality, and surface water flow. This monitoring will continue for a defined period or until such time as rehabilitation areas demonstrate long term stability and self-sustaining ecosystem recovery.

The ultimate goal of the closure phase is to return the site to a condition that poses no residual risk to the environment or surrounding communities, and which supports agreed post-mining land uses.

6 POLICY AND LEGISLATIVE CONTEXT

The South African environmental regulatory framework was promulgated with the aim of environmental protection. The regulatory framework provides requirements and guidelines for E&S management. Table 6-1 provides a list of applicable legislative requirements, guidelines as well as a description of how the project complies with and responds to the policy and legislation context.

Table 6-1: Applicable Legislation, Policies and Guidelines Applicable to the Project

Applicable Legislation and Guidelines used to compile the Report	Description	Reference where applied in Report	Applicability
Legislation			
Chapter 2, section 24 and section 32 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996).	Chapter 2 of the Constitution is the cornerstone of democracy in South Africa. The Chapter enshrines the rights of all people living in South Africa and affirms the democratic values of human dignity, equality and freedom. Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or wellbeing; and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that - • Prevent pollution and ecological degradation; • Promote conservation; and • Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development. Section 24 guarantees the protection of the environment through reasonable legislative (and other measures), and such legislation is continuously in the process of being promulgated. Section 32 provides for access to information, held by any person or organ of state, where such information is required to exercise or protect the rights of any other person. The Promotion of Access to Information Act (Act No. 2 of 2000) gives effect to the provisions of this right.	This report was prepared, submitted and considered within the constitutional framework.	A Basic Assessment (BA) process has been undertaken to identify and assess potential impacts associated with the project. Mitigation measures and monitoring measures as provided in this report have been recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.
Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). Mineral and Petroleum Resources Development Regulations (GN R 527 of 2004, as amended) [1].	The MPRDA makes provision for equitable access to and sustainable development of the nation's mineral and petroleum resources; and to provide for matters connected therewith. The Act also aims to ensure the promotion of economic and social development through exploration and mining related activities. The Act prohibits any person from conducting mining and petroleum operations except with prior Environmental Authorisation (EA). The Minister of Mineral Resources and Energy is responsible for implementing environmental provisions relating to the mining or petroleum operations in terms of the NEMA. The Act requires that mining companies assess the socio-economic impacts of their activities from start to closure and beyond. Companies must develop and implement a comprehensive Social and Labour Plan (SLP) to promote socio-economic development in their host communities and to prevent or lessen negative social impacts.	This report.	Sibanye Gold holds: • Beatrix Mining Right (MR) (FS 10047 MR / FS 081 MR). • Southern Free State (SOFS) MR (FS 10005 MR). The BA will be compiled in accordance with the MPRDA read with the Environmental Impact Assessment (EIA) Regulations, 2014.
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)[2]. • Environmental Impact Assessment (EIA) Regulations, 2014 (Government Notice Regulation (GN R) 982 of 2014, as amended in June 2021)3. • EIA Regulations Listing Notice 1 of 2014 (GN R 983 of 2014, as amended)4. • EIA Regulations Listing Notice 2 of 2014 (GN R 984 of 2014, as amended)[5]. • EIA Regulations Listing Notice 3 of 2014 (GN R 985 of 2014, as amended)[6].	The NEMA can be regarded as the most important piece of general environmental legislation. The overarching principle of the Act is sustainable development. It defines sustainability as meaning the integration of social, economic and environmental factors into planning, implementation and decision-making so as to ensure the development serves present and future generations. The Act provides a framework for environmental law reform and covers three areas, namely: • Land, planning and development; • The use and conservation of natural and cultural resources; and • Pollution control and waste management. Section 24 of the NEMA sets out the provisions which are to give effect to the general objectives of Integrated Environmental Management (IEM) and laid down in Chapter 5 of the NEMA. In terms of section 24(1), the potential impact on the environment of listed activities must be considered, investigated, assessed and reported on to the Competent Authority (CA) charged by the NEMA with granting of the relevant EA. In terms of section 24F(1) of the NEMA no person may commence an activity listed or specified in terms of section 24(2)(a) or (b) unless the CA has granted an EA for the activity. The Minister published the EIA Regulations comprising the EIA Regulations GN R 982, and three Listing Notices namely GN R 983 (Listing Notice 1), GN R 984 (Listing Notice 2) and GN R 985 (Listing Notice 3) in terms of Sections 24(2) and 24D of the NEMA. The Regulations make provision	This report.	Sibanye Gold holds: • Environmental Authorisation: DEA/EIA/00001449/2012 and 14/12/16/3/3/3/58 – Issued 4 July 2014. • First Amendment: FS 30/5/1/2/2 (10005) EM – Issued 13 November 2024. The BA process will be undertaken in compliance with the NEMA requirements read with the EIA Regulations, 2014. In terms of section 24(1) of the NEMA, the potential consequences for or impacts on the environment of inter alia 'listed activities' must be considered, investigated, assessed and reported on to the Minister responsible for mineral resources, except in respect of those activities that may commence without having to obtain an EA in terms of the NEMA. As such, an application for EA in terms of NEMA 'listed activities' as contemplated in GN R 983, will be submitted to the Department of Mineral

[1] GN 527 in GG 26275 of 23 April 2004 as amended by GN R 1288 in GG 26942 of 29 October 2004; GN R 1203 in GG 29431 of 30 November 2006; GN R349 in GG 34225 of 18 April 2011; GN R466 in GG 38855 of 3 June 2015; and GN R420 in GG 43172 of 27 March 2020.
[2] The National Environmental Laws Amendment Act, 2022 (Act No 2 of 2022) was signed into law on 24 June 2022. Except for sections 11, 35(a), 57, 60, 61(c), 61(j), 61(k), 62, 63, 64, 65, 66, 72, 76, 77, 86, 87 and 88 pertaining mostly to changes to the NEMWA, the NEMLAA came into effect on 30 June 2023 as per Proclamation Notice 125 of 2023, published in GG 48869.
[3] GN R982 of 4 December 2014 as amended by GN R326 of 7 April 2017, GN 706 of 13 July 2018, GN 599 of 29 May 2020 and GN 517 of 11 June 2021.
[4] GN R 983 in GG 38282 of 4 December 2014 as amended by GN R327 in GG 40772 of 7 April 2017, GN 706 in GG 41766 of 13 July 2018 and GN 517 in GG 44701 of 11 June 2021.
[5] GN R 984 in GG 38282 of 4 December 2014, as amended by GN R325 in 40772 of 7 April 2017 and GN 517 in GG 44701 of 11 June 2021.
[6] GN R 985 in GG 38282 of 4 December 2014, as amended by GN R324 in 40772 of 7 April 2017, GN 706 in GG 41766 of 13 July 2018 and GN 517 in GG 44701 of 11 June 2021.

Applicable Legislation and Guidelines used to compile the Report	Description	Reference where applied in Report	Applicability
	for the regulation of the procedure and criteria as contemplated in Chapter 5 of the Act relating to the preparation, evaluation, submission, processing and consideration of, and decision on, applications for EA for the commencement of activities, subjected to EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.		and Petroleum Resources (DMPR). The listed activities which are potentially triggered under the Listing Notices are provided in Table 4-2 of this Report. This report outlines the impacts associated with the activities and the proposed measures in which to mitigate and manage the impacts including the monitoring programme.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEMWA)[7]. • List of waste management activities that have, or are likely to have, a detrimental effect on the environment (GN 921 of 2013, as amended)[8]. • National Waste Information Regulations, 2012 (GN R 625 of 2012)9. • Regulations Regarding the Planning and Management of Residue Stockpiles and Residue Deposits, 2015 (GN R632 of 2015, as amended)10. • Waste Classification and Management Regulations, 2013 (GN R634 of 2012)11. • National Norms and Standards for the Assessment of Waste for Landfill Disposal (R635 of 2012)12. • National Norms and Standards for the Disposal of Waste to Landfill (R636 of 2012)13. • National Norms and Standards for the Storage of Waste (GN 926 of 2013)14. • National Norms and Standards for the Remediation of Contaminated Land and Soil Quality – GN 331 in Government Gazette No. 37603 dated 2 May 2014.	The NEMWA commenced on 1 July 2009 and as a result of its commencement the relevant provisions in the Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA) in respect of waste management, were repealed. The Act sets out to reform the law regulating waste management and deals with waste management and control more comprehensively than was dealt with in the ECA. It also introduces new and distinct concepts never canvassed within the realm of waste management in South Africa, such as the concept of contaminated land and extended producer responsibility. It also provides for more elaborate definitions to assist in the interpretation of the Act. In terms of section 19(1) of the NEMWA, the Minister, published in GN R 921, a list of waste management activities that have, or are likely to have a detrimental effect on the environment. Section 20 of the NEMWA pertains to the consequences of listed waste management activities and states that no person may commence, undertake or conduct a waste management activity, except in accordance with the requirements or standards for that activity as determined by the Minister or in accordance with a waste management licence issued in respect of that activity, if a licence is required. In accordance with Section 19(3), the Schedule to GN R921 provides that a waste management licence is required for those activities listed in Category A and B thereof and compliance with the Norms and Standards is required for those activities listed in Category C thereof prior to the commencement, undertaking or conducting of same. In addition, GN R921 differentiates between Category A, B, and Category C waste management activities. Category A waste management activities are those which require the conducting of a Basic Assessment (BA) process as stipulated in the EIA Regulations 2014, as amended, (GN R982) promulgated in terms of the NEMA as part of the waste management licence application and Category B waste management activities are those that require the undertaking of a Scoping and Environmental Impact Assessment process stipulated in the GN R982 as part of the waste management licence application. Category C waste management activities do not require a waste management licence, however a person who wishes to commence, undertake or conduct a waste management activity listed under this category, must comply with, amongst others, the relevant National Norms and Standards for the Storage of Waste (GN R926 of 29 November 2013) published in terms of the NEMWA.	Section 5.	Sibanye Gold is currently in possession of the following waste-related licences: • Beatrix (Oryx) Waste Permit: 16/2/7/C404/C6/Z1/P328. • Beatrix Waste Permit: 16/2/7/C404/C4/Z1/P89. • Beatrix Waste Management Licence (WML): FS 30/5/1/2/3/2/1/81 EM. These licences govern waste management and ensure that all waste-related activities at Beatrix are undertaken in accordance with applicable legal and environmental requirements.
National Water Act, 1998 (Act No. 36 of 1998) (NWA). • Regulations on the use of water for mining and related activities aimed at the protection of water resources (GN R 704 of 1999)[15]. • Water Use Licence Application and Appeals Regulations, 2017 (GN R 267 of 2017)[16].	The national government, acting through the Minister of Water and Sanitation (previously the Minister of Water Affairs), is the public trustee of South Africa's water resources, and must ensure that water is protected, used, developed, conserved, managed, and controlled in a sustainable and equitable manner for the benefit of all persons (section 3(1)).	Section 12.5. Section 12.6. Section 12.7. Part B.	Sibanye Gold is currently in possession of the Beatrix WUL, 08/C42K/AEFJG/8739, dated 31 October 2018 and the subsequent amendment of 2021., which governs the water uses in the specified area. Ongoing compliance with this licence and all applicable provisions of the NWA is mandatory.

[7] As amended by the National Environmental Management: Waste Amendment Act 26 of 2014. As stated above, the National Environmental Laws Amendment Act, 2022 (Act No 2 of 2022) was signed into law on 24 June 2022 and will come into operation on a date to be fixed and proclaimed by the President. Once the amendment act comes into operation residue stockpiles and residue deposits will be removed from NEMWA and regulated in terms of the provisions of NEMA. Residue stockpiles and residue deposits will therefore no longer be regarded as waste for which a waste management licence is required. Residue stockpiles and residue deposits will in future be authorized in terms of the NEMA under the EIA Listing Notices. In terms of the transitional provisions any approval granted, or waste management licence issued in relation to residue deposits and residue stockpiles remain valid until it lapse or replaced under the provisions of the NEMA.
[8] GN 921 in GG 37083 of 29 November 2013 as amended by GN 332 in GG 37604 of 2 May 2014; GN R633 in GG 39020 of 24 July 2015; and GN 1094 in GG 41175 of 11 October 2017.
[9] GN R 625 in GG 35583 of 13 August 2012.
[10] GN R 632 in GG 39020 of 24 July 2015 as amended by the Planning and Management of Residue Stockpiles and Residue Deposits Amendment Regulations, 2018 published under GN 990 in GG 41920 of 21 September 2018. Once the relevant sections in the National Environmental Laws Amendment Act, 2022 (Act No 2 of 2022) comes into effect, residue stockpiles and residue deposits will be excluded from NEMWA and will be regulated in terms of the provisions of NEMA. The Residue Regulations will remain operational and will be deemed to have been made under NEMA.
[11] GN R634 in GG 36784 of 23 August 2012.
[12] R635 in GG 36784 of 23 August 2012.
[13] R636 in GG 36784 of 23 August 2012.
[14] GN 926 in GG 37088 of 29 November 2013.
[15] GN R 704 in GG 20119 of 4 June 1999.
[16] GN R 267 in GG 40713 of 24 March 2017.

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• Regulations regarding the safety of dams in terms of section 123(1) of the NWA (GN R139 of 2012)[17]. General Authorisations: • General Authorisation: 21(c) and (i) water use for the purpose of rehabilitating a wetland for conservation purposes (GN 1198 of 2009)[18]. • General Authorisation: 21(c) and (i) water uses (GN 509 of 2016)[19]. • Revision of General Authorisation for the Taking and Storing of Water (GN 538 of 2016)[20]. • Revision of General Authorisation in terms of section 39 of the National Water Act 36 of 1998 (GN 665 of 2013)[21].	Section 19 of the NWA places an obligation on landowners, persons in control of land, occupants of land and land users of land on which: Any activity or process is or was performed or undertaken; or Any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, to take all reasonable measures to prevent any such pollution from occurring, continuing, or recurring. In terms of the NWA a person may only use water without a licence under certain circumstances. All other use, provided that such use qualifies as a use listed in section 21 of the Act, require a Water Use Licence (WUL). A person may only use water without a licence if such water use is permissible under Schedule 1 (generally domestic type use) if that water use constitutes a continuation of an existing lawful water use (water uses being undertaken prior to the commencement of the NWA, generally in terms of the Water Act of 1956), or if that water use is permissible in terms of a general authorisation issued under section 39 (general authorisations allow for the use of certain section 21 uses provided that the criteria and thresholds described in the general authorisation is met). The Minister published Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals in GN R267 of 2017. The Regulations serve to prescribe the procedure and requirements of Water Use Licence Applications (WULAs) as contemplated in Sections 41 of NWA, as well as an appeal against a decision made by a Responsible Authority in terms of section 41(6) of the NWA. The Regulations provide the requirements for the WULA and state that consideration and decision for a WUL must be undertaken within a period of 300 days of submitting such application. A procedure for public participation must also be conducted as contemplated in section 41(4) of the NWA, as part of the WULA process.		
National Environmental Management: Biodiversity Act, 2004 (Act No. 39 of 2004) (NEMBA). • Threatened or Protected Species Regulations, 2007 (GN R 152 of 2007)[22]. • Alien and Invasive Species Regulations (GN R1020 of 2020)[23]. • Alien and Invasive Species Lists, 2020 (GN 1003 of 2020)[24].	The Act aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. The Act allows for the protection of species and ecosystems that warrant national protection; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; the establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith. In terms of section 57 of the Act, no person may carry out any restricted activity involving any species which has been identified by the Minister as "critically endangered species", "endangered species", "vulnerable species" or "protected species" without a permit. The Act defines "restricted activity" in relation to such identified species so as to include, but not limited to, "hunting, catching, capturing, killing, gathering, collecting, plucking, picking parts of, cutting, chopping off, uprooting, damaging, destroying, having in possession, exercising physical control over, moving or translocating". The Minister has made regulations in terms of Section 97 of the NEMBA with regards to Threatened and Protected Species which came into effect on 1 June 2007. Furthermore, the Minister published lists of critically endangered, endangered, vulnerable, and protected species in terms of section 56(1) of the NEMBA.	Section 12.8. Section 12.9. Part B.	The management and control of alien invasive plants will be governed by the NEMBA during all the phases of the project.
National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEMAQA). • Listed Activities and Associated Minimum Emission Standards Identified in terms of Section 21 of the NEMAQA (GN R 893 of 2013, as amended)[25].	The Act aims to regulate and protect the environment, by "providing reasonable measures for the prevention of air pollution and ecological degradation, and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national Norms and Standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto".	Section 12.10. Part B.	Sibanye Gold is currently in possession of an AEL, reference number LDM/AEL/LCR/004. All project activities will be required to comply with the conditions and requirements stipulated in this AEL.

[17] GN R 139 in GG 35062 of 24 February 2012.
[18] GN 1198 in GG 32805 of 18 December 2009.
[19] GN 509 in GG 40229 of 26 August 2016.
[20] GN 538 in GG 40243 of 2 September 2016.
[21] GN 665 in GG 36820 of 6 September 2013.
[22] GN R152 in GG 29657 on 23 February 2007.
[23] GN R1020 in GG 43735 of 25 September 2020.
[24] GN 1003 in GG 43726 of 18 September 2020. Notice replaced the previous Alien and Invasive Species Lists (GN 864 in GG 40166 of 29 July 2016).
[25] GN R893 in GG 37054 of 22 November 2013, as amended by GN 551 in GG 38863 of 12 June 2015; GN 1207 in GG 42013 of 31 October 2018; GG 687 in GG 42472 of 22 May 2019; GN 421 in GG 43174 of 27 March 2020.

Applicable Legislation and Guidelines used to compile the Report	Description	Reference where applied in Report	Applicability
• National Dust Control Regulations, 2013 (GN R 827 of 2013)[26]. • National Atmospheric Emission Reporting Regulations, 2015 (GN R 283 of 2015)[27]. • Atmospheric Dispersion Modelling Regulations, 2014 (GN R 533 of 2014)28. • National Greenhouse Gas Emission Reporting Regulations (GN R 275 of 2017 as amended)29.	The Minister published Listed Activities and Associated Minimum Emission Standards Identified in terms of Section 21 of the NEMAQA in 2013. Part 3 of the Notice makes provision for a list of activities in the following categories which the Applicant must review to determine whether an application for an Atmospheric Emissions Licence (AEL) is required: • Category 1: Combustion Installations; • Category 2: Petroleum Industry, the production of gaseous and liquid fuels as well as petrochemicals from crude oil, coal, gas or biomass; • Category 3: Carbonisation and Coal Gasification; • Category 4: Metallurgical Industry; • Category 6: Organic Chemicals Industry; • Category 7: Inorganic Chemicals Industry; • Category 8: Thermal Treatment of Hazardous and General Waste; • Category 9: Pulp and Paper Manufacturing Activities, including By-Products Recovery; and • Category 10: Animal Matter Processing.		
Section 25 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA). • Noise Control Regulations (GN R154 of 1992)[30].	These Regulations set out rules relative to the control of noise as provided for in Section 25 of the ECA. The Regulations, among other things: define powers of local authorities to control noise; define general prohibitions in relation with activities that produce noise; define and prohibit noise nuisance; and concern the use of noise measuring instruments.	Part B.	Sibanye Gold is required to comply with all applicable noise-related provisions under these Regulations.
National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA).	The NHRA established the South African Heritage Resources Agency (SAHRA) as well as provincial heritage resources agencies. In terms of the NHRA, no person may destroy, damage, deface, excavate, alter, remove from its original position, subdivide, or change the planning status of any heritage site without a permit issued by the heritage resources authority responsible for the protection of such site. Section 38 of the NHRA states that any person who intends to undertake developments categorised in section 38 of the NHRA must at the very earliest stages of initiating such development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. By way of example, the developments referred to in section 38 of the NHRA include: • The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 metres in length; • The construction of a bridge or similar structure exceeding 50 metres in length; • Any development or other activity which will change the character of a site: o Exceeding 5000 m^2 in extent; or o Involving three or more existing erven of subdivisions thereof; or o Involving three or more erven or divisions thereof which have been consolidated within the past five years; or o The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority; or o The rezoning of a site exceeding 10 000 m^2 in extent; or • Any other category of development provided for in the regulations by SAHRA or the provincial heritage resources authority.	Section 12.13. Part B.	The following studies were undertaken: • The Cultural Heritage Impact Assessment for the Wits Gold DBM Project by Archaetnos CC (Archaetnos, 2011) and • The Heritage Audit Report for the Beatrix Mining Areas of Sibanye Gold by PGS Heritage (PSG, 2017). In addition, the project will implement a formal Chance Find Procedure to ensure that any previously unidentified heritage resources encountered during construction or operation are managed in line with regulatory requirements. The project will develop and implement a Chance Find Procedure.
Mine Health and Safety Act, 1996 (Act No. 29 of 1996) (MHSA). • Mine Health and Safety Regulations (GN R93 of 1997, as amended)[31]. • Mines and Works Regulations (GN R992 of 1970, as amended)[32].	The Act aims to provide for protection of the health and safety of employees and other persons at mines.	Part B.	Sibanye Gold will have to ensure that employees, contractors, subcontractors and visiting personnel, adhere to the requirements of this Act and its Regulations.
Hazardous Substances Act, 1973 (Act No. 15 of 1973) (HAS).	The Act aims to provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitising or flammable nature or the generation of pressure thereby in certain circumstances, and for the	Part B.	Sibanye Gold will have to ensure that employees, contractors and subcontractors adhere to the requirements of this Act.

[26] R827 in GG 36974 of 1 November 2013.
[27] GN R283 in GG 38633 of 2 April 2015.
[28] GN R533 in GG 37804 of 11 July 2014.
[29] GN R275 in GG 40762 of 3 April 2017 as amended by GN R994 in GG 43712 of 11 September 2020.
[30] GN R154 of January 1992.
[31] GN R93 in GG 17725 of 15 January 1997.
[32] GN R992 in GG 2741 of 26 June 1970, was published under the Mines and Works Act, but remain in force in terms of Schedule 4 of the MHSA.

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	control of certain electronic products; to provide for the division of such substances or products into groups in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products; and to provide for matters connected therewith.		
Policies and Plans			
National Development Plan (NDP) 2030	South Africa's NDP 2030 outlines the country's long term goals to eliminate poverty and reduce inequality by 2030. It emphasises inclusive economic growth, sustainable environmental practices, and the responsible use of natural resources.	-	The Beisa Project/Operation aligns with the NDP through its potential to create employment opportunities and its commitment to infrastructure development.
Free State Provincial Growth and Development Strategy (PGDS).	The PGDS provides strategic direction for development in the Free State Province and prioritises sustainable development, job creation, and responsible resource utilisation.		The administrative amendment supports regulatory certainty and continuity of existing operations, thereby aligning with the PGDS objective of promoting responsible mining in the province.
National Waste Management Strategy (NWMS, 2020).	The NWMS supports waste minimisation, reuse, and environmentally responsible disposal, aligned with NEMWA.		The Beisa Project/Operation remains consistent with this policy through the maintenance of existing waste management controls.
National Biodiversity Strategy and Action Plan (NBSAP).	The NBSAP aims to conserve biodiversity and ensure the sustainable use of biological resources.		The Beisa Project/Operation aligns with this plan by maintaining existing environmental management and biodiversity protection measures.
Tools, Standards and Guidelines			
Department of Forestry, Fisheries and the Environment (DFFE) Environmental Screening Tool.	The DFFE requires that their National Environmental Screening Tool be utilised prior to undertaking an application for any EA and that the report generated by the tool be submitted with the EA Application. The tool is a geographically based web-enabled application which allows a proponent intending to submit an application for an EA to pre-screen their proposed site for any environmental sensitivities. Regulation 16(1)(b)(v) of the (as amended) requires a screening report to accompany an application for an EA.	-	The BA process will be undertaken in respect of the authorisation process of the Project and is in compliance with the NEMA requirements read with the EIA Regulations, 2014. An BA application together with the Screening Tool Report was submitted to the DMPR.
Waste management standards: South African National Standard (SANS) 10234:2019, Edition 2: Globally Harmonised System of Classification and Labelling of Chemicals (GHS)[33].	SANS 10234:2008 South Africa has moved a step forward in regard to mandating that Globally Harmonised System (GHS) of Classification and Labelling of Chemicals, be implemented within the country. Standard SANS 10234:2019 (edition-2) was published through the South Africa Bureau of Standards on December 17, 2019. This Standard supersedes Standards: SANS 10265 edition-1 of 1999 and SANS 10234 edition-1.01 of 2008. This Standard is aligned with the 4th revision of the UN GHS Purple book and is cross referenced in the NEMWA and National Health Act, 2003 (Act No. 61 of 2003). The National Committee for Standards for Dangerous Goods, including hazardous chemical substances and dangerous goods, is in charge of preparing this Standard. The Committee has decided to permanently remove the Supplement (List of Classification and Labelling of Chemicals in Accordance with GHS), to the SANS 10234:2008 (edition-1), since the Committee believes that the chemicals on this list are constantly changing. This Standard is also mandated by the South Africa Department of Environment Affairs and Department of Health. This Standard will be considered a minimum requirement to adhere to when the draft Regulation of Hazardous Substances Agents (2018) is published, which is projected for 2020, under the authority of the Department of Labour. The Standard provides guidelines for classifying chemicals based on their physical, health, and environmental hazards, as well as standardised labelling elements such as pictograms, signal words, hazard statements, and precautionary statements.	Part B.	The standard was consulted when compiling the Environmental Management Programme (EMPr).
Hazardous substances management standards: • SANS 10089-1:2008 - Specifications for aboveground storage facilities for petroleum products[34]. • SANS 310: 2011 - Storage tank facilities for hazardous chemicals: Aboveground storage tank	SANS 10089-1:2008 The SANS 10089-1:2008 specifies requirements for aboveground storage facilities used for storing petroleum products in South Africa. This standard outlines technical specifications and safety requirements to ensure the safe and efficient storage of petroleum products, including gasoline, diesel, and other fuels. The SANS 10089-1 covers various aspects of aboveground storage facilities,	-	The standards were consulted when compiling the EMPr.

[33] Standard SANS 10234:2019 (edition-2), South African Bureau of Standards.
[34] South African Bureau of Standards - SANS 10089-1: The petroleum industry Part 1: Storage and distribution of petroleum products in above-ground bulk installations, 2008.

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facilities for flammable, combustible and non-flammable chemicals[35].	including design criteria, construction materials, tank installation, maintenance procedures, and safety measures. SANS 310:2011 The SANS 310:2011 sets out specifications for aboveground storage tank facilities intended for hazardous chemicals, including flammable, combustible, and non-flammable substances, in South Africa. This standard establishes requirements for the design, construction, operation, and maintenance of storage tank facilities to ensure the safe handling and storage of hazardous chemicals. It covers various aspects such as tank design, material selection, installation procedures, containment systems, ventilation, fire protection, and emergency response measures.		
Air quality: • National Ambient Air Quality Standards (NAAQS), 2009[36]. • GN 486 dated 29 June 2012: National Ambient Air Quality Standard for Particulate Matter with Aerodynamic Diameter less than 2.5 Micron Metres ($PM_{2.5}$)[37].	NAAQS The NAAQS provide comprehensive guidelines and Regulations to safeguard air quality across South Africa. These standards outline permissible concentrations of various air pollutants, including particulate matter, sulphur dioxide, nitrogen dioxide, carbon monoxide, ozone, and lead, aimed at protecting public health and the environment. The NAAQS serves as a benchmark for assessing and monitoring air quality levels nationwide, guiding government agencies, industries, and other stakeholders in implementing measures to mitigate air pollution and minimise its adverse impacts. NAAQS – $PM_{2.5}$ The National Ambient Air Quality Standard for Particulate Matter with Aerodynamic Diameter less than 2.5 Micron Metres ($PM_{2.5}$) establishes regulatory guidelines to control and monitor fine particulate pollution in the ambient air across South Africa. $PM_{2.5}$ refers to tiny particles suspended in the air, which can penetrate deep into the lungs and pose significant health risks, including respiratory and cardiovascular problems. The standard sets permissible concentration limits for $PM_{2.5}$ in ambient air, serving as a crucial tool for protecting public health and the environment.	Part B.	The standards were consulted when compiling the EMPr.
Noise standards: • SANS 10103:2008 The measurement and rating of environmental noise with respect to annoyance and to speech communication[38].	SANS 10103:2008 outlines guidelines for the measurement and assessment of environmental noise concerning its potential to cause annoyance and disrupt speech communication. This standard provides a framework for objectively evaluating noise levels in various environments to ensure they meet acceptable thresholds for human comfort and communication.	Part B.	The standard was consulted when compiling the EMPr.
IEM guidelines: • Integrated Environmental Management Information Series – Impact Significance. Information Series 5, 2004[39]. • Integrated Environmental Management Information Series – Cumulative Effects Assessment. Information Series 7, 2004[40]. • Integrated Environmental Management Information Series – Criteria for Determining Alternatives in EIA. Information Series 11, 2004[41]. • Review in EIA, Integrated Environmental Management, Information Series 13, 2004[42]. • Public Participation guideline in terms of NEMA EIA Regulations, 2017[43]. • Guidelines on Need and Desirability, 2017[44]. • Guideline on the Administration of Appeals, 2015[45].	The IEM guidelines serve as a comprehensive framework for managing environmental considerations across various sectors and activities. These guidelines emphasise the integration of environmental considerations into decision-making processes at all stages of planning, implementation, and monitoring. By adopting an integrated approach, IEM seeks to balance socio-economic development with environmental protection, ensuring that development activities are sustainable and minimise adverse environmental impacts. Key components of IEM include stakeholder engagement, EIA, environmental management plans, monitoring, and adaptive management strategies.	This report.	The BA process has been undertaken in accordance with the principles of IEM.

[35] South African Bureau of Standards - SANS 310: 1ED 2011: Storage Tank Facilities for Hazardous Chemicals - Aboveground Storage Tank Facilities for Flammable, Combustible And Non-Flammable Chemicals, 2011.
[36] GN 1210 in GG 32816 of 24 December 2009.
[37] GN 486 in GG 35463 of 29 June 2012.
[38] South African Bureau of Standards - SANS 10103:2008 The measurement and rating of environmental noise with respect to annoyance and to speech communication, 2008.
[39] DEAT (2002) Impact Significance, Integrated Environmental Management, Information Series 5, Department of Environmental Affairs and Tourism (DEAT), Pretoria.
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7 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

The Beatrix and the proposed SOFS Operations together form an integrated strategy to sustain and modernise gold mining activity within the Free State Goldfields. Beatrix 1, 2 and 3 Shafts represent mature operations approaching the end of their economic life, whereas SOFS constitutes a brownfield expansion that will extend production, protect jobs, and optimise use of existing infrastructure.

7.1 Economic Considerations

7.1.1 Beatrix 1, 2 and 3 Shaft Operations

Beatrix operation remains a critical regional employer with approximately 6 268 employees and contractors as of 2023 and proven mineral reserves of ~0.7 Moz gold and resources of 7.6 Moz (Sibanye-Stillwater, 2023). Yet, ore grades are declining and operational costs are rising, threatening premature closure. Continuing production from Beatrix is economically vital to:

- Sustain existing employment and prevent regional income loss.
- Preserve supply chains and municipal revenue, particularly within the Matjhabeng and Masilonyana Local Municipalities.
- Utilise sunk infrastructure—shafts, processing plants, and power networks—thereby avoiding costly decommissioning.

The Free State Goldfields once produced nearly 75 % of provincial output, employing about 180 000 workers in the 1980s; by 2013, fewer than 30 000 jobs remained (Stockholm Environment Institute, 2021). Maintaining Beatrix Operations is thus essential to slow the structural decline of the district's economy.

7.1.2 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

The SOFS Project introduces a new mining front south of Virginia, ensuring continuity of ore extraction beyond the Beatrix Mine's lifespan. The development will:

- Generate construction and operational employment, absorbing skilled workers from declining shafts.
- Re-energise the Free State mining supply chain through local procurement and B-BBEE-compliant suppliers.
- Contribute to national Gross Domestic Product and royalty/tax revenue under the Mineral and Petroleum Resources Royalty Act, 2008 (Act No. 28 of 2008).
- Support the National Development Plan 2030 goals of inclusive growth and infrastructure investment.

Nationally, gold mine output has dropped by about 80 % over the past 30 years, making the efficient use of remaining Free State resources a national economic priority (Investor, 2025).

7.2 Social Considerations

7.2.1 Beatrix 1, 2 and 3 Shaft Operations

Beatrix has long been the social anchor of the Virginia-Welkom region. A sudden shutdown would magnify existing unemployment, accelerate out-migration, and strain already-fragile municipal finances (Municipality, 2022). Continued operation supports:

- Sustained household income for over 6 000 families.
- Local economic stability, preventing collapse of service industries and housing markets.
- Ongoing Social and Labour Plan (SLP) implementation, including education and health initiatives.

Average entry-level underground wages in 2023 were approximately R 24 600 per month, with median annual compensation around R 324 000, illustrating the mine's significance to regional income levels (Sibanye-Stillwater, 2023).

7.2.2 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

The SOFS Operation will act as a transition vehicle, providing new employment and absorbing the Beatrix workforce as older shafts close. It will:

- Create direct, indirect, and induced jobs during the 19-year life of mine (LoM).
- Offer training and skills transfer programmes for youth and historically disadvantaged groups.
- Deliver local economic development (LED) projects and community infrastructure through the integrated SLP.
- Reinforce regional social cohesion by preventing the socio-economic collapse experienced after prior mine closures.

These outcomes directly align with the Free State Provincial Growth and Development Strategy (Free State Provincial Government, 2022), which identifies mining revitalisation and human-capital development as core priorities.

7.3 Environmental Considerations

7.3.1 Beatrix 1, 2 and 3 Shaft Operations

The Beatrix shafts occupy a long-established mining area where environmental challenges such as legacy contamination, surface disturbance, and water management are ongoing realities. However, continued operations present an opportunity to transition toward improved environmental performance rather than abandonment and deterioration of old infrastructure.

Active mining under regulated conditions enables:

- Progressive rehabilitation and modernisation of legacy facilities, aligning with current

design and compliance standards.

- Implementation of monitoring programmes for water, air, and biodiversity to track and mitigate impacts.
- Controlled decommissioning and phased closure planning to ensure long term land stability and ecological recovery.

In this way, the ongoing Beatrix Operations serve as an environmentally responsible bridge between historical mining practices and modern standards of environmental stewardship, ensuring that closure occurs systematically, transparently, and within regulatory oversight.

7.3.2 Proposed SOFS Operations (Phase 1 – De Bron Merriespruit Project)

The proposed SOFS development provides a platform for embedding sustainability principles from the earliest stages of mine design, construction, and operation. Unlike historical mining models, SOFS integrates modern technology, adaptive management, and life cycle planning to deliver a low-impact, resource-efficient, and climate-resilient operation.

8 MOTIVATION FOR THE OVERALL PREFERRED SITE, ACTIVITIES AND TECHNOLOGY ALTERNATIVE

In accordance with the EIA Regulations, 2014, applicants must provide sufficient information on feasible and reasonable alternatives to enable informed decision-making. The assessment of alternatives for the Beatrix and SOFS Operations was comprehensively undertaken as part of the approved EIA and associated EMPrs. These processes evaluated a range of reasonable site, activity, and technological alternatives in line with the NEMA principles.

Given that the MRs have been formally granted, and both the EIA and EMPrs have been approved by the Department of Mineral and Petroleum Resources (DMPR), the evaluation and selection of preferred alternatives have already been concluded. Consequently, no further consideration of new or alternative sites, activities, or technologies is possible at this stage. The current proposal is therefore bound by the approved MR areas, authorised activities, and technology choices determined through the prior EIA process.

8.1 Site Location Alternatives

The location of both the Beatrix and SOFS Operations is geologically constrained within the Free State Goldfields of the Witwatersrand Basin. The mineralised reefs that define the orebody are fixed in position and cannot be relocated. The Beatrix orebody extends beneath a long-established mining footprint, while the SOFS orebody lies immediately south of Virginia within the delineated and authorised MR area.

Because the mineralisation is confined to these specific geological zones, no viable alternative locations exist outside the approved MR boundaries. The EIA process confirmed that the current sites represent the only feasible and lawful locations for extraction. Accordingly, no new site location alternatives can be considered.

8.2 Activity Alternatives

The authorised activities associated with the approved MRs include the underground extraction of gold-bearing reefs and all essential supporting infrastructure, such as water management, tailings deposition, ventilation systems, and mineral processing. These activities were assessed and approved through the EIA and EMPr processes.

Alternative mining activities were found infeasible due to geological, safety, and environmental limitations. Therefore, the existing underground mining activities remain the only practical and legally authorised approach. As such, no further activity alternatives can be evaluated or implemented.

8.3 Technology Alternatives

During the EIA phase, various mining and processing technologies were considered. Conventional narrow-reef underground mining methods were confirmed as the most appropriate for the Beatrix and SOFS orebody, given the reef thickness, dip, and structure. Advanced mechanised or bulk mining methods, such as block caving, were ruled out on safety and economic grounds.

Similarly, for mineral processing, the CIL process was selected as the preferred technology over Carbon-in-Pulp due to its higher recovery efficiency in low-grade, carbonaceous ore, reduced plant footprint, lower capital cost, and improved control of preg-robbing potential. These technological selections were reviewed and approved as part of the EIA and EMPr processes.

As these technologies are already authorised, no new technology alternatives are under consideration.

8.4 "No-Go" Alternative

The "No-Go" alternative represents the scenario in which the Beatrix and SOFS Operations do not proceed beyond their existing authorised limits and no further development or operational continuation occurs within the approved MR areas. In this case, all activities would be halted, and the status quo would prevail. While this alternative is a mandatory consideration in terms of the EIA Regulations, it must be evaluated in light of the approved MRs, EAs, and EMPrs, which collectively guide the lawful continuation of mining.

From a biophysical perspective, the "No-Go" alternative would result in limited short-term environmental disturbance, as no new construction or operational activities would take place. This would avoid additional surface infrastructure development, waste generation, and incremental disturbance to land, vegetation, and water resources. However, it would also prevent the implementation of planned progressive rehabilitation measures associated with the continuation of operations. Existing disturbed or brownfield areas, such as redundant shaft complexes, tailings footprints, and open disturbed zones, would remain in their current condition, without the benefit of active rehabilitation, stabilisation, or closure investments that form part of the approved EMPr commitments. In effect, the "No-Go" alternative could prolong environmental degradation and

safety risks associated with legacy mining features by leaving them unmanaged or under-maintained.

From a geological and resource management standpoint, the “No-Go” alternative would result in the sterilisation of proven and probable mineral reserves within the SOFS MR area. These resources, which have been delineated through extensive exploration and confirmed through the EIA process, would remain unexploited despite their economic viability and the existence of approved rights. The sterilisation of these resources would represent a direct loss to the national mineral inventory and to the broader economic contribution of the mining sector to South Africa’s Gross Domestic Product.

From a socio-economic perspective, the “No-Go” alternative carries significant negative implications. The Beatrix and SOFS Operations are central to the local and regional economies of the Matjhabeng and Masilonyana Local Municipalities, both of which are already characterised by high unemployment, dependency on the mining sector, and limited alternative economic activities. Should the operations not proceed, the result would be a reduction in direct employment opportunities, loss of contractor and supplier income, and a decline in induced employment in the service and retail sectors. The loss of wages and procurement spending would, in turn, erode household incomes, exacerbate poverty levels, and place additional strain on municipal social services and infrastructure.

Furthermore, the cessation of mining activities would undermine the ongoing implementation of the company’s SLP commitments. These include training, skills development, enterprise support, community infrastructure, and socio-economic upliftment programmes. Suspension or termination of these initiatives would deprive surrounding communities of critical support systems aimed at local economic diversification and sustainable livelihoods.

From a strategic policy perspective, the “No-Go” option would be misaligned with the objectives of the Free State Provincial Growth and Development Strategy, the Matjhabeng and Masilonyana Integrated Development Plans (IDPs), and the National Development Plan, all of which promote inclusive economic growth, job creation, and responsible utilisation of natural resources. Allowing the mining rights to lapse without responsible utilisation would contradict national priorities for mineral beneficiation, transformation, and post-mining rehabilitation.

From a long term sustainability perspective, the continuation of authorised mining allows for structured closure planning, implementation of rehabilitation programmes, and establishment of post-mining land uses that are ecologically and socio-economically viable. In contrast, the “No-Go” alternative would defer these responsibilities indefinitely, leaving previously disturbed land in a state of partial abandonment without the funding mechanisms or operational capacity necessary for progressive rehabilitation.

In summary, while the “No-Go” alternative would prevent any new disturbance and may appear environmentally conservative in the short-term, it would:

- Foreclose opportunities to rehabilitate and repurpose disturbed brownfield sites.

- Result in sterilisation of valuable mineral resources.
- Exacerbate unemployment and socio-economic decline in the region.
- Undermine ongoing SLP and community development initiatives.
- Contradict national and provincial development policies.

Accordingly, the "No-Go" alternative is not considered desirable or sustainable when balanced against the strategic, social, environmental, and economic advantages of proceeding with the authorised continuation of the Beatrix and SOFS Operations. The preferred alternative, continuation within the approved MR and EMPr framework, therefore, remains the most responsible and sustainable option.

9 FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED ALTERNATIVES WITHIN THE SITE

The process followed to determine the preferred site, activity, and technology alternatives was comprehensively undertaken as part of the EIA process completed for the Beatrix and SOFS Operations.

During the EIA, a systematic and comparative assessment of alternatives was performed, including:

- Desktop analysis and site verification, to identify feasible operational footprints based on geological, technical, environmental, and land use constraints.
- Screening of environmental sensitivities, such as proximity to watercourses, wetlands, infrastructure, and existing disturbed areas.
- Stakeholder engagement, including consultation with landowners, communities, and regulatory authorities to identify E&S concerns.
- Specialist investigations, including geology, geohydrology, surface water, ecology, socio-economic, heritage, air quality, and noise studies, to inform the selection of the most suitable alternative.
- Integration of findings through the Environmental Impact Report and EMPr to ensure the preferred alternative achieved the optimal balance between environmental protection, technical feasibility, and socio-economic benefit.

Following this structured evaluation, the preferred alternative, comprising the current authorised mining method, infrastructure layout, and processing technology, was formally approved by the DMPR through the issuance of the Mining Rights and EMPrs.

As the selection process has been finalised through the approved EIA and EMPrs, no further review or amendment of alternatives is possible at this stage. The current operational configuration therefore represents the legally authorised and environmentally optimised alternative for the site.

10 DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED

During the EIA phase, several development footprint alternatives were considered to identify the most suitable locations for surface infrastructure associated with both the Beatrix and SOFS Operations. These included the siting of shafts, WRDs, TSFs, processing infrastructure, and access routes.

The alternatives were assessed based on technical feasibility, environmental sensitivity, land availability, safety, and proximity to existing infrastructure. The following key principles guided the evaluation:

- Maximisation of brownfield development, by prioritising placement of new infrastructure within or adjacent to existing disturbed areas.
- Avoidance of high environmental sensitivity zones, including wetlands, watercourses, and areas of high biodiversity value.
- Optimisation of operational efficiency, by ensuring proximity between shafts, processing facilities, and waste management infrastructure.
- Minimisation of socio-economic impacts, through avoidance of residential or community land and alignment with existing servitudes.

Based on these criteria, the preferred development footprint was selected as the most environmentally and operationally suitable configuration. The layout was refined through iterative input from engineering design teams and environmental specialists.

All footprint alternatives, including initial layout options, were subjected to environmental and technical screening, and the final authorised footprint reflects the outcome of that rigorous process. Since the MRs and EMPrs are now approved, no further footprint alternatives can be considered, and all current activities must remain within the approved development boundaries.

11 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

11.1 Approach and Methodology

The public participation approach adopted for this project is in line with the processes contemplated in Chapter 6 (regulation 39 to 44) of the EIA Regulations, 2014. A phased approach for the public participation activities has been adopted as aligned with requirements of NEMA, namely:

- Application Phase.
- Announcement Phase.
- BA Phase.
- Decision Phase.

Table 11-1 notes the public consultation phases, objectives for each interaction with I&APs, key

activities undertaken and outputs.

Table 11-1: Public Consultation Phases, Objectives, Key Activities and Outputs

Phase	Objective	Key Activities	Key Outputs
Application Phase	To initiate the process by identifying triggered Listed Activities and submitting the required application.	Conduct site screening to confirm applicable Listed Activities. Prepare and submit the Environmental Authorisation (EA) Application to Department of Mineral and Petroleum Resources (DMPR).	Submission and formal acceptance of the EA Application by the DMPR.
Announcement Phase	To inform stakeholders of the proposed project and initiate the public participation process.	Publish advertisements in national and local newspapers. Erect site notices. Distribute a Background Information Document (BID).	Public awareness of the project. Receipt of initial comments and concerns from interested and affected parties (I&APs).
Basic Assessment Phase	To assess the potential environmental impacts of the project and propose mitigation measures.	Conduct specialist studies and compile the Draft Basic Assessment Report (BAR). Circulate the Draft BAR for 30-day public review. Submit Final BAR.	Submission of a comprehensive BAR outlining potential impacts and proposed mitigation measures.
Decision-Making Phase	To enable the Competent Authority to evaluate the Final BAR and issue a decision.	DMPR reviews the Final BAR. Conditions of authorisation may be included to ensure compliance.	EA granted.

11.2 Public Participation Activities

The public participation process (PPP) was executed in compliance with the regulations stipulated in the EIA Regulations, 2014. An integrated approach, conducting a combined PPP for both applications, was adopted to ensure effective engagement with stakeholders. The Public Participation Report is attached as Appendix H.

11.3 Announcement to Local Municipalities

An invitation letter (Appendix A of the Public Participation Report) was sent on 2 June 2025 to the Offices of the Speaker of the Masilonyana and the Matjhabeng local municipalities respectively. The letter announced the intention of the applications, invited the participation of the municipalities and requested them to assist with hosting public meetings in their areas of jurisdiction. Matjhabeng Local Municipality provided their cooperation and assisted with the identification of a suitable public venue. Masilonyana Local Municipality requested to first have a clarification meeting. Subsequently, a virtual meeting was held on 19 June 2025 between representative of the Masilonyana Local Municipality, Sibanye-Stillwater and GCS during which the applications were announced, and assistance was requested with the rolling-out of the PPP.

At the request of the Masilonyana Local Municipality, GCS and Sibanye-Stillwater attended a meeting on 15 July 2025 where GCS presented the public participation approach to a larger audience of Masilonyana Local Municipality representatives. A memorandum of the points discussed was made available to all who attended the meeting (Appendix A of the Public Participation Report). As one

of the outcomes of the meeting, the Masilonyana Local Municipality confirmed its willingness to assist in developing a public participation strategy in line with Regulation 41 of the EIA Regulations, 2014.

For the remainder of July 2025 GCS attempted to convene an online workshop with the Masilonyana Local Municipality to jointly develop the public participation strategy. Despite several follow-up attempts, no response was received. A draft Stakeholder Engagement Plan (SEP) (Appendix A of the Public Participation Report) was submitted to the Masilonyana Local Municipality on 31 July 2025 requesting comments by 6 August 2025 to enable timely implementation of the plan. No response was received despite follow-up efforts.

Sibanye-Stillwater submitted a formal letter to the Masilonyana Local Municipality on 8 August 2025 emphasising the importance of finalising the SEP and highlighting the regulatory implications of continued delays. No response was received.

Sibanye-Stillwater submitted a formal letter to the Regional Manager of the DMPR outlining the challenges faced and requesting guidance in terms of the process followed with the Masilonyana Local Municipality. Following engagements with the DMPR, a public meeting was not held in the Masilonyana municipal area and extension was received for the submission of the Final Basic Assessment Reports (FBARs) until 16 January 2026.

11.4 Development of Stakeholder Database

An existing stakeholder database, obtained from Sibanye Gold, was reviewed and updated. The updated database included I&APs grouped into the following categories:

- Authorities: National and Provincial;
- District and Local Municipalities: Lejweleputswa District Municipality, Matjhabeng and Masilonyana Local Municipalities;
- Environmental Non-Profit Organisations: Including the Federation for Sustainable Environment;
- Adjacent Landowners and those residing in the Mining Rights areas;

The stakeholder database is included as Appendix A of the Public Participation Report.

11.5 Public Participation Media

In compliance with NEMA, the following public participation media were employed during the assessment:

11.5.1 Publication of Newspaper Advertisements

Newspaper advertisements in English and Sesotho were published as follows:

Newspaper	Date
Masilonyana News	15 November 2025
Free State Sun	31 October 2025

Newspaper	Date
Sowetan	30 October 2025
Vista	30 October 2025

The listed newspapers are all distributed in the Mining Rights and surrounding areas. The advertisement notified I&APs of the project, invited them to register and provide comments on the Draft Basic Reports (DBARs). Refer to Appendix B of the Public Participation Report for proof of the placement of the advertisements.

11.5.2 Site Notices

Site notices in English and Sesotho were placed on 13 November 2025 in public locations around the project area to inform I&APs about the project and encourage their registration and participation. A table and map indicating the location of site notices are provided in Appendix D of the Public Participation Report.

11.5.3 Background Information Document and Registration and Comment Form

The BID, which was available in English and Sesotho provided details on the applications, availability of the DBARs, environmental regulatory processes, opportunities for participation and was distributed on 13 November 2025 via email to registered I&APs. A Registration and Comment Form accompanied the BID to facilitate stakeholder registration and feedback. Refer to Appendix E of the Public Participation Report.

11.5.4 Announcement of the availability of the Draft Basic Assessment Reports

On 11 November 2025, stakeholders were notified of the availability of the DBARs via email and SMS. The DBARs were accessible electronically on two separate websites and in hard copy at the locations listed below.

Place	Address
Hard copies:	
Meloding Public Library	Meloding Street, Virginia
Virginia Public Library	Virginia Garden Circle
Welkom City Library	Welkom Central, Welkom
Theunissen Public Library	Le Roux Street, Pienaar Ave, &, Theunissen
Electronic copies:	
GCS Website	https://www.gcs-sa.biz/public-documents/
Sibanye's Data Free Portal	https://ulwazi.datafree.co/#/pub/login

Proof of delivery is provided in Appendix F of the Public Participation Report.

A legislated 30-day review period was provided for stakeholders to review and comment on the DBARs, spanning 14 November 2025 to 8 January 2026. Notification emails are included in Appendix F of the Public Participation Report, and SMS notifications which were sent on 12 November 2025 are included as Appendix G of the Public Participation Report.

11.5.4.1 Public meeting to review the contents of the Draft Reports

A public meeting was held on 26 November at 14:00 at the Ferdie Meyer Hall in Welkom. The purpose

of the meeting was to review and discuss the content of the Draft Basic Assessment Reports. Notice of the meeting was provided in email notifications, in the advertisements published, site notices placed. The meeting was attended by members of the community who reside in the Mining Rights area. Appendix H of the Public Participation Report provides the attendance register and presentation delivered during the meeting. The discussions which took place during the meeting are included in the Comment and Response Report (CRR).

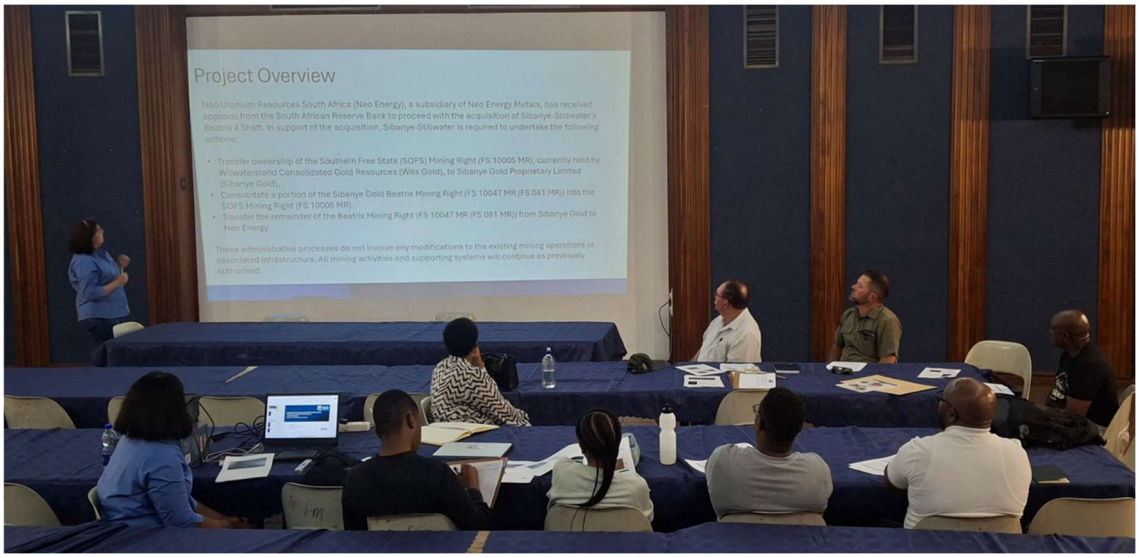


Figure 11-1: A public meeting was held on 26 November 2025 at the Ferdie Meyer Hall in Welkom

11.5.5 Announcement of the availability of the Final Basic Assessment Reports

The CRR was appended to the FBARs for submission to the DMPR. The FBARs were released electronically on the GCS and Sibanye websites for stakeholders to verify the accuracy of their comments and how these comments have been considered in the submissions. Notifications regarding the FBARs' submission were sent via email and SMS on 19 January 2026.

Notification of the decision to be taken on the application by the DMPR will be distributed to I&APs. They will also be informed of the appeals procedure.

11.6 Comments and Response Report

All comments received from the announcement in November 2025 and from the public review of the DBARs were captured in a CRR (Appendix I of the Public Participation Report). The CRR is appended to the FBARs as a full record of issues raised to date, including responses on how the issues were considered.

11.7 Conclusion

A comprehensive PPP was conducted for the project, ensuring extensive efforts to inform and engage I&APs. The stakeholder database was regularly updated to maintain effective communication, and notifications and reports were disseminated through multiple channels.

The process adhered to legal requirements and principles of transparency, providing all relevant stakeholders with an opportunity to contribute and be heard.

The DMPR will assess the FBARs and make an informed decision on whether the project should be approved. The decision will be communicated to I&APs as per the regulatory requirements.

12 ENVIRONMENTAL ATTRIBUTES

This section provides an overview of the environmental baseline conditions which have been extracted from available information and desktop assessments undertaken by the relevant specialists.

12.1 Climate

The project area falls within the central Free State plateau and exhibits a cold semi-arid (BSk) climate under the Köppen–Geiger classification system. This climatic regime is characterised by warm, wet summers and cool, dry winters.

Long term climatic data for the Welkom–Virginia region indicate a mean annual temperature of approximately 17.7 °C, with strong seasonal variation. The warmest months occur between December and February, when daily maximum temperatures average around 29–30 °C, while the coldest months are June and July, when daily minimum temperatures often fall below 5 °C. This pronounced temperature range reflects the region's high-altitude continental climate.

Rainfall in the region is strongly seasonal, concentrated during the summer months (October–March) and minimal during winter (May–August). The mean annual precipitation for the project area ranges from 570 mm to 600 mm, based on long term records from the South African Weather Service (Welkom and Virginia stations). January and February are typically the wettest months, each contributing 60–80 mm of rainfall, while June and July receive less than 10 mm. Summer rainfall events are typically convective thunderstorms of high intensity and short duration, contributing to localised erosion and flash runoff, while the dry winter period is dominated by stable, clear conditions and frost.

Evaporation data derived from the South African Atlas of Climatology and Agrohydrology indicate an annual A-Pan equivalent potential evaporation of approximately 2 441 mm for the site.

12.2 Topography

The topography of the area is typical of the gently undulating plains of the Highveld plateau in the central Free State Province. The area lies between the towns of Welkom, Virginia, and Theunissen, within the Matjhabeng and Masilonyana Local Municipalities. Elevations range from approximately 1 340 to 1 420 metres above mean sea level (mamsl), with the terrain exhibiting a gradual regional slope towards the east and northeast, following the natural drainage direction of the Sand and Vet River systems.

The landscape is generally flat, with subdued relief and minimal elevation differences across the

MR area. The northern and central portions, near Virginia, comprise broad plains underlain by weathered Karoo sediments intruded by dolerite sills, which occasionally form low rises or gentle ridges. The southern portions, closer to Theunissen, display slightly more variation in relief due to localised dolerite intrusions and shallow drainage depressions. Overall, the topography is low-gradient and uniform, with typical slope angles of less than two percent, providing favourable conditions for both mining and agricultural activities.

The area is intersected by a network of perennial and non-perennial drainage lines associated with the Sand and Vet Rivers, which are the principal hydrological features. These rivers flow eastward and form shallow valleys and minor tributary channels, with limited incision due to the area's soft sedimentary geology and gentle gradient. Scattered pans and seasonal depressions occur in the flatter parts of the landscape, reflecting restricted surface drainage and the presence of fine-grained clayey soils derived from Beaufort mudstones.

12.3 Geology

12.3.1 Regional Geology

The Beatrix and SOFS Operations are located within the Free State Goldfield, along the south-western margin of the Witwatersrand Basin, a major Archaean sedimentary basin globally renowned for its gold and uranium mineralisation. The basin is composed primarily of sedimentary rocks of the Witwatersrand Supergroup, deposited between approximately 3.1 and 2.7 billion years ago, and subsequently overlain by the Ventersdorp Supergroup volcanic rocks and the Karoo Supergroup sedimentary cover.

The gold-bearing reefs occur within the Central Rand Group of the Witwatersrand Supergroup, where mineralisation is hosted in quartz-pebble conglomerates developed on erosional unconformities. These reefs were deposited in ancient braided-river and alluvial-fan systems, representing high-energy fluvial environments. In the Free State Goldfield, reef packages generally dip between 10° and 25°, are laterally extensive, and vary in thickness from 1 to 2.5 m.

The regional structure is defined by a north–south trending synclinal basin geometry, disrupted by a series of normal and reverse faults. The most significant of these is the De Bron Fault, which forms the western structural boundary of the SOFS area and exhibits a down-throw of more than 1 000 m to the west. Compression and subsequent extensional events during basin evolution produced a complex structural architecture of folds, normal faults, and unconformities that control the distribution and thickness of the economic reefs.

The stratigraphic succession within the Central Rand Group includes, from base to top, the Virginia, St Helena, Welkom, Harmony, and Dagbreek Formations. Economic reef horizons developed along the basal unconformities of these units include the Leader Reef (Dagbreek Formation), B Reef (Spes Bona Formation), Kalkoenkrans Reef (Aandenk Formation), and the Beatrix/VS5 Reef (Eldorado Formation). These reefs constitute the principal gold-bearing units exploited at both Beatrix and SOFS.

12.3.2 Local Geology

At Beatrix Operations, the local geology is characterised by a broad north–south trending syncline that controls the dip and geometry of the reefs. The reefs dip moderately to the east and flatten into the basin centre. Intrusive dolerite dykes and sills are common and locally affect mining through water and methane inflows. Faulting typically results in vertical displacements ranging between 30 m and 200 m, which influence orebody continuity and mine planning.

The main economic reef at Beatrix is the Kalkoenkrans Reef, occurring at the base of the Kimberley Formation. It is a well-packed, medium- to coarse-pebble conglomerate consisting of milky and smoky quartz pebbles with minor black chert. Other important reefs include the BR (Elsburg Formation), VS5 Reef (Eldorado Formation), Aandenk Reef (Kimberley Formation), Composite Reef, and the Beisa Reef, the latter containing both gold and uranium mineralisation.

The SOFS orebody represents the southern extension of the Beatrix geological domain and lies across the axis of a north-easterly plunging synform that marks the southern closure of the Witwatersrand Basin. At surface, the area is underlain by the Karoo Supergroup, comprising mudstone and shale of the Adelaide Subgroup (Beaufort Group, Permian age), with subordinate fine-grained sandstone and minor calcareous horizons. Borehole data confirm that the Karoo succession varies in thickness between 258 m and 655 m.

During the Late Jurassic, this sequence was intruded by dolerite dykes and sills, particularly concentrated in the northern and south-eastern sectors of the SOFS lease area. The thermal alteration of the Karoo strata at contact zones produced localised fracturing and weathering, resulting in preferential groundwater flow paths. Beneath the Karoo strata, the Ventersdorp Supergroup overlies the auriferous conglomerates of the Witwatersrand Supergroup, which contain the same economic reefs exploited at Beatrix Mine.

Within the SOFS area, five unconformity-bounded sequences of the Johannesburg Subgroup have been recognised—Virginia, St Helena, Welkom, Harmony, and Dagbreek Formations. Gold- and uranium-bearing reefs are developed along their basal contacts. The Leader, B, Kalkoenkrans, and Beatrix/VS5 Reefs are the most significant, though local variations occur due to thinning of the Central Rand Group towards the basin margin.

12.3.3 Structural Geology

Structurally, both Beatrix and SOFS are influenced by a series of folds, faults, and intrusive features associated with the late-stage tectonic and igneous history of the Witwatersrand Basin. The Beatrix/VS5 unconformity at the base of the Eldorado Formation provides a key regional stratigraphic marker for correlation across both areas.

At Beatrix, the structure is relatively simple, defined by gentle synclinal folding and limited faulting, with displacements typically less than 200 m. In contrast, SOFS exhibits more complex deformation. The Central Rand Group strata are deformed into a broad, north-easterly plunging syncline with smaller parasitic folds marking the southern margin of the basin. The De Bron Fault dominates the

western boundary, showing down-throw in excess of 1 000 m and defining the transition to the Platberg Graben sequence. Additional minor thrust faults and shear zones trend northeast–southwest, locally duplicating stratigraphy and influencing orebody geometry.

This structural framework, together with the dolerite intrusions, affects both mine design and hydrogeological behaviour, particularly in terms of groundwater flow and geotechnical stability.

12.4 Soil, Land Use and Land Capability

The following sections have been extracted and adapted from the specialist study titled "Detailed Soil, Land Use and Land Capability Assessment for the SOFS Mining Right Application Area" prepared by Terra-Africa Consult (2012), and the "Beatrix Gold Mine – Baseline Biodiversity and Wetland Assessment" compiled by Natural Scientific Services CC (NSS, 2016b).

12.4.1 Soils

The SOFS and the Beatrix Operations are situated within the Free State Goldfields, where soils are derived primarily from Ecca and Beaufort Group shales, mudstones, and sandstones, often intruded by dolerite sills. The terrain is predominantly flat to gently undulating, with slopes rarely exceeding 3%.

At SOFS, the dominant land types are Bd20 and Dc8, corresponding to well-drained, sandy clay-loam soils underlain by sedimentary and doleritic formations. Six principal soil forms were identified: Clovelly (Cv), Avalon (Av), Oakleaf (Oa), Valsrivier (Va), Mispah (Ms) and Katspruit (Ka).

- Clovelly (50%) – deep, well-drained yellow-brown apedal soils with high potential for cultivation.
- Avalon (20%) – deep soils with a soft plinthic B-horizon, retaining water and performing well in dry years.
- Oakleaf (16%) – moderately deep soils with neocutanic B-horizons, suitable for limited cropping.
- Valsrivier (11%) – clay-enriched subsoils prone to erosion and restricted drainage, supporting grazing.
- Mispah (2%) – shallow lithic soils over weathered rock, supporting only grazing.
- Katspruit (1%) – hydromorphic wetland soils, providing water filtration and storage functions.

Soil pH values ranged between 4.5 and 5.4, classifying them as strongly to very strongly acidic. High calcium and magnesium concentrations were recorded, likely due to long term fertiliser use. The soils are dominated by loamy sand to sandy clay-loam textures, resulting in moderate erodibility and low to medium fertility.

At Beatrix 1–3 Shafts, field and wetland assessments revealed similar pedological patterns, with hydromorphic and alluvial soils occurring along the Doring River and its tributaries, and red-brown

apedal and structured soils on upland areas. Wetland soils displayed mottled and gleyed horizons typical of fluctuating water tables, corresponding to the Katspruit and Valsrivier form.

12.4.2 Land Use

The regional landscape around both the SOFS and Beatrix Operations is characterised by dryland crop farming and livestock grazing within the Dry Sandy Highveld Grassland Biome.

At SOFS, land use is dominated by maize, wheat, and soybean cultivation, interspersed with grazing lands and scattered rural homesteads. Portions of the site are used for cattle and sheep farming, reflecting long-established agricultural land tenure patterns. The project area intersects four privately owned farms, meaning that mining development could fragment agricultural units and reduce management efficiency.

At Beatrix 1–3 Shafts, mining and agriculture coexist, with operational infrastructure, ventilation shafts, and haul roads situated amidst extensive cultivated fields. The Doring River and associated depressions support ephemeral wetlands and pans, some of which are utilised for agricultural drainage or evaporation ponds. Historical modifications and tailings-related seepage have altered portions of the landscape, though agricultural production remains dominant in peripheral zones.

12.4.3 Land Capability

The land capability classes within the SOFS area are primarily arable (Classes III–IV), with smaller extents of grazing land (Class V–VI) and wetland capability (Class VII).

- Arable areas (~905 ha) correspond to the deep Clovelly, Avalon, and Oakleaf soils, which can support sustained dryland cropping under moderate inputs.
- Grazing areas (~122 ha) coincide with shallow, rocky, or clay-rich soils (Valsrivier and Mispah forms).
- Wetland areas (~23 ha) comprise hydromorphic Katspruit soils that provide ecological services such as water purification, groundwater recharge, and biodiversity support.

At Beatrix 1–3 Shafts, land capability mirrors these trends but is more fragmented by mining and wetland systems. Productive land occurs mainly on the gently sloping plains between the Doring and Boschluis Spruit Rivers, whereas valley bottoms and depressions possess low to very low agricultural potential due to periodic waterlogging and altered hydrology.

12.5 Hydrogeology

The following sections below have been extracted and adapted from the De Bron Merriespruit South Groundwater Study prepared by GCS (Pty) Ltd (2012), and the Beatrix Mine Hydrogeological Study compiled by SRK Consulting (2019). Additional updates and contextual information were incorporated from the SOFS EMPr Update Hydrogeological Assessment Report (2024).

12.5.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

12.5.1.1 Regional Hydrogeological Setting

SOFS Operations is located south of Virginia, is underlain by two primary aquifer systems. The upper aquifer is associated with the Karoo Supergroup, comprising mudstones and sandstones of the Vryheid Formation intruded by dolerite dykes and sills. This forms an intergranular–fractured aquifer with variable secondary permeability. The deeper aquifer occurs within the quartzites and conglomerates of the Witwatersrand Supergroup, confined below the Karoo sequence and hydraulically separated by a dolerite sill and mudstone sequence.

Fracturing and faulting, particularly along the De Bron Fault Zone, significantly influence groundwater movement. The shallow aquifer yields between 0.1 and 0.5 L/s, while transmissivity values in the deeper aquifer average approximately 10 m^2/day. The shallow aquifer supports limited domestic and agricultural water use, while the deeper aquifer contributes primarily to mine inflows once intercepted by underground workings.

12.5.1.2 Groundwater Levels and Flow

Static water levels within the shallow Karoo aquifer range from approximately 10 to 25 mbgl. Groundwater gradients correspond closely with surface topography, with flow directed generally north and northwest toward the Sand River. Recharge occurs through diffuse infiltration and is estimated at 1–3% of the mean annual rainfall, equivalent to roughly 3–15 mm per year. The low recharge reflects the semi-arid climate and dominance of low permeability mudstone units.

12.5.1.3 Groundwater Quality

Groundwater quality across the area is generally suitable for agricultural use, though some localised impacts from agricultural activities are evident. Electrical conductivity ranges from 70 to 800 mS/m, and pH values between 5.6 and 8.2 indicate neutral to mildly acidic conditions. The dominant water types are Calcium–magnesium–bicarbonate and sodium–magnesium–chloride, reflecting variable weathering and mixing processes. Elevated arsenic and nitrate concentrations have been recorded in some shallow boreholes, likely associated with agricultural fertiliser application and livestock activities.

12.5.1.4 Hydraulic Modelling and Mine Inflows

Hydraulic modelling using both steady-state and transient simulations has indicated potential mine inflows ranging between 200 and 6 300 m^3/day, depending on geological connectivity, shaft depth, and fault zone permeability. Drawdown is anticipated to extend approximately 1–1.5 km from the proposed shafts in the upper aquifer, with minor influence in the confined lower aquifer. Post-mining recovery simulations predict slow rebound of groundwater levels over approximately 100 years following cessation of dewatering, with no risk of decant due to the topographic elevation of the proposed workings.

12.5.1.5 Contamination Risk and Mitigation

Geochemical testing of tailings and waste rock confirmed the presence of pyrite with limited neutralisation capacity, indicating potential acid generation under oxidising conditions. Modelling of contaminant migration predicts that, without mitigation, a sulphate-rich plume could extend up

to 1 km downgradient of the TSF over a 100-year period.

Mitigation measures recommended for the SOFS Operations include:

- Installation of liners and seepage interception drains beneath all TSF and return water dams.
- Grouting of shaft collars and decline sidewalls to limit ingress and percolation.
- Establishment of a groundwater monitoring network with boreholes located upgradient and downgradient of key infrastructure.
- Quarterly sampling for electrical conductivity, pH, sulphate, cyanide, arsenic, iron, manganese, and nitrate.
- Integration of all groundwater data into a centralised database for trend analysis and annual reporting.

12.5.1.6 Post Closure Behaviour

Post closure groundwater recovery is expected to be gradual, governed by the slow recharge rate and the hydraulic isolation of the deeper aquifer. The long term modelling predicts equilibrium recovery without surface decant, provided that containment measures and rehabilitation practices are effectively implemented.

12.5.2 Beatrix 1, 2 and 3 Shafts

12.5.2.1 Regional Hydrogeology

The Beatrix Operations, comprising Shafts 1, 2, and 3, lies within the same regional geological domain as the SOFS Operations. The hydrostratigraphy consists of a shallow Karoo aquifer and a deeper Witwatersrand aquifer. The shallow aquifer, formed within the weathered sandstones and mudstones of the Karoo Supergroup, is largely unconfined and of local significance. The deeper aquifer occurs within fractured quartzites and conglomerates of the Witwatersrand Supergroup and is hydraulically influenced by historical and current dewatering.

12.5.2.2 Groundwater Levels and Flow

Groundwater levels range between 1 332 and 1 405 mamsl, reflecting a southward-deepening gradient aligned with local surface topography. Flow is directed primarily northwest towards the Sand River and westward toward the Doring River. Groundwater levels have been influenced by prolonged mine dewatering, forming a localised cone of depression beneath active shafts.

12.5.2.3 Hydraulic Properties and Recharge

Transmissivity within the shallow aquifer varies from 0.5 to 5 m^2/day, confirming limited yield and localised importance. The deeper Witwatersrand aquifer shows hydraulic conductivities ranging from 10^{-3} to 10^{-5} m/s and a storativity value of approximately 10^{-4}. Recharge to both systems is estimated at 1–3% of annual rainfall (6–15 mm/year). The Karoo aquifer is recharged through diffuse infiltration, while the deep aquifer receives limited recharge through fractures and fault zones.

12.5.2.4 Groundwater Quality

Groundwater monitoring between 2004 and 2018 identified pH values of 6.4–8.9 and electrical conductivity between 250 and 1 200 mS/m. The water chemistry is dominated by Ca-Mg-SO_4 and Na-Cl types. Localised areas of elevated sulphate, iron, and manganese concentrations occur downgradient of TSF and evaporation ponds, indicating seepage influence. Water quality in the shallow aquifer is generally suitable for livestock and limited domestic use, while deeper groundwater requires treatment prior to use due to salinity and trace-metal content.

12.5.2.5 Contamination and Receptors

Potential groundwater receptors include private boreholes, the Doring and Theronspruit rivers, and associated wetlands. Contaminant migration is largely controlled by structural discontinuities, with plume migration rates of approximately 5 m/year. Contaminants primarily include sulphate, chloride, and dissolved metals emanating from TSFs and evaporation ponds.

12.5.2.6 Groundwater Management and Mitigation

Groundwater management measures implemented or proposed for Beatrix include:

- Construction of interception trenches and cut-off drains connected to sumps and return water systems.
- Progressive rehabilitation and capping of TSFs and return water dams to limit infiltration.
- Regular chemical monitoring of groundwater to assess plume migration.
- Limiting new borehole abstraction within 1 km downgradient of TSFs.
- Implementation of water reuse and containment measures to minimise contamination risk.

Long term modelling predicts that contaminant plumes from Beatrix 2 TSF could extend up to 1 km north-west by 2025 if unmanaged. However, post closure rebound modelling suggests that the system will stabilise within 30–50 years after mine closure, with no significant decant risk expected due to the compartmentalised hydrogeological conditions.

12.6 Hydrology

The following sections have been extracted and adapted from the Wits Gold DBM Project Hydrology Scoping Report (2012) and the Terrestrial Biodiversity Impact Assessment (Bathusi, 2012). Additional contextual updates were incorporated from the SOFS EMPr Update Hydrogeological and Surface Water Assessment (2024).

12.6.1 Hydrological Setting

The SOFS and Beatrix Operations are located within the central Free State plateau, which experiences a cold semi-arid (BSk) climate under the Köppen–Geiger classification. The climate is typified by warm, wet summers and cool, dry winters. Mean annual temperatures are approximately 17.7 °C, with summer maximums of 29–30 °C and winter minimums often falling below 5 °C. Rainfall is strongly seasonal, occurring predominantly between October and March, with an average of 570–

600 mm per year, while winter months are characteristically dry. Summer thunderstorms are short-lived but intense, generating localised erosion and flash runoff. Annual potential evaporation is approximately 2 441 mm, resulting in a strongly negative water balance that limits perennial surface flow.

These climatic conditions shape the hydrological response of the landscape. The area is characterised by ephemeral drainage systems, which flow only during and immediately after rainfall events. Between storms, stream channels remain dry, and baseflow is negligible due to low infiltration rates and high evaporative losses. The terrain is generally flat to gently undulating, with elevations ranging between 1 320 and 1 460 mamsl. This subdued relief promotes slow runoff velocities and the accumulation of water in shallow depressions, which form ephemeral pans and wetland systems.

Surface water occurs mainly in the form of farm dams, small impoundments, and natural pans, which are recharged during the summer months and dry out during the winter. These features play an important role in sediment retention, groundwater recharge, and biodiversity support but are sensitive to increased sedimentation, agricultural runoff, and mining related disturbance. Within the SOFS area, surface water drains northwards towards the Merriespruit, a tributary of the Sand River, while the Beatrix Operations drain westwards towards the Doring River and ultimately into the same broader system.

The hydrological regime of both areas is therefore defined by low annual runoff, high evaporation rates, and intermittent flows. Under natural conditions, the catchment produces limited surface discharge, and runoff events are of short duration. Any alteration to land cover, such as vegetation clearance or compaction from mining and agricultural activity, can significantly affect infiltration, erosion rates, and sediment yield.

12.6.2 Catchment

The SOFS and Beatrix Operations fall within the Upper Vaal Water Management Area (WMA 8) and are located primarily in Quaternary Catchments C42K and C42L. Surface drainage follows a north-north-west direction towards the Sand River, which is a major tributary of the Vaal River. The Merriespruit and several smaller unnamed tributaries represent the principal surface water features within the SOFS area, while the Beatrix 1–3 Shafts are drained by short ephemeral streams that converge with the Doring River to the west.

The catchment exhibits gentle slopes, fine-textured soils, and low infiltration capacity, which result in rapid runoff during heavy summer storms but minimal sustained discharge. Because evaporation greatly exceeds rainfall, the system is dominated by non-perennial streams and pans that retain water only temporarily. Several farm dams and constructed channels have modified natural drainage pathways, increased retention time and altering downstream flow patterns.

Land use within the catchment is dominated by dryland crop cultivation and livestock grazing, with mining operations contributing additional anthropogenic pressure. These land uses have introduced

soil compaction, erosion, and nutrient enrichment, particularly near farm dams and drainage lines. During high intensity rainfall, surface runoff mobilises sediment and nutrients into depressional wetlands and pans, accelerating siltation and eutrophication.

Water quality monitoring in the region indicates neutral to slightly alkaline conditions with moderate mineralisation typical of the Free State interior. Algal blooms in farm impoundments suggest elevated nutrient loading from fertiliser runoff. Wetlands and pans function as temporary sinks, attenuating stormflow peaks, promoting sediment deposition, and providing limited groundwater recharge.

From a regional perspective, the Sand River system is hydrologically sensitive due to cumulative abstraction and sedimentation pressures from agriculture and mining. Both the SOFS and Beatrix catchments contribute to this system; therefore, stormwater management and sediment control measures are critical to maintaining downstream ecological integrity and compliance with the NWA and associated Resource Quality Objectives (RQOs).

12.6.3 Water Infrastructure and Management

At SOFS, the primary components of the water management system will comprise:

- Clean water diversion channels and berms constructed to direct runoff around mining areas and prevent contamination.
- Dirty water collection systems that capture runoff from operational zones, which are routed to PCDs for containment and reuse.
- Return water systems linked to the TSF for recycling of process water to minimise freshwater abstraction.
- Farm dams and small impoundments within the surrounding catchment, which store water for agricultural and livestock use.
- Monitoring boreholes and weirs, forming part of the integrated water balance and compliance monitoring network.

The Beatrix 1, 2 and 3 Shafts are supported by similar infrastructure, including:

- Underground dewatering systems and pump stations to manage fissure water inflows.
- Process water storage and transfer infrastructure between shafts and metallurgical plants.
- Dirty water containment facilities, including PCD and sumps designed to accommodate a 1:50-year storm event.
- Stormwater attenuation ponds, constructed to reduce downstream erosion and manage peak discharges during summer rainfall.

12.6.4 Water Quality Pressures

Water quality within the SOFS and Beatrix catchments is influenced by both natural processes and

anthropogenic activities. Natural mineralisation of groundwater contributes to elevated background salinity, while human activities have introduced additional stressors, including:

- Agricultural runoff, contributing nutrients (nitrates and phosphates) and sediment loads.
- Mining operations, which pose risks of sulphate and metal enrichment through tailings seepage, contact water runoff, and accidental spills.
- Road networks and settlements, which introduce hydrocarbons, solid waste, and microbial contaminants during storm events.

Within the SOFS area, baseline sampling shows neutral to slightly alkaline pH (7.1–8.3) and electrical conductivity of 60–100 mS/m, indicating generally good water quality but with isolated elevated nitrate levels downstream of cultivated areas. The Merriespruit, as the main drainage line, exhibits higher turbidity and suspended solids concentrations during rainfall events, primarily due to agricultural soil erosion and disturbed surfaces near access roads.

At Beatrix, historic mining and tailings deposition have locally affected surface water quality, particularly downstream of the Beatrix 2 TSF and associated return water dams. Monitoring results indicate elevated sulphate, iron, and manganese concentrations, reflecting minor seepage impacts. Despite these localised influences, downstream recovery is rapid due to dilution and natural attenuation in vegetated wetlands.

Key potential water quality pressures include:

- Seepage and runoff from TSFs and WRDs.
- Erosion and sedimentation from disturbed soils and roads.
- Nutrient loading from agriculture and wastewater.
- Limited baseflow contribution due to high evaporation rates, which reduces dilution potential.

To mitigate these risks, both operations implement (or will implement) stormwater management, erosion control, progressive rehabilitation, and groundwater–surface water quality monitoring in line with their Water Use Licence (WUL) conditions.

12.6.5 Ecological Status and Sensitivity

According to the DWS (2014a), the Present Ecological State (PES) of the local rivers is variable:

- Doring River – Largely natural (PES: B), with ecosystem functions essentially unchanged.
- Boschluis Spruit – Moderately modified (PES: C), with habitat loss but functional processes still intact.
- Sand River – Moderately modified (PES: C), with altered flows and biotic changes.

The Doring and Sand Rivers are classified as having high ecological importance (EI) due to the

presence of protected species. All three rivers have moderate ecological sensitivity (ES), meaning that flow reductions or water level changes can lead to rapid habitat loss, especially in smaller streams.

The Boschluis Spruit and Doring Rivers are classified as Endangered Lower Foothill systems, while the Sand River is a Critically Endangered Lowland River. None of these rivers are formally protected.

12.6.6 Eco-Status Summary

A summary of the eco-status and current impacts on local rivers is provided in Table 12-1.

Table 12-1: Summary of the Eco-status and impacts on local rivers (DWA, 2014)

Quaternary Catchment	Water Resource	Present Ecological State (PES)	Ecological Importance (EI)	Ecological Sensitivity (ES)	Current Impacts
C42K	Boschluis Spruit	C moderately modified	MODERATE	MODERATE	Roads, agriculture, trampling, erosion, chicken farming and mining.
C42K	Doring River	B Largely natural	HIGH	MODERATE	Roads, mining with small dams, slime dams, agriculture and erosion.
C42L	Sand River	C moderately modified	HIGH	MODERATE	Roads, instream weirs, agriculture and erosion. After merging with the Palmietkuilspruit, the Sand River is also impacted by irrigation from channel (Allemanskraal dam), return flows and alien invasive plants.

12.7 Wetlands

This section consolidates findings from the Wetland and Aquatic Ecology Assessment for the Proposed Wits Gold DBM Project near Virginia, Free State (WCS, 2012) and the Beatrix Baseline Biodiversity Assessment – Wetland Assessment (NSS, 2016b).

12.7.1 Wetland Distribution and Extent

12.7.1.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

Within the SOFS MR area, wetlands occupy approximately 61 hectares, representing 6.2% of the total project footprint (WCS, 2012). Three primary wetland hydro-geomorphic units were identified:

- Hillslope seep wetlands (68%).
- Pan/depressional wetlands (30%).
- Artificial impoundments (2%), including small farm dams and stock watering points.

The wetlands are concentrated in the lower-lying portions of the landscape, particularly in gently undulating areas south of Virginia, where slopes are below 1°. These wetlands are generally disconnected from major drainage lines but form a mosaic of small, hydrologically isolated systems that collectively influence local hydrology and sediment balance. Refer to Figure 12-1.

12.7.1.2 Beatrix 1, 2 and 3 Shaft Area

At Beatrix, wetlands (Figure 12-2) are more hydrologically integrated into the Doring River, Bosluisspruit, and Sand River systems. The dominant wetland types include:

- Channelled valley-bottom wetlands (along major rivers).
- Unchannelled valley-bottom wetlands (along minor tributaries).
- Hillslope seepage systems.
- Depressional pans (notably within the Rietpan–Wolvepan complex (Figure 12-3)).

The Beatrix wetlands extend across multiple catchments within the Upper Vaal Water Management Area (WMA 8), specifically Quaternary Catchments C42K and C42L. Together, they contribute to the hydrological and ecological functioning of the Sand River system.

Many wetlands in the Beatrix area have been historically modified by mine-related activities such as tailings deposition, dam construction, and road crossings, which have fragmented natural drainage and altered sedimentation processes. Nevertheless, several natural wetland remnants of moderate to high ecological integrity persist, particularly along the Doring River corridor.

12.7.2 Hydro-Geomorphic Setting

The wetlands across both project areas form part of a semi-arid plateau characterised by low relief, shallow slopes, and limited surface drainage.

At SOFS, the terrain consists of fine-grained sandstones, siltstones, and shales of the Karoo Supergroup, which weather to form poorly drained soils such as the Katspruit, Rensburg, Longlands, and Avalon forms. These soils have high clay content and low permeability, leading to perched saturation and lateral interflow during the wet season.

Wetlands typically develop in areas where shallow groundwater movement intersects the surface, resulting in seasonal saturation. Pan systems are often deflationary in origin, formed by the wind erosion of fine material and subsequent water accumulation.

At Beatrix, the geology and structure are more variable, with dolerite intrusions and faulting influencing drainage. The Doring and Bosluisspruit Rivers occupy shallow valleys, and their associated floodplains host broad valley-bottom wetlands. Hillslope seeps are sustained by perched aquifers within the weathered zone above dolerite sills, while depressions and artificial impoundments capture both surface and subsurface runoff.

The low topographic gradient across both mining areas enhances sediment deposition and restricts drainage, which in turn supports the persistence of wetland vegetation even under semi-arid climatic conditions.

12.7.3 Wetland Hydrology

Wetland hydrology in the Free State Goldfields is driven by seasonal rainfall patterns and shallow

groundwater flow. The region receives an average annual rainfall of 570–600 mm, mostly during the summer months (October–March). The mean annual potential evaporation exceeds 2 400 mm, resulting in strong seasonal variability in water availability.

At SOFS, wetlands are primarily fed by rainfall and lateral subsurface flow from adjacent uplands. Hillslope seeps remain saturated for several weeks after rainfall events, while pans fill during intense summer storms and dry out progressively through evaporation during winter. Groundwater contribution is limited due to low permeability but is locally significant along shallow perched zones.

At Beatrix, the Doring River and its tributaries maintain semi-perennial flow, recharged by regional groundwater seepage and tailings return water systems. Smaller valley-bottom and seep wetlands depend on seasonal inflow and shallow aquifer discharge. Surface hydrology has been partially altered by culverts, haul roads, and small impoundments, leading to increased upstream inundation and reduced downstream baseflow.

Overall, these wetlands exhibit pulsed hydrological regimes, alternating between saturation and drying, which drive distinct ecological communities and soil processes.

12.7.4 Vegetation and Habitat Characteristics

Vegetation across the SOFS and Beatrix wetlands reflects hydrological gradients and soil saturation patterns.

At SOFS, the dominant species include *Juncus effusus* (Common Rush), *Leersia hexandra* (Southern Cutgrass), *Paspalum distichum* (Knotgrass), *Cyperus textilis* (Flat Sedge), and *Imperata cylindrica* (Cotton Wool Grass). In more permanently saturated zones, *Phragmites australis* (Common Reed) and *Typha capensis* (Bulrush) dominate, often forming dense monocultures that stabilise soils but reduce species diversity.

At Beatrix, riparian and valley-bottom systems are dominated by *Salix mucronata* (Cape Willow) and *Sporobolus pyramidalis* (Giant Rat's Tail Grass). The understorey is typically composed of *Leersia hexandra, Cyperus fastigiatus* (Tall Flatsedge), and *Echinochloa pyramidalis* (Common Barnyard Grass). Alien species such as *Populus* × *canescens* (Grey Poplar) and *Eucalyptus camaldulensis* (Red River Gum) are present along disturbed riparian zones.

The Rietpan–Wolvepan complex supports hydrophilic and aquatic species including *Potamogeton pectinatus* (Fennel Pondweed), *Chara vulgaris* (Common Stonewort), *Nymphaea nouchali* (Blue Water Lily), and *Lemna minor* (Common Duckweed). These wetlands also provide breeding and foraging grounds for amphibians (*Pyxicephalus adspersus*, Giant Bullfrog) and avifauna such as herons, egrets, and flamingos.

12.7.5 Present Ecological State

At SOFS, wetlands are rated as Moderately to Largely Modified (Categories C–D). The most significant disturbances include cultivation (affecting 43% of the wetland area), trampling by livestock, channel incision, and alien vegetation encroachment.

At Beatrix, the Doring River retains a Largely Natural (Category B) condition, with intact riparian zones and good vegetation cover. The Bosluisspruit and Sand River systems are moderately modified (Category C) due to agricultural runoff, altered hydrology, and siltation. Wetlands near TSFs exhibit visible degradation through sediment loading and nutrient enrichment, while isolated pans such as Rietpan maintain moderate to high integrity due to limited anthropogenic influence.

12.7.6 Ecological Importance and Sensitivity

Wetlands in both mining areas exhibit low to Moderate EI, but those associated with perennial systems such as the Doring River demonstrate high sensitivity. The Rietpan–Wolvepan complex is of Very high EI, functioning as a biodiversity refuge that supports waterfowl, amphibians, and aquatic invertebrates.

According to the National Freshwater Ecosystem Priority Areas database (Nel, 2012), the Doring River and Bosluisspruit are classified as Endangered Lower Foothill systems, while the Sand River is a critically endangered Lowland River. These systems are recognised as priority areas for conservation and management interventions.

12.7.7 Current Impacts and Threats

The primary anthropogenic pressures include:

- Cultivation and land clearing within wetland buffers.
- Erosion and sedimentation from adjacent disturbed areas.
- Altered hydrology from roads, culverts, and impoundments.
- Seepage and contamination from TSFs and PCD.
- Alien vegetation encroachment by *Phragmites australis* (Common Reed), *Tamarix ramosissima* (Salt Cedar), and *Eucalyptus camaldulensis* (Red River Gum).
- Nutrient and agrochemical loading from nearby agricultural activities.
- Loss of natural buffers through grazing and trampling.

These cumulative pressures have led to changes in wetland hydrology, soil compaction, altered species composition, and reduced habitat connectivity.

12.7.8 Wetland Functionality

Functional assessments using the WET-EcoServices framework indicate that SOFS and Beatrix wetlands provide:

- Moderate sediment and nutrient retention.
- Moderate biodiversity support.
- Low to moderate flood attenuation.
- Important local microclimatic regulation through evapotranspiration and moisture

retention.

Although some systems are degraded, their ecosystem functions remain significant, especially in maintaining water quality and providing refuge in a semi-arid landscape.

12.7.9 Management and Mitigation Measures

Key recommendations include:

- Establish and maintain buffers of 30 m for seeps and 50–100 m for pans and valley-bottom wetlands.
- Design stormwater control systems to mimic natural drainage and prevent concentrated flow.
- Rehabilitate disturbed wetlands using indigenous vegetation (Juncus effusus, Paspalum distichum, Cyperus textilis).
- Implement alien vegetation control programmes targeting Phragmites, Tamarix, and Eucalyptus.
- Monitor water quality quarterly for pH, EC, sulphates, nitrates, and metals.
- Conduct biennial WET-Health assessments and maintain photo-monitoring points to track recovery.
- Enforce no-go zones for heavy machinery in delineated wetland areas.

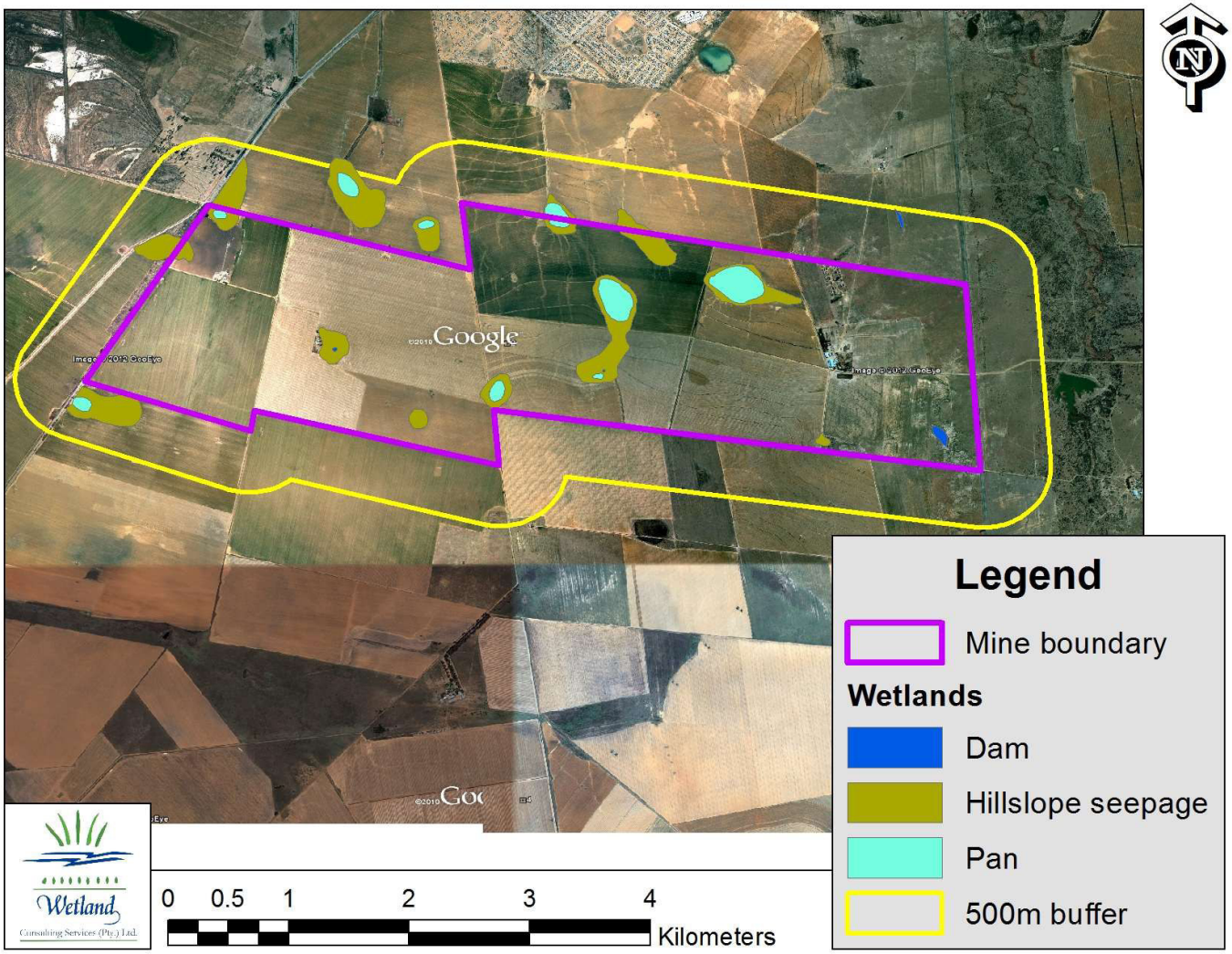


Figure 12-1: Wetland Systems - SOFS Area (WCS, 2012)

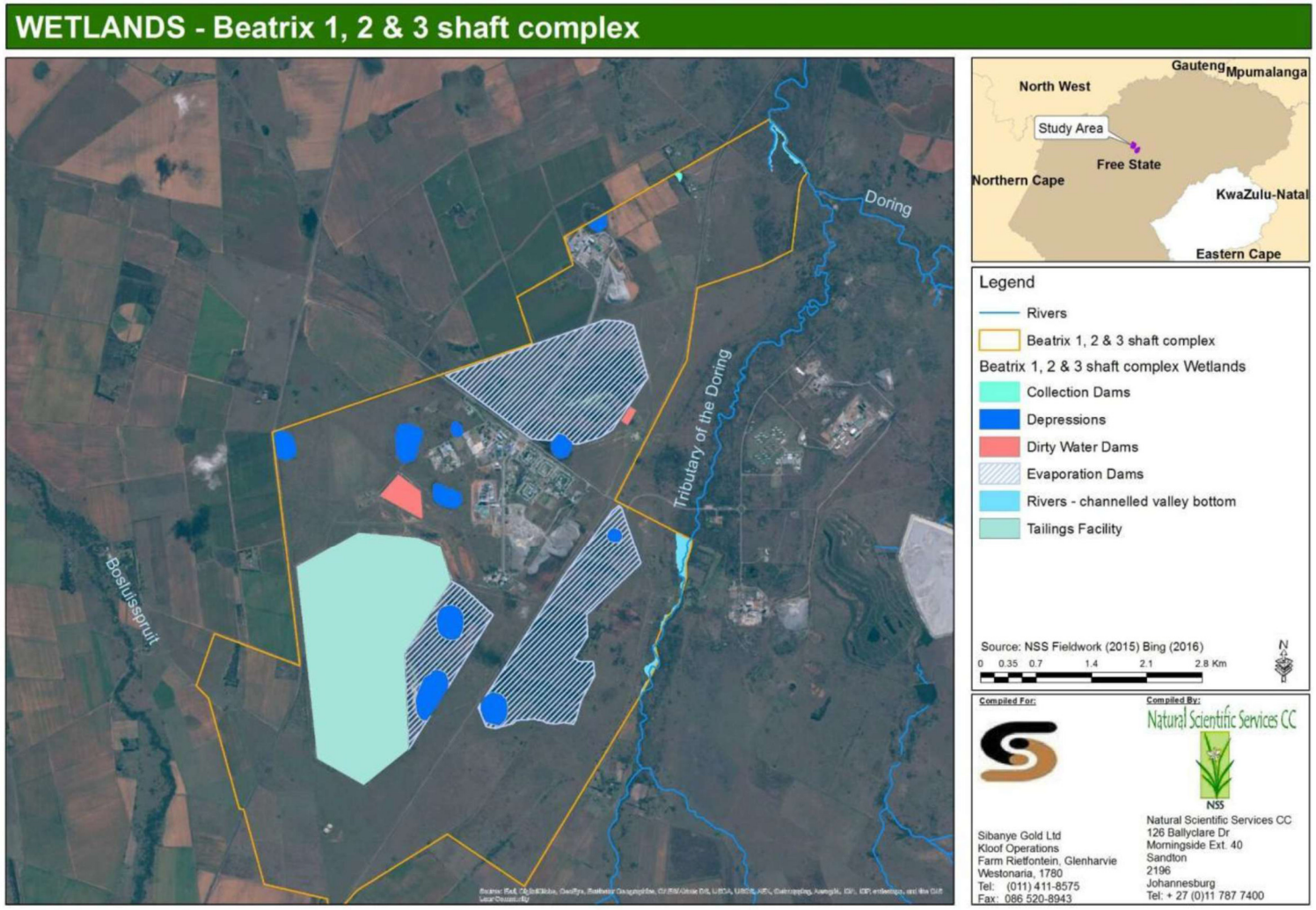


Figure 12-2: Wetland Systems – Beatrix 1, 2, 3 Shaft (NSS, 2016b)

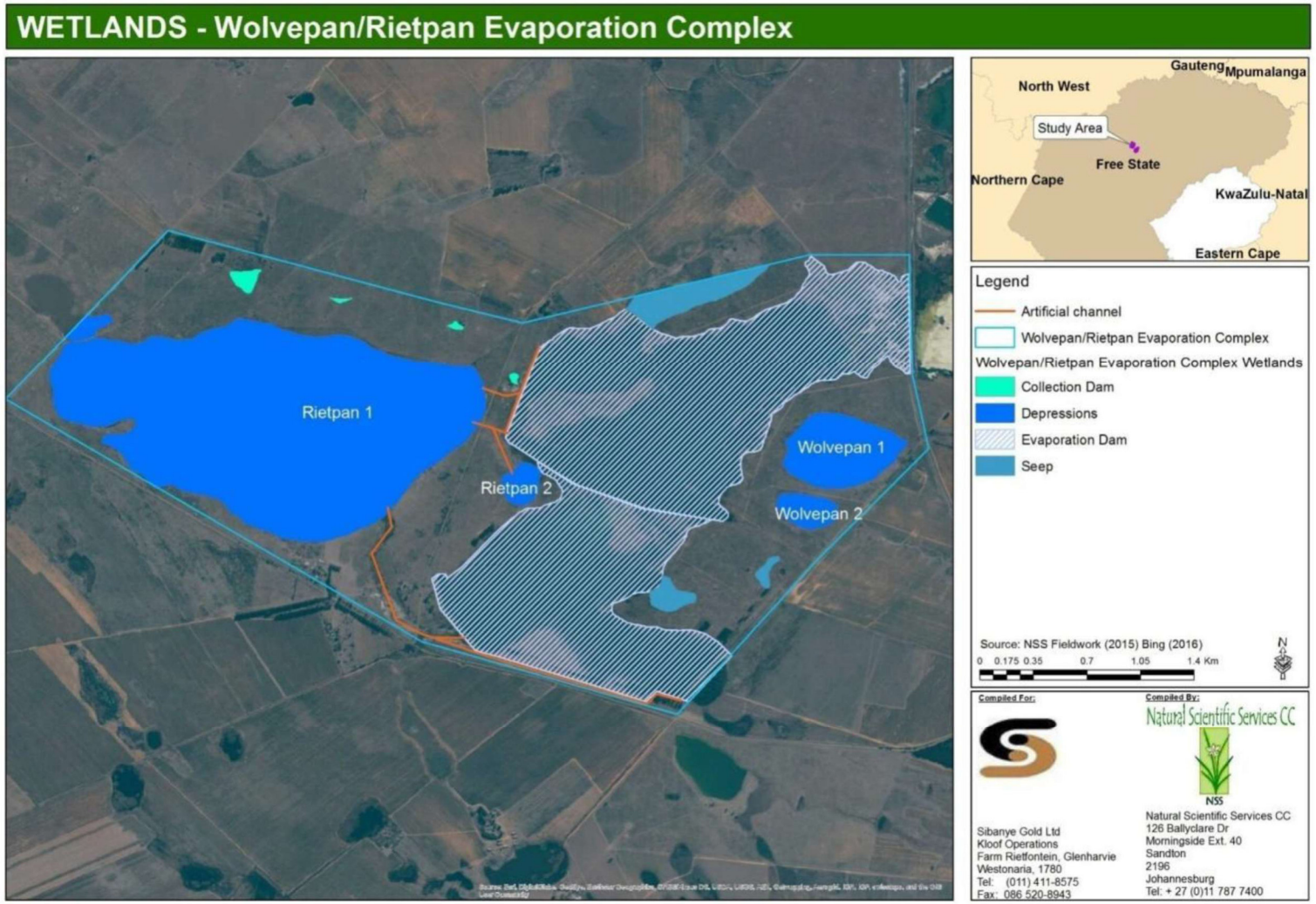


Figure 12-3: Wetland Systems - Wolvepan/Rietpan Evaporation Complex (NSS, 2016b)

12.8 Flora

The following section was extracted and consolidated from the Wits Gold DBM Terrestrial Biodiversity Impact Assessment prepared by Bathusi Environmental Consulting (2012) and the Beatrix Biodiversity Management and Action Plan (BMAP) prepared by Natural Scientific Services (2019/2020).

12.8.1 Regional Vegetation Context

The project area lies within the Grassland Biome, forming part of the Grassland Bioregion of the central Free State. The terrain represents the extensive Highveld plateau, consisting of flat to gently undulating plains with shallow drainage depressions and pans. According to Mucina and Rutherford (2006), the principal vegetation type is Vaal-Vet Sandy Grassland (Gm6), an endangered ecosystem, while localised drainage and floodplain areas support Highveld Alluvial Vegetation (Az4), classified as Least Threatened.

The Vaal-Vet Sandy Grassland is a short-to-medium height, frost-tolerant grassland dominated by tussock grasses interspersed with a rich diversity of forbs and geophytes. Less than 40 percent of this vegetation type remains intact, largely due to cultivation, overgrazing, and mining. Only about 1 percent is formally conserved within provincial nature reserves such as Soetdoring and Willem Pretorius.

The vegetation structure and distribution are shaped by a semi-arid continental climate characterised by warm, wet summers (October–March) and cool, dry winters (May–August). Fire and grazing are major ecological drivers, maintaining grassland heterogeneity and promoting regeneration of dominant species such as *Themeda triandra* (Red Grass).

12.8.2 Landscape Setting and Vegetation Structure

Topographically, the Beatrix–SOFS region lies between 1 320 m and 1 460 m amsl, with subdued relief and gently rolling plains. Soils derived from mudstone, shale and dolerite are moderately deep, sandy loam to clay-loam, and mesotrophic. These conditions support species typical of moist Highveld grassland.

Vegetation cover is predominantly herbaceous, with limited woody species confined to riparian corridors. The DBM Biodiversity Assessment (Bathusi, 2012) recorded 103 species in 41 families, with Poaceae (grasses), Asteraceae (daisies), and Fabaceae (legumes) being most abundant. Intact stands exhibit a dense sward dominated by *Themeda triandra, Eragrostis curvula* (Weeping Lovegrass), *Cymbopogon plurinodis* (Turpentine Grass), and *Aristida congesta* (Tassel Three-awn).

The forb layer contains colourful seasonal herbs such as *Helichrysum aureonitens* (Everlasting), *Gazania krebsiana* (Treasure Flower), *Senecio inaequidens* (Ragwort), and *Pelargonium sidoides* (Umckaloabo). Bulbous plants like *Hypoxis hemerocallidea* (African Potato) and *Ledebouria revoluta* (African Hyacinth) contribute to biodiversity and have recognised ethnobotanical value.

12.8.3 Floristic Composition and Habitat Gradients

Floristic diversity follows micro-habitat gradients from dry uplands to moist depressions.

- Upland grasslands are dominated by *Themeda*, *Eragrostis*, and *Tristachya leucothrix* (Hair Grass).
- Depressions and seeps support hydrophilic grasses and sedges such as *Juncus effusus* (Common Rush), *Cyperus marginatus* (Sedge), and *Leersia hexandra* (Cutgrass).
- Riparian zones and wetland edges contain *Phragmites australis* (Common Reed) and *Typha capensis* (Bulrush), which stabilise soils but can form dense monocultures.

Seasonal and permanent pans host a range of aquatic and semi-aquatic plants including *Potamogeton pectinatus* (Pondweed), *Lemna minor* (Duckweed), and *Chara vulgaris* (Stonewort). These habitats provide critical breeding and feeding areas for amphibians and wetland birds, underlining their EI.

12.8.4 Species of Conservation Concern

Several protected or declining species occur within the region. These include *Boophone disticha* (Bushman Poison Bulb), *Hypoxis hemerocallidea* (African Potato), *Crinum bulbispermum* (Orange River Lily), and *Harpagophytum procumbens* (Devil's Claw). All are listed as *Protected* under the Free State Nature Conservation Ordinance (2007) and NEMBA, while *Boophone disticha* and *Hypoxis hemerocallidea* are also classified as Declining on South African National Biodiversity Institute (SANBI) Red List.

These plants are associated with undisturbed grassland, rocky ridges, and moist clayey depressions. They are particularly vulnerable to soil disturbance, trampling, and collection for medicinal purposes. No critically endangered species were recorded during the surveys, but the presence of suitable habitat warrants continued monitoring and protection of sensitive micro-sites.

12.8.5 Habitat Types and Floristic Sensitivity

Vegetation mapping from both the DBM Biodiversity Assessment (Bathusi, 2012) and Beatrix BMAP (2019/2020) identifies seven principal habitat units across the mining lease areas:

- Natural Grassland (high sensitivity) – Intact vegetation with high species richness, providing erosion control and pollinator habitat.
- Degraded Grassland (medium Sensitivity) – Moderately disturbed areas showing secondary grass dominance.
- Agricultural Fields (low) – Highly transformed croplands dominated by alien weeds.
- Wetlands and Pans (medium–high) – Seasonal systems supporting hydrophytes and ecological connectivity.
- Riparian Corridors (medium) – Linear strips of moisture-loving species, vulnerable to erosion and invasion.

- Disturbed Infrastructure Areas (low) – Mine yards and haul roads with ruderal vegetation.
- Alien Woodlots (low) – Small stands of *Eucalyptus camaldulensis* (Red River Gum) and *Acacia mearnsii* (Black Wattle).

Natural grassland and wetland habitats are the most ecologically valuable, and the Free State Biodiversity Conservation Plan (BCP) (DESTEA, 2014) designates many of these remnants as Critical Biodiversity Areas (CBA 1) and Ecological Support Areas (ESA 2) requiring conservation management.

12.8.6 Alien and Invasive Species

Alien plant invasion is a significant ecological pressure. The most pervasive invaders include *Acacia mearnsii* (Black Wattle), *Eucalyptus camaldulensis* (Red River Gum), *Opuntia ficus-indica* (Prickly Pear), *Pennisetum clandestinum* (Kikuyu Grass), *Tagetes minuta* (Tall Khakiweed), and *Gomphocarpus fruticosus* (Milkweed).

These species colonise disturbed ground and riparian zones, outcompeting indigenous vegetation and altering fire and hydrological regimes. The Beatrix BMAP includes an Alien Plant Control Programme comprising mechanical removal, biological control, and selective herbicide treatment, in line with legal requirements.

12.8.7 Conservation Importance and Ecosystem Status

The Vaal-Vet Sandy Grassland ecosystem is considered of high conservation importance because it provides essential ecological services such as carbon storage, pollination, and soil stabilisation. The SANBI National Biodiversity Assessment (SANBI, 2018) confirms that most of the SOFS and Beatrix MR area fall within Critically Modified ecosystem units, with < 40 percent remaining intact.

Provincial spatial planning tools further classify these areas as CBA 1 (core biodiversity areas) and CBA 2 (buffer zones). The riparian corridors along the Bosluisspruit, Doring River, and Sand River are recognised as ecological linkages vital for species movement and genetic exchange. Maintaining the integrity of these corridors is therefore crucial to sustaining the region’s ecological function.

12.8.8 Ecological Functions and Ecosystem Services

The flora provides numerous ecosystem services fundamental to E&S wellbeing. Dense grass cover prevents soil erosion, enhances water infiltration, and maintains nutrient cycling. Wetland vegetation filters sediment and improves water quality, while indigenous forbs and geophytes supply food for a wide range of pollinators and invertebrates.

Grasslands act as significant carbon sinks, storing organic matter within deep root systems. Many species, including *Boophone disticha* and *Hypoxis hemerocallidea*, hold medicinal and cultural importance, linking biodiversity conservation to local livelihoods.

12.8.9 Management and Mitigation Measures

Mitigation and management recommendations include:

- Avoidance: Conserve remaining natural grassland and wetland habitats; maintain ≥ 50 m

buffers around wetlands and ≥ 30 m around natural grassland patches.

- Rehabilitation: Use indigenous grasses such as *Themeda triandra*, *Eragrostis curvula*, and *Cynodon dactylon* (Couch Grass) in post-disturbance revegetation; conserve and replace topsoil to restore the seedbank.
- Alien Control: Continue annual invasive plant removal as per the BMAP, with monitoring through GIS mapping.
- Monitoring: Undertake bi-annual flora surveys; target at least 80 percent indigenous cover within three years of rehabilitation.
- Awareness: Provide training for all personnel to identify and avoid damage to protected species.

12.9 Fauna

This section is based on the findings of the Wits Gold DBM Project Terrestrial Biodiversity Impact Assessment (Bathusi, 2012) and draws on regional context from the Biodiversity Baseline Assessment Report, Section C: Faunal Assessment, compiled by NSS (NSS, 2016c).

12.9.1 Regional Faunal Context

The project area forms part of the Grassland Biome, specifically the Dry Highveld Grassland Bioregion, which supports a mosaic of faunal species adapted to open grassland and seasonal wetland environments. The landscape comprises undulating plains dissected by shallow drainage lines such as the Bosluisspruit and Doring Rivers and dotted with pans and artificial impoundments.

The faunal community reflects this transitional setting between mesic grassland and arid savanna. Many species are resilient to disturbance and capable of exploiting both natural and semi-modified habitats. However, species richness and abundance decline sharply in heavily transformed zones dominated by cultivation, infrastructure, and alien vegetation. The persistence of fauna is therefore largely dependent on the condition and connectivity of remaining natural grassland patches and riparian corridors.

12.9.2 Mammalian Fauna

Mammalian diversity in the study area is considered moderate, with 23 species confirmed and a further 12 species likely to occur based on habitat availability and regional distribution. Most large mammal species that historically occurred in the Free State Grasslands—such as *Taurotragus oryx* (Eland), *Connochaetes taurinus* (Blue Wildebeest), *Panthera leo* (Lion), and *Acinonyx jubatus* (Cheetah)—have been extirpated through land use change and hunting.

The mammalian assemblage is now dominated by small- to medium-sized species adapted to human-altered environments. Common species include *Rhabdomys pumilio* (Striped Mouse), *Mastomys coucha* (Multimammate Mouse), *Otomys irroratus* (Vlei Rat), *Aethomys chrysophilus* (Bushveld Gerbil), *Lepus capensis* (Cape Hare), and *Galerella sanguinea* (Slender Mongoose).

Larger generalists such as *Sylvicapra grimmia* (Common Duiker), *Procavia capensis* (Rock Hyrax), and *Canis mesomelas* (Black-backed Jackal) occur sporadically in less-disturbed areas and along drainage lines. Bats are particularly important components of the local ecosystem. Species such as *Miniopterus natalensis* (Natal Long-fingered Bat) and *Myotis tricolour* (Temminck's Myotis Bat) may utilise abandoned shafts, culverts, or dolerite crevices for roosting. Their conservation is essential for maintaining insect population control and ecosystem balance.

No mammalian species of national conservation concern were recorded during the survey, but the regional occurrence of *Lepus capensis* (Cape Hare) and *Sylvicapra grimmia* (Common Duiker) indicates residual ecological value within fragmented grassland habitats.

12.9.3 Avifauna

Bird diversity in the study area is high relative to its transformed condition. A total of 153 species were either recorded or expected to occur, representing both resident and migratory species typical of the Highveld plateau. The avifaunal assemblage includes grassland specialists, wetland-dependent taxa, and aerial foragers that utilise agricultural fields for feeding.

Common grassland and open-country species include *Cisticola juncidis* (Zitting Cisticola), *Euplectes orix* (Red Bishop), *Alauda curvirostris* (Eastern Clapper Lark), *Anthus cinnamomeus* (African Pipit), *Francolinus africanus* (Grey-winged Francolin), and *Saxicola torquata* (African Stonechat).

Wetland and riparian areas attract *Ardea cinerea* (Grey Heron), *Egretta garzetta* (Little Egret), *Anas undulata* (Yellow-billed Duck), *Fulica cristata* (Red-knobbed Coot), and *Himantopus himantopus* (Black-winged Stilt). Seasonal pans and farm dams are occasionally visited by *Phoenicopterus roseus* (Greater Flamingo), *Platalea alba* (African Spoonbill), and *Mycteria ibis* (Yellow-billed Stork) during wetter years.

Species of conservation significance include:

- *Falco naumanni* (Lesser Kestrel) – *Vulnerable (International Union for Conservation of Nature (IUCN))*, a Palearctic migrant that roosts in grassland patches during summer.
- *Circus macrourus* (Pallid Harrier) – *Near Threatened*, migratory raptor dependent on open grassland for foraging.
- *Eupodotis afra* (Southern Black Korhaan) – *Vulnerable*, endemic to South Africa; sensitive to disturbance and habitat fragmentation.
- *Anthus vaalensis* (Vaal Pipit) – *Near Threatened*, indicative of good-quality grassland.

The presence of these species underscores the importance of maintaining intact grassland patches and buffer zones around wetlands to provide suitable breeding and foraging grounds.

Avifaunal richness peaks during the wet summer months (December–March), coinciding with insect abundance and migratory influx.

12.9.4 Herpetofauna (Reptiles and Amphibians)

The herpetofauna is relatively diverse, reflecting the mosaic of dry uplands, moist depressions, and ephemeral wetlands. Fourteen reptile species and ten amphibian species were recorded or expected to occur.

Reptiles include *Agama atra* (Southern Rock Agama), *Trachylepis punctatissima* (Speckled Rock Skink), *Lygodactylus capensis* (Cape Dwarf Gecko), and *Bitis arietans* (Puff Adder). Snakes such as *Pythonodipsas carinata* (Rough-scaled Snake) and *Psammophylax rhombeatus* (Rhombic Skaapsteker) may occur in grasslands and along rocky ridges.

Amphibians are mainly associated with seasonal pans, drainage channels, and moist grassland depressions. Common species include *Kassina senegalensis* (Snoring Puddle Frog), *Ptychadena mascareniensis* (Mascarene Grass Frog), *Strongylopus grayii* (Clicking Stream Frog), *Amietia angolensis* (Common River Frog), and *Xenopus laevis* (African Clawed Frog). Their life cycles are tightly linked to the availability of temporary water bodies formed during the summer rainfall season.

No threatened reptile or amphibian species were confirmed; however, these taxa are sensitive to pollution, siltation, and hydrological disturbance—factors requiring strict water management and rehabilitation oversight.

12.9.5 Invertebrates

Invertebrate diversity was not formally surveyed in detail, but opportunistic records and regional data indicate a healthy representation of pollinators, decomposers, and soil invertebrates. Butterfly species such as *Danaus chrysippus* (Plain Tiger), *Colotis evenina* (African Orange Tip), and *Junonia oenone* (Blue Pansy) are typical of Highveld grasslands, while bees (*Apis mellifera scutellata*) and wasps are common pollinators.

Grasshoppers, crickets, and dung beetles contribute to nutrient cycling and form a key part of the food web for birds, reptiles, and small mammals. The ecological value of these invertebrates lies in their role in pollination, decomposition, and soil aeration. Loss of floral diversity or pesticide contamination would directly reduce their populations, negatively affecting higher trophic levels.

12.9.6 Habitat Types and Sensitivity

Five primary habitat units were identified for faunal use:

- Natural Grassland – high sensitivity; supports small mammals, ground-nesting birds, and reptiles; acts as core habitat.
- Degraded Grassland – medium sensitivity; provides foraging for generalists such as mongooses and hares.
- Wetlands and Pans – high sensitivity; critical breeding sites for amphibians and feeding zones for waterbirds.

- Riparian Corridors – medium sensitivity; serve as migration and dispersal pathways for mammals and reptiles.
- Agricultural/Disturbed Areas – low sensitivity; limited habitat value, mainly for opportunistic species (*Passer domesticus*, *Rattus rattus*).

Overall, roughly 18 percent of the landscape retains medium to high faunal sensitivity, concentrated along drainage lines and remnant grassland patches.

12.9.7 Ecological Function and Interactions

The remaining faunal assemblages fulfil important ecological functions. Small mammals regulate insect and seed populations, birds contribute to pollination and pest control, and amphibians indicate water quality through their sensitivity to contaminants. Raptors such as kestrels and harriers play top-down roles in ecosystem balance.

These interactions maintain the integrity of food webs and contribute to ecosystem resilience. Loss of habitat connectivity, especially between wetland and grassland ecosystems, would disrupt these processes and lead to long term declines in biodiversity.

12.9.8 Threats and Pressures

Key pressures on fauna in the area include:

- Habitat Loss and Fragmentation: Conversion of grassland to cropland and mining infrastructure.
- Hydrological Alteration: Changes to natural drainage affecting amphibian breeding and aquatic species.
- Pollution: Nutrient loading, sedimentation, and chemical contamination of wetlands.
- Noise and Vibration: Disturbance during construction and blasting impacting mammals and birds.
- Vehicle Collisions: Mortality along access roads, particularly for reptiles and small mammals.
- Predation and Competition: Domestic cats and dogs preying on indigenous fauna.
- Light Pollution: Disorientation of nocturnal insects and interference with bat foraging.

12.9.9 Conservation Value and Legal Protection

While no critically endangered species were confirmed, the presence of *Falco naumanni*, *Eupodotis afra*, and *Circus macrourus* elevates the conservation significance of the project area. These species are listed under the NEMBA and the IUCN Red List as Vulnerable or Near Threatened.

In terms of provincial policy, the Free State Biodiversity Conservation Plan (DESTEA, 2014) identifies the Bosluisspruit and Doring River corridors as ESA, providing regional linkages for wildlife movement.

All indigenous fauna are protected under the Free State Nature Conservation Ordinance (1983), which requires a permit for capture, relocation, or research activities involving protected species.

12.9.10 Management and Mitigation Measures

To conserve fauna and minimise ecological disruption, the following measures are recommended:

- Habitat Protection: Retain all high sensitivity grassland and wetland areas as no-go zones.
- Buffer Zones: Maintain a minimum 50 m buffer around wetland systems and 30 m around grassland patches.
- Habitat Connectivity: Preserve corridors along the Bosluisspruit and Doring River to allow species dispersal.
- Pollution Prevention: Implement strict stormwater, waste, and chemical management to prevent habitat contamination.
- Timing of Activities: Restrict vegetation clearing and heavy machinery use during the wet season (November–March) to protect breeding fauna.
- Lighting Control: Install downward-directed, low-lux lighting to reduce disturbance to nocturnal species.
- Rehabilitation: Revegetate disturbed areas with indigenous grassland species to re-establish faunal habitat.
- Monitoring: Conduct annual faunal monitoring focusing on avifauna, amphibians, and small mammals; update species lists accordingly.

12.10 Air Quality

This section has been extracted and consolidated from the Wits Gold DBM Project Air Quality Scoping Report (Kijani Green Energy, 2012), Monthly Dustfall Monitoring Report (Aquatico, 2025) and the Annual Atmospheric Emissions Licence Emission Report (Sibanye-Stillwater, 2025).

12.10.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

12.10.1.1 Existing Air Quality and Baseline Conditions

Baseline dust monitoring undertaken during the 2011–2012 scoping phase recorded moderate dust deposition rates ranging from 120 mg/m²/day to 450 mg/m²/day. These values fall well within the National Dust Control Regulation limits for non-residential areas. Minor exceedances were only recorded adjacent to disturbed ground and haul routes.

Regional air quality is primarily influenced by existing mining, agriculture, and wind erosion from fallow fields. No exceedances of national standards for SO_2, NO_2, or CO were detected or predicted. The overall baseline quality was considered typical of a semi-rural Highveld environment with periodic increases in dust levels during dry, windy months and immediately following tilling or construction activities.

12.10.1.2 Sources of Emissions

During the life cycle of the SOFS Operations, the main air emission sources can be categorised as follows:

- Construction Phase
    - Earthworks, topsoil stripping, and vegetation clearance generating coarse dust.
    - Vehicle movement on unpaved surfaces and temporary access roads.
    - Material handling, stockpiling, and loading/unloading activities.
    - Minor combustion emissions from diesel-powered plant and equipment.
- Operational Phase
    - Fugitive dust from conveyor transfer points, ore tipping and waste deposition.
    - Wind erosion from unrehabilitated tailings and disturbed ground.
    - Vehicle exhaust emissions containing oxides of nitrogen, carbon monoxide, and hydrocarbons.
- Decommissioning Phase
    - Demolition of surface structures and rehabilitation of disturbed areas.
    - Dust from re-handling of soil and waste rock during closure activities.

Tailings deposition and vehicle movement on unpaved haul roads are expected to be the primary contributors to dust emissions. Gaseous emissions will be negligible compared with particulate matter.

12.10.1.3 Sensitive Receptors and Dispersion

The nearest sensitive receptors include the residential outskirts of Virginia, the Merriespruit community, and farm dwellings to the south and south-east. Model simulations undertaken using the SCREEN3 Gaussian plume model showed that predicted dustfall concentrations decline rapidly with distance from emission sources and fall below nuisance thresholds within 300–500 m under typical wind conditions.

The area’s flat topography favours dispersion; however, strong seasonal winds, low humidity, and the absence of vegetative cover during winter create conditions conducive to short-term dust events. Continuous dust suppression and phased rehabilitation are therefore critical for managing off-site impacts.

12.10.1.4 Impact Assessment

Potential air quality impacts include:

- Nuisance dustfall affecting visibility and local amenity.

- Inhalable particulate exposure for workers and nearby residents.
- Deposition on crops and vegetation, leading to reduced photosynthetic efficiency.
- Short-term degradation of air quality during construction.

Without mitigation, the significance of air quality impacts is assessed as medium (moderate intensity, local extent, short duration, and moderate probability). With full implementation of control measures, residual impacts are reduced to low and temporary in nature.

12.10.1.5 Mitigation and Management Measures

A comprehensive air quality management strategy will include:

- Water spraying of haul roads, open areas, and stockpiles using recycled or non-potable water.
- Speed limits not exceeding 30 km/h on unpaved roads.
- Progressive rehabilitation and prompt vegetative stabilisation of disturbed areas.
- Wind barriers or geotextile covers for fine material stockpiles.
- Enclosure of conveyors and fitting of dust extraction systems at transfer points.
- Scheduling of earthworks during low-wind conditions where practical.
- Routine maintenance of vehicles and equipment to minimise exhaust emissions.

12.10.1.6 Monitoring and Reporting

Monitoring of dustfall and particulate matter (PM_{10} and $PM_{2.5}$) will be undertaken using a DustWatch bucket network positioned at the northern and southern boundaries to measure upwind and downwind conditions. Monthly results will be compared against regulatory limits and trends evaluated quarterly.

A meteorological station will record wind speed, direction, humidity, and rainfall, allowing correlation of dust events with prevailing weather patterns. Monitoring data will be reported through Sibanye's Environmental Management System (EMS) and submitted annually to the Competent Authority.

12.10.2 Beatrix 1, 2 and 3 Shaft Area

Beatrix Mine has operated for several decades, and the surrounding air quality reflects the long term influence of underground mining, waste rock and tailings deposition activities, and ongoing rehabilitation and environmental management practices. The mine maintains an established ambient air quality monitoring programme to assess particulate fallout and stack emissions, supported by monthly dustfall monitoring and annual Atmospheric Emissions Licence (AEL) compliance reporting.

12.10.2.1 Existing Air Quality Conditions

Ambient dustfall monitoring results indicate that air quality in the vicinity of Beatrix Shafts 1, 2 and 3 remains generally within the non-residential dustfall limit of 1 200 mg/m²/day, as prescribed by the National Dust Control Regulations. During the December 2024 monitoring period, seven of the eight monitoring stations recorded compliant dustfall levels, with only the VD Merwe station reflecting a short-term exceedance. The exceedance is attributed to seasonal wind conditions rather than mining-specific emission sources. Importantly, the overall annual monitoring record demonstrates full compliance with the permitted exceedance frequency, meaning that exceedances did not occur consecutively nor more than twice at any single station during the year.

Annual stack emission monitoring conducted in alignment with the AEL confirms general compliance at regulated point sources, including the Beatrix metallurgical smelter. A single particulate matter exceedance recorded at Kiln B during 2024 was noted to occur at a low emission rate unlikely to influence ambient air quality.

12.10.2.2 Emission Sources

Air emissions in the Beatrix shaft area arise from a combination of fugitive and process-related sources. The primary fugitive dust sources include TSF, haul and access roads, stockpiles, and exposed surfaces around operational facilities. Intermittent dust can also arise from vehicle movement and material handling. Process-related emissions are associated with metallurgical treatment and smelting operations, which are regulated through the mine's AEL. Additional combustion emissions originate from diesel generators and vehicle fleets.

12.10.2.3 Cumulative Impacts

Air quality within the region is influenced not only by mining activities but also by agriculture, unpaved roads, and natural wind-driven dust. Seasonal climatic conditions—particularly dry, high-wind winter and early summer periods—play a significant role in short-term increases in particulate levels. Meteorological data indicates that wind direction and speed remain the dominant factors affecting dustfall distribution patterns around the mine. The cumulative impacts are therefore regional in scale and meteorologically driven, rather than confined to or solely attributable to Beatrix Operations.

12.10.2.4 Mitigation and Ongoing Management

Beatrix implements a range of operational controls to manage dust and emissions. These include regular wet suppression on haul roads and disturbed surfaces, progressive rehabilitation of inactive tailings and waste rock areas, vegetative cover establishment, and maintenance of bunded and contained hydrocarbon storage facilities. Where required, corrective action plans are developed in response to monitoring results, including technical assessment and control improvement for particulate emissions at Kiln B.

12.10.2.5 Monitoring and Reporting Framework

The mine maintains a monthly dustfall monitoring programme, consisting of eight ambient

monitoring stations located in non-residential receptor areas and sampled in accordance with American Society for Testing and Materials (ASTM) D1739 and South African National Accreditation System (SANAS) 1137.

The monitoring data is evaluated against regulatory thresholds and tracked to identify trends. Stack emissions are monitored periodically as required under the AEL, and annual emissions reporting is undertaken through National Atmospheric Emission Inventory System and the South African Greenhouse Gas Emissions Reporting System frameworks. The mine also maintains a dust and air quality complaints register, with follow-up investigations and communication undertaken where required.

12.11 Noise

This section has been derived from the Noise Monitoring Report, compiled by Acoustech Consulting (Consulting, 2025).

A noise monitoring survey was undertaken in May 2025 to determine compliance with SANS 10103:2008 (The measurement and rating of environmental noise) and the Free State Noise Control Regulations (Provincial Notice 24 of 1998). The purpose of the assessment was to evaluate the contribution of Beatrix Mine operations to ambient noise levels in the surrounding area, with particular consideration of sensitive receptors including residential farmsteads and mine-associated housing.

12.11.1 Monitoring Locations

Noise measurements were conducted at four (4) monitoring points located around the Beatrix Mine operations. These sites represented noise-sensitive receptors situated near operational shafts and nearby agricultural homesteads:

Monitoring Point	Location Description	Coordinates	Land Use Rating
NM1	No.4 Shaft – Resident 2	28°11'31.0"S; 26°43'37.1"E	Urban
NM2	No.4 Shaft – Resident 1	28°09'38.6"S; 26°42'00.5"E	Rural
NM3	No.3 Shaft – near farmhouse	28°13'43.1"S; 26°48'27.8"E	Rural
NM4	No.1 & 2 Shafts – Wynandsfontein Farm	28°17'38.8"S; 26°47'43.5"E	Rural

At the time of monitoring, Shaft 2 and Shaft 4 were non-operational, and therefore no significant mechanical noise was emitted from these shafts.

12.11.2 Methodology

Noise monitoring was conducted on 19 May 2025, with:

- Daytime measurements: 10:50–12:39.
- Night-time measurements: 22:41–00:34.

Instrumentation and procedure included:

- Type 1 Integrating Sound Level Metre, SANAS-certified.

- Metre mounted 1.4 m above ground, free-field position.
- Settings: A-weighted, Fast response.
- Calibration before and after readings, deviation <1 dB confirmed.
- 10-minute measurement durations to stabilise LAeq data.

Results were interpreted according to SANS 10103 rating levels for day (07:00–22:00) and night (22:00–07:00) periods.

Weather conditions were suitable for acoustic measurement, with wind speeds < 11 km/h and no precipitation at time of monitoring.

12.11.3 Daytime Noise Levels

Daytime noise levels ranged from 31.9 dBA to 49.9 dBA, all of which are within the acceptable SANS rating limits for the corresponding acoustic districts.

- NM1 recorded the highest daytime level (49.9 dBA), attributable to a slightly more developed residential environment.
- NM3 recorded the lowest (31.9 dBA), reflecting a stable rural acoustic climate with minimal anthropogenic influence.

No daytime measurements indicated a disturbing noise condition (i.e., exceeding ambient levels by ≥ 5 dBA).

12.11.4 Night-time Noise Levels

Night-time noise levels remained consistently low, ranging from 30.5 dBA to 37.8 dBA. This is characteristic of quiet rural night acoustic conditions, where natural ambient levels dominate.

No mechanical mine activity contributed perceptibly to night noise levels. This result is significant, as night-time noise sensitivity is typically higher due to rest and sleep requirements.

12.11.5 Sources of Noise

The dominant contributing sound sources recorded during monitoring were:

Noise Source	Character	Relevance
Livestock movements (cattle)	Intermittent, low intensity	Typical rural soundscape
Bird calls	Natural tonal bursts	Baseline ecological acoustics
Distant vehicle activity	Sporadic	Local farm access and R30 corridor
Wind rustling vegetation	Continuous soft broadband noise	Natural background masking

Mine shafts were generally inaudible, with no tonal, impulsive, or cyclical equipment noise detected.

12.11.6 Conservation and Community Implications

The daytime noise measurements recorded across the four monitoring points ranged between 31.9 dBA and 49.9 dBA, which fall within the acceptable rating levels for the respective rural and urban

acoustic districts as defined under SANS 10103:2008. The highest daytime level was observed at NM1 (near No. 4 Shaft Resident 2), reflecting its closer proximity to a more developed residential setting, although no direct mine-related noise sources were audible at the time of monitoring. The lower recorded values, such as those at NM3, are indicative of a quiet rural sound environment dominated by natural ambient conditions. Importantly, none of the locations exhibited noise levels that exceeded the threshold for a disturbing noise, which is defined in the Free State Noise Control Regulations (PN24 of 1998) as exceeding the ambient noise level by 5 dBA or more. The results therefore demonstrate that daytime activities associated with the mine were not contributing materially to environmental noise exposure at nearby receptors during the monitoring period.

12.11.7 Recommendations

The Noise Monitoring Report concludes that no immediate noise mitigation actions are required, as the mine is currently operating within the allowable noise thresholds for the surrounding land use zones. However, several precautionary and forward-looking measures are recommended to ensure continued compliance. These include maintaining a biennial noise monitoring programme to confirm that ambient noise conditions remain stable over time, particularly if operational intensity changes. Any future noise-generating activities, such as the recommissioning of shafts or installation of new ventilation or haulage infrastructure, should be screened for potential noise impacts prior to implementation, and monitored as necessary. Should any noise complaints be received from affected parties, these should be investigated by an independent acoustic specialist to verify and address the concern. Additionally, ongoing operator awareness and proactive maintenance of mechanical equipment, such as conveyors and ventilation fans, are recommended to prevent abnormal or tonal noise emissions that may alter the current acoustic environment.

12.12 Radiological Assessment

A Radiological Assessment was undertaken by African Radiation Consultants (2012), to assess potential radiation exposure risks associated with the proposed SOFS Operations. The study forms part of the application for EA and the National Nuclear Regulator (NNR) registration process, in accordance with the National Nuclear Regulator Act, 1999 (Act No. 47 of 1999).

Gold-bearing reefs in the Free State region are known to contain naturally occurring radioactive materials (NORM) such as uranium, thorium, and radium, which may be present in ore, mine wastes, and tailings. As a result, both workers and members of the public could potentially be exposed to low levels of radiation from these materials during mining, processing, and waste management activities.

To ensure regulatory compliance and protect human health and the environment, the NNR requires a Certificate of Registration prior to the commencement of operations. As part of this authorisation process, the following documentation must be submitted:

- A baseline radiological survey to establish natural background radiation levels.
- A worker safety assessment evaluating potential occupational exposure.

- A public and environmental radiological safety assessment.
- A comprehensive Radiation Management Plan addressing radiation protection, waste management, transport safety, emergency preparedness, and medical surveillance.

The baseline survey includes gamma radiation monitoring, radon gas measurements, and full-spectrum radiological analyses of soil, surface water, groundwater, sediment, and vegetation. This data provides the basis for future comparisons once mining commences, allowing changes in radiation levels to be monitored over time.

Worker exposure will be assessed in accordance with the Council for Nuclear Safety Licencing Guide LG-1029, while public exposure assessments follow methodologies recommended by the International Atomic Energy Agency for near-surface radioactive waste facilities. These assessments consider all possible exposure pathways, including inhalation, ingestion, and direct radiation, and evaluate both normal operational and post closure scenarios.

Results from the assessment will inform the development of a Radiation Management Plan, which will outline specific monitoring, control, and mitigation measures to ensure radiation doses to workers and the public remain well below international safety limits. Regular reporting to the NNR will ensure continued compliance and oversight throughout the life of the project.

In summary, the radiological assessment concludes that, with the implementation of proper management controls and adherence to national and international standards, the proposed SOFS Operations poses no significant radiological risk to workers, the public, or the surrounding environment.

12.13 Heritage Resources

The assessment draws primarily on the Cultural Heritage Impact Assessment for the Wits Gold DBM Project by Archaetnos CC (Archaetnos, 2011) and the Heritage Audit Report for the Beatrix Mining Areas of Sibanye Gold by PGS Heritage (PSG, 2017).

12.13.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

12.13.1.1 Overview and Methodology

Archaetnos CC undertook a detailed Heritage Impact Assessment in November 2011 for the proposed Wits Gold DBM Project located south of Virginia in the Free State Province

The study included a literature review, desktop research, and field survey of the proposed surface infrastructure footprint areas, as the mining activities themselves are deep underground and unlikely to affect the surface environment. The survey followed standard archaeological practices, including field mapping, photographic recording, and GPS documentation of identified sites.

12.13.1.2 Historical and Archaeological Context

The region forms part of the central Free State Goldfields, an area with a long record of human occupation spanning from the Early Stone Age to the historical colonial period. The Stone Age

occupation is represented by scattered stone tools and lithic material found in nearby localities such as the Vaal River, Florisbad, and Erfkroon. Although none were found within the project footprint, the landscape's proximity to permanent water sources would have attracted prehistoric activity.

No evidence of Iron Age settlements was recorded within the SOFS Project area, likely due to the absence of high-lying terrain and defensive hilltops typically preferred by Late Iron Age communities in the region. Historical developments in the area relate primarily to early European settlement, railway expansion, and agricultural land use during the 19th and early 20th centuries.

12.13.1.3 Identified Heritage Resources

Two cultural heritage sites of local significance were recorded during the 2011 survey:

- A graveyard, likely dating to the early 20th century, located within the proposed development footprint; and
- A disused railway station complex, consisting of historical structures and features situated just outside the direct impact area.

The graveyard represents the most sensitive heritage feature, containing unmarked and formal graves that may be of both European and African origin. The railway site, though outside the footprint, retains cultural and industrial heritage value as evidence of the early mining and transport infrastructure associated with the development of the Free State Goldfields.



Figure 12-4: Graveyard (28°10.588'S and 26°54.604'E) (Archaetnos, 2011)



Figure 12-5: Disused railway station complex, consisting of historical structures (28°10.223'S and 26°51.161'E) (Archaetnos, 2011)

12.13.1.4 Impact Assessment and Mitigation

The proposed SOFS surface infrastructure could directly affect the identified graveyard. Archaetnos recommended that, if feasible, the site should be incorporated into the development layout and fenced off to ensure protection. Should preservation in situ not be possible, the graves must be exhumed and reinterred following legal procedures under Section 36 of the NHRA, and the Human Tissue Act, 1983 (Act No. 65 of 1983).

Exhumation would require:

- A permit from South African Heritage Resources Agency (SAHRA).
- Involvement of a qualified archaeologist and registered undertaker.
- Consultation with known or traceable descendants.
- Approval from provincial and local health authorities.

A Grave Management Plan should also be implemented to ensure long term protection, record keeping, and descendant access.

The railway station site should be recorded and retained as part of the local heritage fabric, with any alteration subject to Provincial Heritage Resources Authority – Free State approval.

12.13.1.5 Conclusion

The footprint contains limited heritage resources, primarily a graveyard of local cultural significance. Potential heritage impacts are considered low to moderate, provided that mitigation

is implemented as prescribed. The area retains a low archaeological sensitivity, though chance finds procedures should be applied during construction to ensure that any previously unknown archaeological material (such as stone tools, ceramics, or graves) is reported to the appointed heritage specialist and SAHRA for assessment.

12.13.2 Beatrix 1, 2 and 3 Shaft Area

12.13.2.1 Overview and Scope

PGS Heritage (2017) conducted a comprehensive Heritage Audit and Management Plan for the Beatrix Mining Areas. The study area covered approximately 13 877 ha between Welkom and Theunissen within the Matjhabeng and Masilonyana Local Municipalities. The audit combined archival research, field surveys, and the development of a heritage database to support long term management under the NHRA. The study identified 66 heritage sites across the Beatrix MR, including historical farmsteads, cemeteries, and archaeological sites dating from the Stone Age and historical farming periods.

12.13.2.2 Archaeological and Historical Context

The Free State interior hosts a long continuum of human occupation from the Early, Middle, and Late Stone Age to the Late Iron Age. Within the Beatrix area, 12 archaeological sites were recorded, primarily Stone Age scatters containing stone tools and debris located near watercourses and pans. These represent early hunter-gatherer activity in the region.

Historically, the Beatrix area was settled by Voortrekker farming families during the 19th century. Farm complexes dating from this period remain scattered throughout the landscape, many featuring stone and brick structures, windmills, and storage outbuildings. Thirty historical structures were documented, eleven of which are believed to be over 100 years old and are therefore protected under Section 34(1) of the NHRA.

12.13.2.3 Graves and Burial Grounds

The audit identified nine formal cemeteries and several possible unmarked grave clusters, particularly near historical homesteads. It is noted that stillborn or infant burials were often placed beneath or adjacent to family homes in accordance with African traditions. One cemetery (Site 042) associated with an early Voortrekker family was assigned Grade III (Local) heritage significance, while the main farmstead (Site 043) and associated outbuildings (Site 044) were rated medium to high significance. Refer to Figure 12-6.

12.13.2.4 Heritage Significance and Sensitivity

Based on the SAHRA and Association of Southern African Professional Archaeologists significance classification, sites were rated from Grade IIIA (high local significance) to Generally Protected (GP-A to GP-C).

- The archaeological sites possess research potential and scientific value for understanding regional prehistory.

- The historical structures contribute to the cultural landscape and farming heritage of the Free State.
- The graves and cemeteries hold high emotional, historical, and religious significance and require careful preservation or relocation under permit.

12.13.2.5 Impact Assessment and Mitigation

The audit found that most heritage resources are located outside active mining infrastructure, reducing the likelihood of direct disturbance. Nonetheless, all proposed expansions or surface activities must be preceded by a heritage screening to confirm potential impact.

PGS Heritage recommended that Sibanye Gold maintain a Heritage Management Plan and a Heritage Database to record, monitor, and manage all identified sites.

Mitigation measures include:

- Preservation in situ of sites of high and medium significance.
- Mapping and controlled sampling of archaeological sites prior to disturbance.
- Permit applications to Provincial Heritage Resources Authority – Free State for any alteration to structures older than 60 years.
- Formal exhumation permits and family consultation for any grave relocations.
- Ongoing awareness training for environmental and construction staff regarding heritage chance finds procedures.

12.13.2.6 Conclusion

The Beatrix Operations contain a high density of heritage sites spanning multiple historical periods. The overall heritage significance of the mining area is assessed as high, but the risk of direct impact from ongoing operations remains low, as most mining activities occur within previously disturbed footprints. Continued implementation of the Heritage Management Plan, combined with periodic audits and Provincial Heritage Resources Authority – Free State liaison, will ensure compliance with the NHRA and long term preservation of cultural resources.

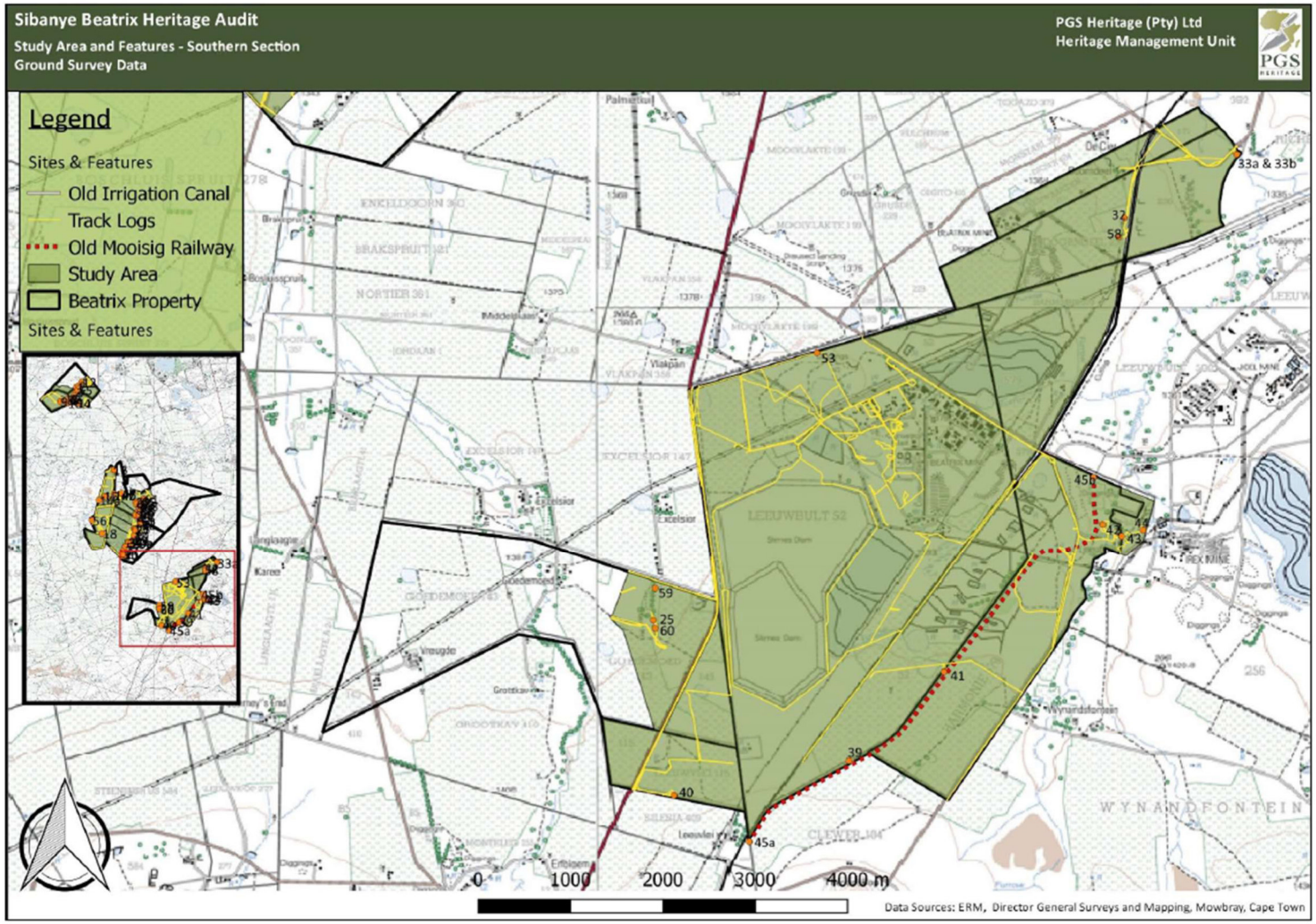


Figure 12-6: Beatrix 1, 2 and 3 Shaft Area, showing tracklogs (yellow) and heritage sites identified during the fieldwork (orange dots) (PSG, 2017)

12.14 Socio-economic

The information in this section has been derived from the Social and Labour Plan 2022-2026 compiled by Sibanye-Stillwater, (Sibanye-Stillwater, 2025).

12.14.1 Historic and Geographic Overview

The Free State is South Africa's third-largest province, covering 129 825 km^2. Despite its size, it has the second-smallest population (2 834 714 people) and the second-lowest population density. It is home to 5.1% of the national population. Predominantly rural, the province is characterised by farmland, mountains, goldfields, and dispersed towns. It shares borders with the Northern Cape, Eastern Cape, North West, Mpumalanga, KwaZulu-Natal, and Gauteng provinces, as well as Lesotho.

Agriculture, mining, and manufacturing are the dominant sectors of the Free State economy. Approximately 90% of the province is cultivated for crop production. The province contributes significantly to South Africa's food basket, producing 34% of the country's maize, 37% of its wheat, 53% of its sorghum, 33% of its potatoes, 18% of its red meat, 30% of its groundnuts, and 15% of its wool. The Free State is also one of the world's top five gold producers and leads the country's chemicals industry, being home to Sasol, the multinational synthetic-fuels producer.

Local government in the Free State is organised into five major municipalities: one metropolitan municipality (Mangaung) and four district municipalities—Xhariep, Lejweleputswa, Thabo Mofutsanyane, and Fezile Dabi. Within these districts, there are 18 local municipalities. Lejweleputswa District, which is rich in gold deposits, provides a key spatial overview of the province. Sibanye-Stillwater's operations are located in the Masilonyana Local Municipality and the Matjhabeng Local Municipality, both within the Lejweleputswa District Municipality.

Table 12-2: Key Spatial Data, 2018 (Community Survey 2016)

	South Africa	Free State	District Municipalities				
			Lejwele-putswa	Fezile Dabi	Thabo Mofutsanyana	Xhariep	Mangaung
Size of the Area (km^2)	1 229 341,50	1 300 011,50	32168	20829	33516,8	37930	9899,1
%Share of the Region	N/A	10,58%	24.74%	16%	26%	29%	8%

Lejweleputswa District is the third most populous of the five Free State districts. It is a Category C municipality located in the northwestern part of the province. The district comprises five local municipalities—Masilonyana, Tokologo, Tswelopele, Matjhabeng, and Nala—with approximately 18 towns distributed throughout. Table 12-3 presents the main socio-economic characteristics of Lejweleputswa in comparison to those of the province and South Africa as a whole (Sibanye-Stillwater, 2025).

Table 12-3: Key Socio-economic Indicators (Sibanye-Stillwater, 2025)

Indicator	Unit/Variable	SA	Free State	Lejweleputswa District
Demographic	Total population	55563654	2834714	649964
	% Share of Region		5.1%	22%
	Population density (number of people per) (2018)	45.3	21.8	20.1
	Urban Population Growth Rate (%) (2016 - 2020)	1.6	0.7	0.2
Development	Human Development Index	0.709	0.708	0.62
	Gini coefficient (2019)	0.64	31.8	28.5%
	Poverty gap rate (from upper poverty line)	55.5	23.4	30.9
	Number with Matric age 20+ years	11 964 348	544.168	114 454
	% With Matric of age 20+ years population	35.4%	19.1	18.03%
	Share of household occupying formal dwellings (2017)	87.1%	83.6	83.2%

Masilonyana, a Category B municipality covering 6 618 km², lies between the province's largest municipality, Mangaung Metro, to the south, and the second-largest, Matjhabeng, to the north. The towns of Theunissen, Brandfort, Winburg, Soutpan, and Verkeerdevlei—formerly Transitional Local Councils—were amalgamated into this municipality. The area is notable for its game reserves and tourism attractions, including the Florisbad National Quaternary Research Station. Soutpan, within Masilonyana, is well known for its commercially exploited salt lakes.

Matjhabeng, also a Category B municipality, spans 5 690 km² and is bordered by Nala to the north, Masilonyana to the south, Tswelopele to the east, and Moqhaka to the west. It is recognised as a major hub of mining activity.



Figure 12-7: Local Municipalities within Lejweleputswa District (Sibanye-Stillwater, 2025)

12.14.2 Economic Sectors

Mining, construction, transport, electricity, and trade are the major economic sectors in Lejweleputswa District, with mining being the dominant contributor. However, the district economy has experienced a prolonged recession from 2015 to 2018, highlighting significant economic challenges.

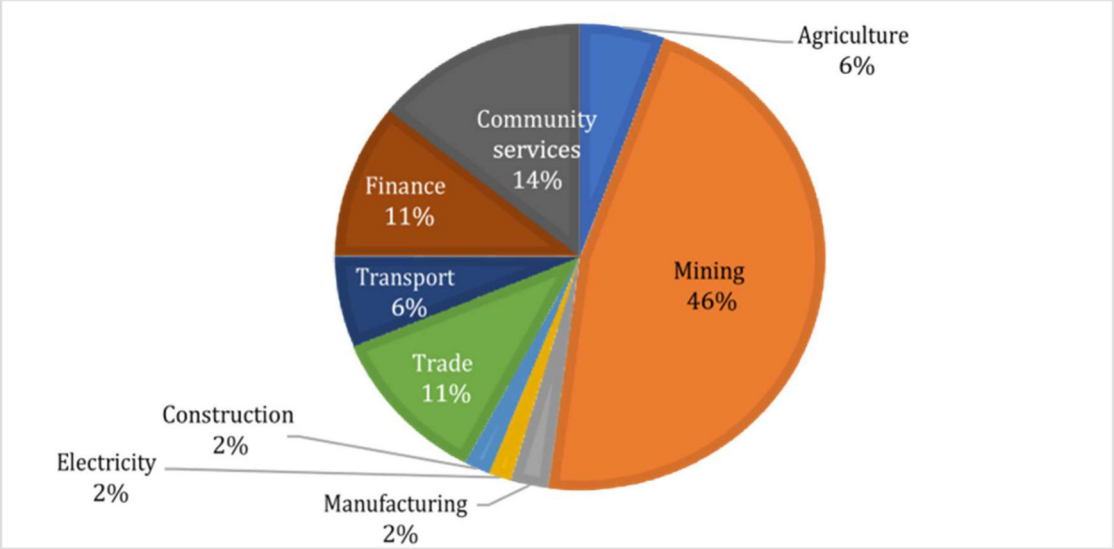


Figure 12-8: Percentage contribution of each sector to the Lejweleputswa District Municipality Economy (IDP 2020 – 2021)

12.14.3 Social Development Perspective

Masilonyana and Matjhabeng municipalities have populations of 62 770 and 429 113 respectively (StatsSA, 2016). Table 12-4 provides an overview of their demographic profiles. Masilonyana's population has grown by 1.07%, while Matjhabeng's population has increased by 1.2% over five years. Most residents in both municipalities fall within the working-age population (15–64 years).

The Free State is characterised by a "demographic dividend"—the economic growth potential that arises when the share of the working-age population is larger than the non-working-age population. However, this advantage can only be realised if children and youth are properly educated and equipped with relevant skills aligned to the province's economic needs.

Table 12-4: Demographic Information (Community Survey 2016)

	Masilonyana		Matjhabeng	
Demographic	**2016**	**2011**	**2016**	**2011**
Population	62 770	59 895	429 113	407 020
Age Structure				
Population under 15	28%	29.7%	25%	27,30%
Population 15 to 64	66.7%	64.59%	70.2%	68.%
Population over 65	5.4%	5.8%	4.8%	4.7%
Population Growth				
Per Annum	1.07%	n/a	1.2%	n/a

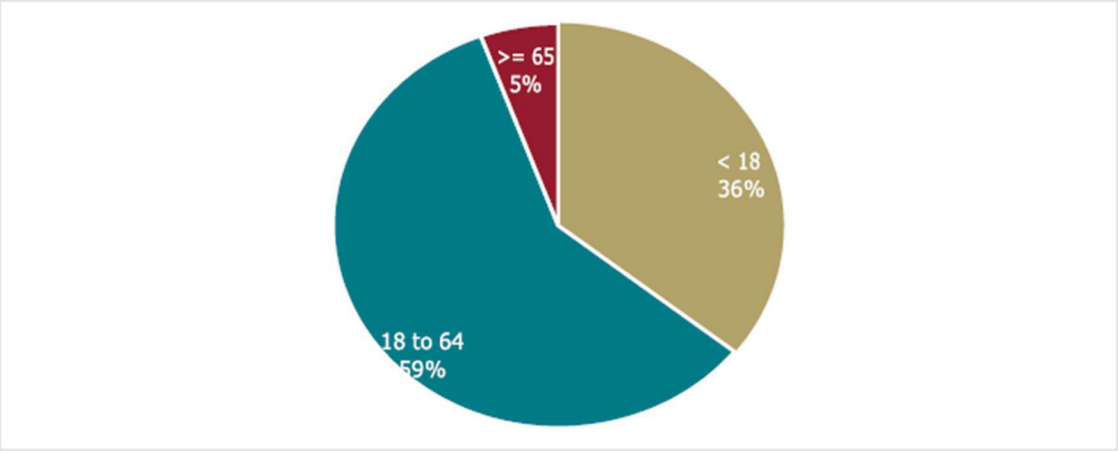


Figure 12-9: Free State Province Population by 3 Main Age Groups (Community Survey 2016)

An analysis of households shows that nearly 70% are male-headed in both municipalities.

Table 12-5: Distribution of Household Head by Gender (Community Survey 2016)

	Masilonyana		Matjhabeng	
Gender	**Number**	**Percentage**	**Number**	**Percentage**
Female	8 536	39.6%	58,685	39.3%
Male	13 022	60.4%	90,481	60.7%
Total	21 558	100%	149 166	100%

12.14.4 Origin of population and migration

According to the data presented in Figure 12-10, the majority of Free State residents are born within the province, with 90% of the population indicating local birth. This suggests relatively low migration trends and highlights that the Free State is not a significant destination for immigrants. Contributions from other South African provinces and foreign-born residents each account for less than 2% of the population.

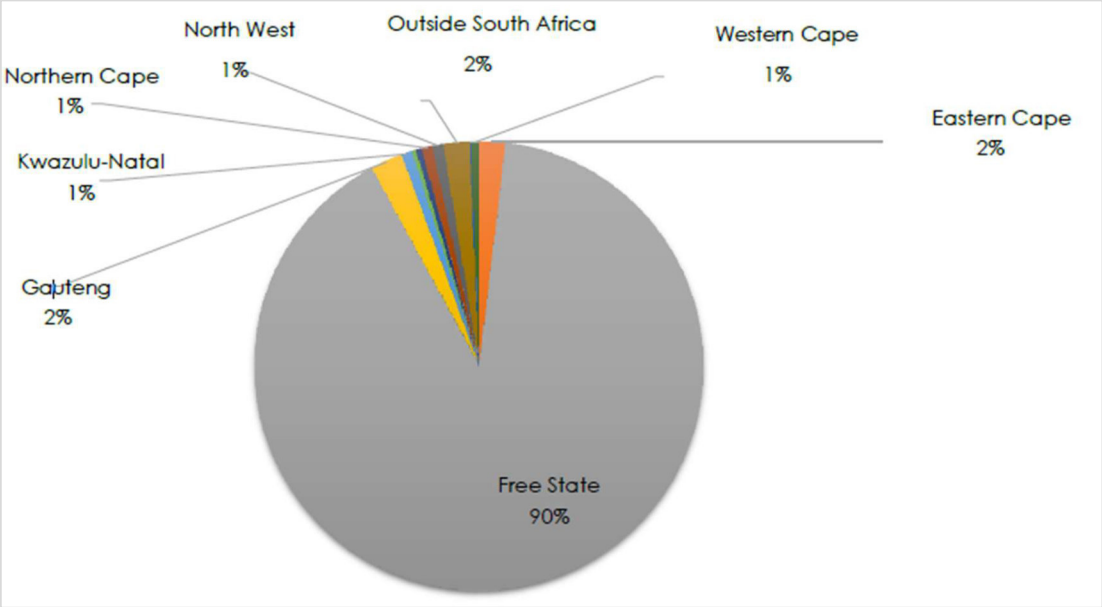


Figure 12-10: Place of Birth/Area of Origin of Residents (Community Survey 2016)

An analysis of Masilonyana and Matjhabeng confirms this provincial trend. In Masilonyana, 98.5% of residents were born in South Africa, while in Matjhabeng the figure is 96.3%. The majority were born in the Free State itself, with 93.3% in Masilonyana and 86.2% in Matjhabeng reporting local birth. Notably, Matjhabeng shows a stronger migratory influence from the neighbouring Eastern Cape, which contributes 5.1% to its population—a deviation from the provincial pattern.

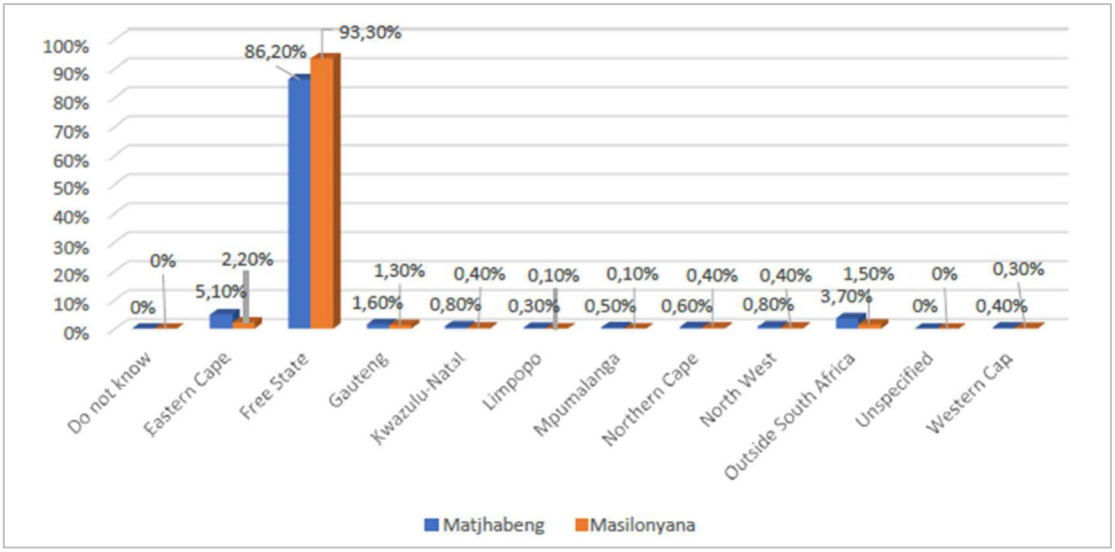


Figure 12-11: Place of Birth/Area of Origin of Residents in Masilonyana and Matjhabeng (Community Survey 2016)

12.14.5 Education

Table 12-6 provides an overview of the highest education levels attained by residents of Masilonyana and Matjhabeng, compared with the Lejweleputswa District, the Free State, and South Africa as a whole.

Approximately one in three residents in both Masilonyana and Matjhabeng have completed matric, while a similar proportion have some secondary schooling but did not matriculate. Post-secondary qualifications are relatively limited, with certificates and diplomas being the most common (4.5% in Masilonyana and 4.1% in Matjhabeng). The percentage of degree holders in both municipalities is below 4%, slightly lower than provincial and national averages.

The proportion of residents with no schooling in Masilonyana (7.2%) is double that of Matjhabeng (3.7%), suggesting a notable disparity in access to basic education between the two municipalities.

Table 12-6: Population (Over 20 and older) by Highest Education Level in Masilonyana and Matjhabeng (Community Survey 2016)

Level of Education	Masilonyana (%)	Matjhabeng (%)	Lejweleputswa (%)	Free State (%)	South Africa (%)
No schooling and not sure	7.2	3.7	5.7	7.2	8.7
Primary level schooling	16.9	15.2	18	16.9	13.2
Secondary level schooling but with no Matric	38.8	38.8	38	34.4	33.1
Matric	30.8	33.3	30	30.5	32.6
Post matric certificate and diploma	4.5	4.1	3.8	4.5	5.3
Bachelor's degree	3.7	3.1	2.94.4	4.4	4.3
Honours degree	0.9	0.9	0.8	0.9	1.3
Masters degree	0.3	0.1	0.1	0.3	0.4
Postgraduate certificate/diploma	0.7	0.7	0.6	0.7	0.9
PhD	0.2	0.1	0.1	0.2	0.2

12.14.6 Service Delivery

Dwelling Type

Quality and affordable housing, supported by adequate social facilities and access to employment, is a key indicator of sustainable community development. An analysis of dwelling types in Masilonyana and Matjhabeng shows that the majority of households—84% in Masilonyana and 86.2% in Matjhabeng—live in conventional formal housing.

Table 12-7: Distribution of households by Type of Main Dwelling in Masilonyana and Matjhabeng (Community Survey 2016)

Housing Typology	Matjhabeng (%)	Masilonyana (%)	Lejweleputswa (%)	Free State (%)	South Africa (%)
Caravan/tent	0	0	0	0	0
Cluster house in complex	0.1	0	0.1	0.3	0.3
Cluster house in complex of flats	2	0.6	1.5	1.7	3.5
House/flat/room in backyard	4.6	6.5	4.6	5.9	65.9
House or brick/concrete block structure on a separate plot	76.9	74.6	76.2	74.4	65.9

Housing Typology	Matjhabeng (%)	Masilonyana (%)	Lejweleputswa (%)	Free State (%)	South Africa (%)
Informal dwelling (shack; in backyard)	6.3	4.6	5.9	6	5.4
Informal dwelling (shack; not in backyard)	8.4	11	9.8	8	7.5
Room/flatlet on a property or larger dwelling/servants quarter/granny flat	0.3	0.9	0.3	0.4	0.8
Semi-detached house	0.3	0.8	0.3	0.3	0.8
Townhouse (semi-detached house in a complex)	0.3	0.6	0.3	0.7	0.8
Dwelling/hut/ structure made of traditional materials	0.3	0.2	0.5	1.6	7
Other	0.5	0.2	0.5	0.7	0.8

Home ownership levels are relatively high: 60.2% of Masilonyana residents and 61.6% of Matjhabeng residents own fully paid-off houses. A further 8.1% in Masilonyana and 9.8% in Matjhabeng are in the process of acquiring ownership. Rental accommodation is limited, reflecting a strong correlation between place of origin and investment in long term housing. However, around 15% of households in both municipalities continue to reside in informal settlements, highlighting the need for improved housing provision.

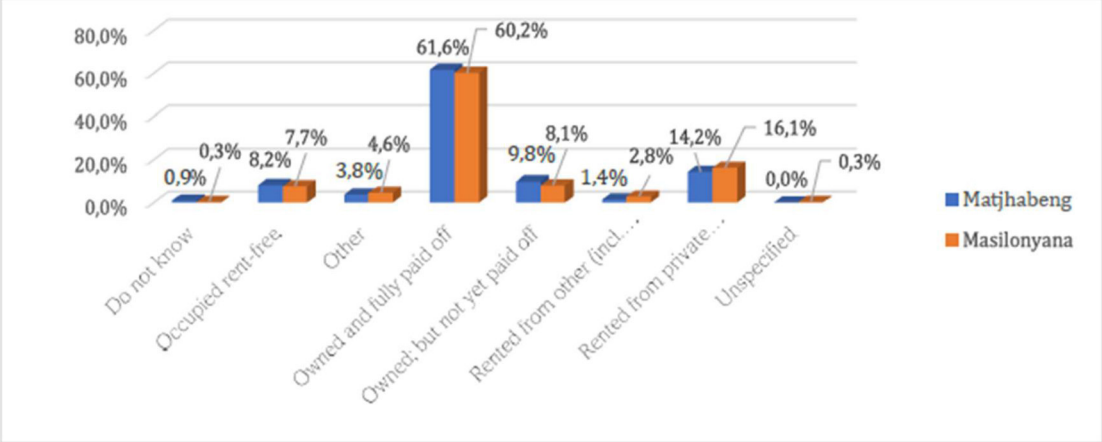


Figure 12-12: Housing by Ownership in Masilonyana and Matjhabeng (Community Survey 2016)

Water

Access to piped water is generally adequate but varies in distribution. In Masilonyana, 65.6% of households have access inside their dwellings and 28.8% within their plots. By contrast, Matjhabeng has invested in water infrastructure within residential plots, with only 40.3% of households having water inside their homes and 54.4% accessing it within their plots.

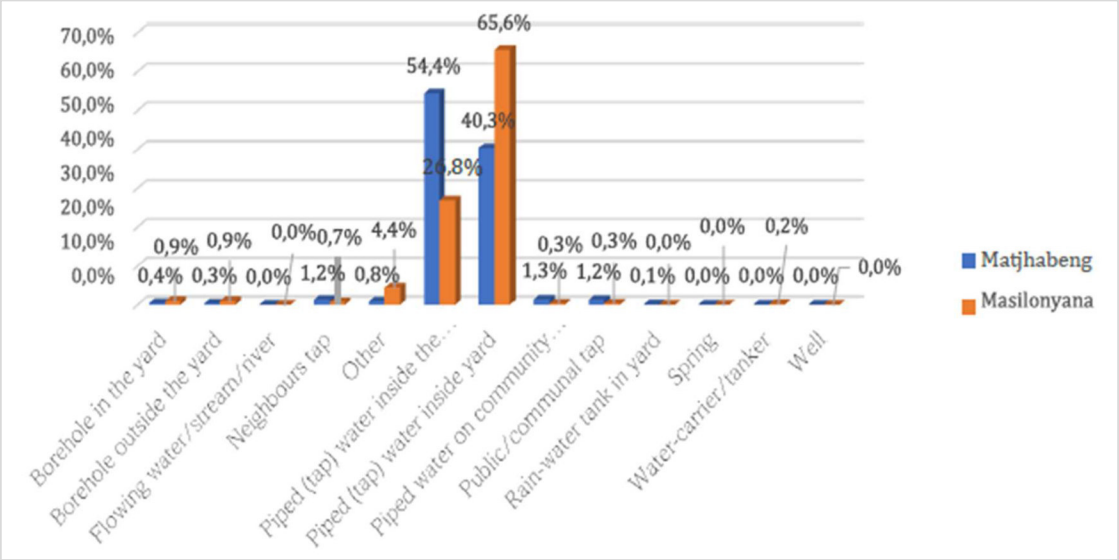


Figure 12-13: Population by Water Source (Community Survey 2016)

Despite these differences, municipal provision is the dominant source of water supply, serving 97.5% of households in Masilonyana and 93.2% in Matjhabeng. Nonetheless, nearly 2% of households in both municipalities still rely on alternative sources.

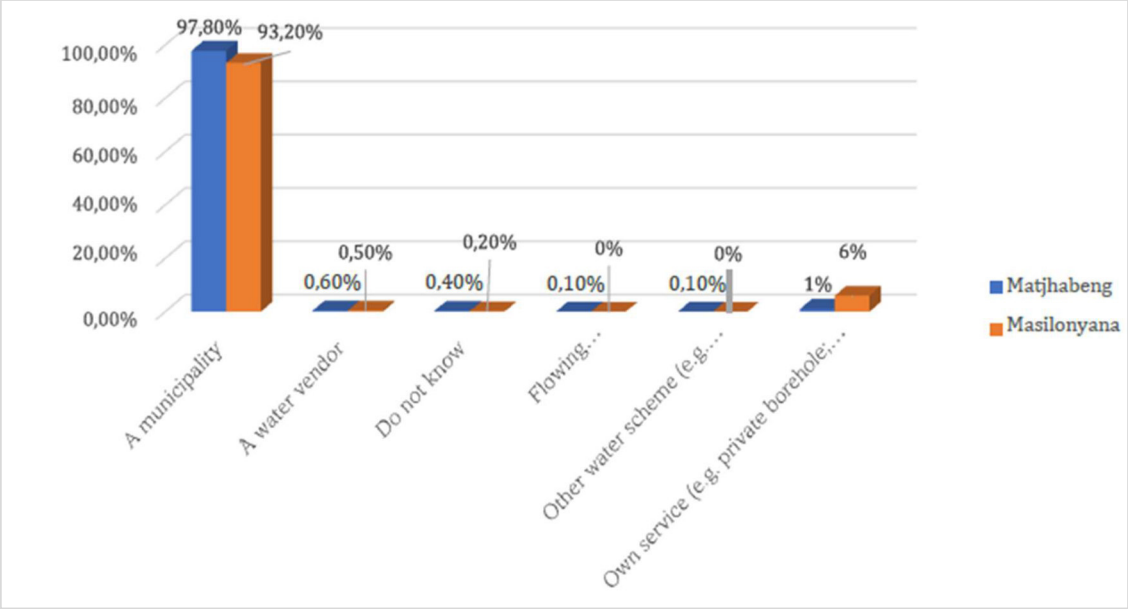


Figure 12-14: Population by Water Supplier (Community Survey 2016)

Energy

Electricity access is relatively high in both municipalities. Most households use prepaid or conventional metres, although 3% of Matjhabeng and 5.5% of Masilonyana residents have no access to conventional electricity. Renewable energy use is negligible, with fewer than 0.5% of households

using solar or wind-generated power.

Table 12-8: Distribution of households by Type of Main Dwelling in Masilonyana and Matjhabeng (Community Survey 2016)

Type of Energy Source	Matjhabeng		Masilonyana	
	Population	Percentage (%)	Population	Percentage (%)
Battery	456	0	89	0.10
Connected to other source which household is not paying for	5429	0.1	153	0.2
Connected to other source which household pays for	160	1.3	818	1.3
Generator	70483	0	0	0
In-house conventional metre	338377	16.4	7356	11.7
In-house prepaid metre	13007	78.9	50682	80.7
No access to electricity	764	3	3461	5.5
Other	764	0.2	212	0.3
Solar home system	252	0.1	0	0

Sanitation

Adequate sanitation remains a challenge. In Masilonyana, 7.4% of households rely on the bucket system, compared to 3.1% in Matjhabeng. Alarmingly, 1.3% of households in Masilonyana and 2.2% in Matjhabeng have no toilet facilities at all. The majority of households, however, use flush toilets connected to municipal sewerage systems.

Table 12-9: Distribution of Households by Type of Toilet Facility (Community Survey 2016)

Type of Toilet Facility	Matjhabeng		Masilonyana	
	Population	Percentage (%)	Population	Percentage (%)
Bucket toilet (collected by municipality)	6 765	1.6	3753	6
Bucket toilet (emptied by household)	6 606	1.5	905	1.4
Chemical toilet	439	0.1	281	0.4
Ecological toilet (e.g. urine diversion; enviro loo)	55	0	145	0.2
Flush toilet connected to a public sewerage system	368596	85.9	5395	84
Flush toilet connected to a septic tank or conservancy tank	1172	0.3	492	0.8
Pit latrine/toilet without ventilation pipe	28638	6.7	841	1.3
Pit latrine/toilet with ventilation pipe	1036	0.2	462	0.7
Other	115	2.7	545	0.9
None	4307	1	1395	2.2

Refuse Removal

Effective waste management is essential for protecting both communities and the environment. In both municipalities, refuse removal is primarily managed by local authorities, with 78.5% of households in Masilonyana and 82.2% in Matjhabeng benefiting from organised collection services.

Nevertheless, challenges persist: 16.8% of Masilonyana households and 8.4% of Matjhabeng households rely on private refuse dumps, while 3.4% of Matjhabeng households still dispose of waste illegally. This is a particular concern given the ES of wetlands in the Free State.

Table 12-10: Percentage Distribution of Households by Refuse Removal (Community Survey 2016)

Type of Toilet Facility	Matjhabeng		Masilonyana	
	Population	Percentage (%)	Population	Percentage (%)
Communal container/central collection point	404	0.9	0	0
Communal refuse dump	2011	4.7	1293	2.1
Dump or leave rubbish anywhere (no rubbish disposal)	14804	3.4	702	1.1
Own refuse dump	35943	8.4	10547	16.8
Removed by local authority/private company/community members at least once a week)	31734	74	41819	66.6
Removed by local authority/private company/community members less often than once a week	35105	8.2	8096	12.9
Other	1771	0.4	313	0.5

Internet Access

Internet access, a key driver of socio-economic development in the era of the Fourth Industrial Revolution (4IR), remains very limited. Only 10% of households in Masilonyana and 7% in Matjhabeng report having access.

This digital divide reflects significant socio-economic inequality. The Covid-19 pandemic highlighted the importance of internet connectivity for education, information sharing, and economic activity. Yet, more than 90% of households in both municipalities remain excluded from reliable online access, cutting them off from important educational, commercial, and social opportunities.

Table 12-11: Access to the Internet (in percentage terms) (Community Survey 2016)

Gender of household head	Masilonyana	Matjhabeng
Female	11%	8%
Male	9%	6%
Total	10%	7%

12.14.7 Food Security and Agricultural Activities

Agriculture plays an important role in sustaining livelihoods in Masilonyana and Matjhabeng. In Masilonyana, crop production is the most common agricultural activity, while in Matjhabeng approximately 35% of households are involved in vegetable production.

Table 12-12: Households involved in agricultural activities in Masilonyana and Matjhabeng (Community Survey 2016)

Type of Agricultural Activity	Lejweleputwa		Masilonyana		Matjhabeng	
	Number	Percentage	Number	Percentage	Number	Percentage
Livestock production	7 330	18	1119	19	2984	13
Poultry production	8947	22	1074	18	4240	18
Production of other crops	10 090	24	1796	31	4703	20

Type of Agricultural Activity	Lejweleputwa		Masilonyana		Matjhabeng	
	Number	Percentage	Number	Percentage	Number	Percentage
Vegetable production	11 854	28	1255	21	8066	35
Other	3 162	8	656	11	3022	13
Total	41 383	1000	5869	100	23015	19

Despite relatively high engagement in agricultural activities, food insecurity remains a significant socio-economic challenge. South Africa is broadly self-sufficient in food production, yet many households experience hunger due to poverty and limited income. Nationally, 19.9% of households report running out of food, with the Northern Cape (27.6%) and Eastern Cape (26.3%) being the worst affected.

In Lejweleputswa, 27.7% of households reported running out of money to buy food, with Masilonyana and Matjhabeng showing similar trends.

Table 12-13: Level of Household Food in the last 12 Months (Community Survey 2016)

Food (in)security indicator	Matjhabeng		Masilonyana		Lejweleputswa	
	Population	%	Population	%	Population	%
Prevalence of running out of money to buy food	37869	25,4	6534	30,3	60204	27,7
Skipped a meal	25974	17	4228	19,6	41239	18,9%

Socio-economic downturns continue to affect food security in both municipalities. Approximately one in four households (25.4%) in Matjhabeng reported running out of money to buy food, while 17% had skipped meals. The situation is more severe in Masilonyana, where 30.3% of households reported insufficient funds for food and 19.6% had skipped meals.

The Covid-19 pandemic further exacerbated food insecurity. Widespread job losses increased household dependency ratios, placing additional pressure on already vulnerable communities. Without targeted interventions, the prevalence of hunger and malnutrition is likely to rise in both municipalities.

12.14.8 Health

The Human Immunodeficiency Virus (HIV) remains a major public health challenge in South Africa. While perspectives on the links between HIV/AIDS and socio-economic conditions vary, the United Nations Joint Programme on HIV/AIDS (UNAIDS, 2001) has identified factors such as poverty, underdevelopment, limited opportunities, and a lack of control over one's future as significant contributors to the spread of the epidemic.

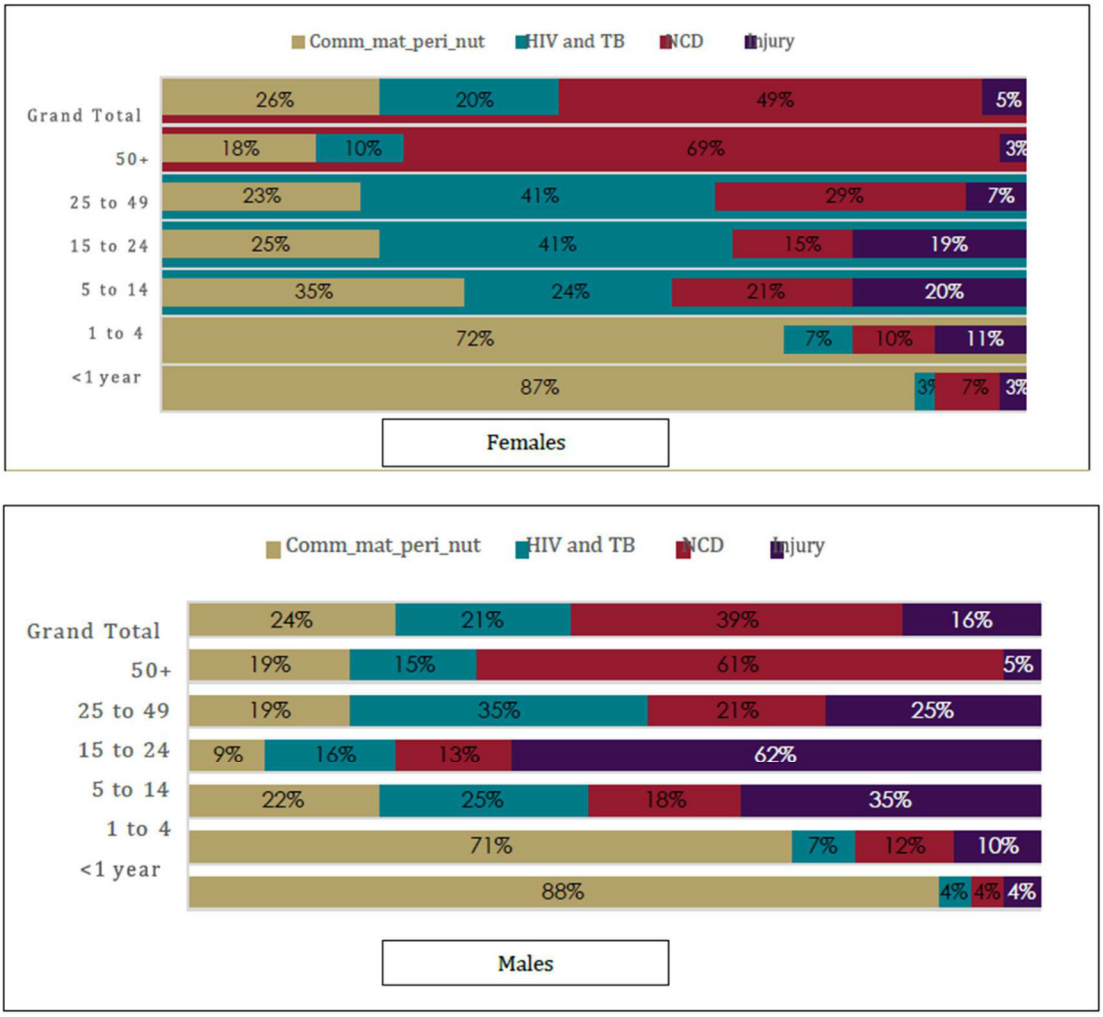


Figure 12-15: Percentage of the population affected by HIV/AIDS in relation to the poverty levels in South Africa (Lejweleputswa District Health Profile)

Lejweleputswa District has also been severely impacted by the Covid-19 pandemic. The Free State accounted for 5.6% of all confirmed Covid-19 cases in South Africa, and Lejweleputswa demonstrated high vulnerability in terms of both transmission potential and health susceptibility.

The socio-economic impacts of Covid-19 have been far-reaching. The pandemic not only disrupted daily life but also destabilised demographic patterns. South Africa's crude death rate increased significantly from 8.7 deaths per 1 000 people in 2020 to 11.6 deaths per 1 000 people in 2021. This sharp rise in fatalities resulted in a decline in life expectancy at birth in 2021 and placed additional strain on the national fiscus.

Covid-19 also exposed and deepened existing socio-economic inequalities. The pandemic magnified vulnerabilities within the economy, particularly the structural weaknesses associated with "jobless" economic growth. Building resilience to such shocks—whether from pandemics or broader challenges such as climate change—emerges as one of the most viable long term strategies to address poverty

and socio-economic vulnerability in the Free State Province.

13 IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS

13.1 Methodology used in Determining and Ranking the Nature, Significance, Consequences, Extent, Duration and Probability of Potential Environmental Impacts and Risks

To ensure uniformity, the assessment of potential impacts will be addressed in a standard manner so that a wide range of impacts is comparable. For this reason, a clearly defined rating scale will be provided to the specialist to assess the impacts associated with their investigation.

Each impact identified will be assessed in terms of probability (likelihood of occurring), scale (spatial scale), magnitude (severity) and duration (temporal scale). To enable a scientific approach to the determination of the environmental significance (importance), a numerical value will be linked to each rating scale.

The following criteria will be applied to the impact assessment:

Occurrence

- Probability of occurrence (how likely is it that the impact may occur?); and
- Duration of occurrence (how long may impact last?).

Severity

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity?); and
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?).

Status of Impact

- +: Positive impact
- -: Negative impact
- N: Neutral (no impact)

In order to assess each of these factors for each impact, the following ranking scales were used:

Probability:=P 5 – Definite/do not know 4 – Highly probable 3 – medium probability 2 – low probability 1 – Improbable 0 – None	*Duration:=D* 5 – Permanent 4 - Long term (ceases with the operational life) 3 - medium-term (5-15 years) 2 - Short-term (0-5 years) 1 – Immediate
Scale:=S 5 – International 4 – National	*Magnitude:=M* 10 - Very high/do not know 8 – high

3 – Regional 2 – Local 1 – Site only 0 – None	6 – Moderate 4 – low 2 – Minor
Status of Impact +: Positive -: Negative N: Neutral	

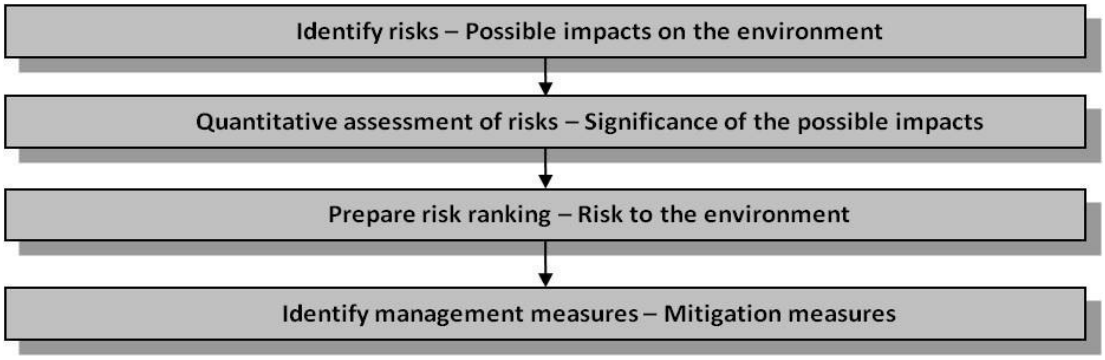
Once the above factors have been ranked for each impact, the environmental significance of each was assessed using the following formula:

Significance Points (SP) = (magnitude + duration + scale) x probability

The maximum value that can be achieved is 100 SP. Environmental effects were rated as follows:

Significance	*Environmental Significance Points*	*Colour Code*
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	>-30	L
Medium (negative)	-30 to -60	M
High (negative)	<-60	H

The following process will be followed:



13.1.1 Cumulative Impacts

For the purpose of this assessment, cumulative impacts are discussed in general terms, drawing on findings from relevant specialist studies and existing regional information. The evaluation focuses on the overall contribution of the Beatrix and SOFS Operations to key regional pressures such as land transformation, water quality degradation, air emissions, and socio-economic change within the Free State Goldfields.

13.2 The Positive and Negative Impacts that the Proposed Activity will have on the Environment and the Community that may be Affected

The proposed continuation of mining through the Beatrix and SOFS Operations presents a combination of positive socio-economic benefits and manageable environmental trade-offs. Collectively, these activities represent an effort to sustain regional livelihoods while maintaining compliance with national environmental legislation and best practice management standards.

From a social and economic perspective, the project will have a distinctly positive impact. The Beatrix and SOFS Operations together will:

- Safeguard more than 6 000 jobs and associated household incomes in the Matjhabeng and Masilonyana municipal areas.
- Sustain regional procurement networks and small business participation, supporting local economic diversification.
- Maintain municipal revenues generated through rates, service payments, and indirect spending, thereby stabilising community infrastructure and public services.
- Extend the life of the mining sector within the Free State Goldfields, which has faced prolonged contraction and job loss over the past three decades.

The continuation of operations therefore provides a critical social safety net for affected communities while advancing commitments under the SLP and national priorities for inclusive economic growth.

From an environmental perspective, the project will inevitably generate localised negative impacts related to:

- Land disturbance through construction and operational activities, leading to permanent alteration of landforms in areas occupied by shafts, WRDs, TSFs, and related infrastructure.
- Soil and vegetation loss within the approved footprint, including a reduction in arable potential and disturbance of grassland habitats.
- Potential water quality degradation through seepage, runoff, or accidental releases if not effectively managed.
- Dust, noise, and visual impacts during active mining, which may temporarily affect nearby receptors.

However, the siting of the SOFS Operations has been carefully planned to avoid sensitive environmental features, including wetlands, drainage lines, and areas of high biodiversity value. Modern water and waste management systems, stormwater controls, and rehabilitation measures are incorporated into the design, ensuring that residual impacts remain localised, reversible where possible, and within acceptable regulatory thresholds.

In summary, the project's positive socio-economic and regional development benefits outweigh the anticipated negative impacts, provided that mitigation and monitoring measures are effectively implemented.

13.3 The Possible Mitigation Measures that could be Applied and the Level of Risk

The E&S risks associated with the proposed operations are well understood and manageable through a combination of preventative design, operational controls, and progressive rehabilitation. Mitigation measures are designed to align with the precautionary principle under NEMA and the duty of care obligations of the MPRDA.

Key mitigation measures and corresponding risk levels are summarised below:

Aspect / Issue	Potential Impact	Mitigation and Management Measures	Residual Risk Level
Land Disturbance and Topography	Permanent alteration of landforms, erosion of exposed soils, and visual scarring.	Restrict clearing and earthworks to approved areas; balance cut-and-fill to preserve natural contours; install stormwater diversion berms; apply slope stabilisation and progressive rehabilitation using contour ripping and revegetation.	Low
Soils and Land Capability	Loss of fertile topsoil, compaction, and reduction in arable potential.	Strip and store topsoil separately; avoid stockpile heights > 2 m; protect from erosion; re-spread during rehabilitation; apply lime or ameliorants to restore fertility; monitor soil quality post-rehabilitation.	Low – medium
Surface and Groundwater	Contamination from seepage, hydrocarbons, or contact water; alteration of drainage.	Maintain clean/dirty water separation (GN 704 compliance); line all process and dirty water facilities; install leak detection systems; conduct monthly water quality monitoring at compliance points; implement emergency spill response and reporting.	Medium
Air Quality	Dust emissions from TSFs, haul roads, and construction areas; nuisance fallout.	Implement Dust Management Plan; maintain moisture on haul roads; cover loads; vegetate exposed surfaces; use fixed DustWatch network; investigate exceedances and adjust controls.	Low
Noise and Vibration	Disturbance of nearby receptors and fauna.	Confine noisy operations to daytime; maintain equipment; fit silencers; monitor ambient noise in accordance with SANS 10103/10328; communicate schedules to communities.	Low
Biodiversity and Habitat Integrity	Habitat loss and fragmentation of grasslands or wetlands.	Avoid sensitive habitats through layout design; demarcate no-go areas; rehabilitate with indigenous seed mixes; manage invasive alien plants; monitor vegetation recovery annually.	Medium
Visual Quality	Alteration of landscape character from elevated infrastructure.	Site infrastructure within existing disturbed zones; use neutral colours; landscape perimeters; rehabilitate slopes; integrate post closure landform design with surroundings.	Low
Socio-Economic Conditions	Employment fluctuations, inequality, or dependency.	Implement Social and Labour Plan; prioritise local employment and procurement; invest in training and enterprise development; prepare a Social Transition and Closure Plan.	Medium
Cultural Heritage	Accidental disturbance of archaeological or burial sites.	Maintain buffer zones; train staff in chance find procedures; notify SAHRA immediately upon discovery; protect and document finds; include community consultation for grave relocation.	Low
Cumulative Regional Effects	Combined impacts on air, water, and land from regional mining.	Coordinate monitoring and reporting between Beatrix and SOFS; share data with authorities; engage in regional forums; update mitigation based on cumulative trends.	Medium

13.4 Motivation where no Alternative Sites were Considered

No alternative sites were considered for either Beatrix or SOFS Operations, as the mineralised reefs are geologically fixed within the Witwatersrand Basin. Relocating the mining footprint is therefore not feasible or lawful. The current sites represent the only viable and authorised locations for continued extraction under the approved MRs.

13.5 Statement Motivating the Alternative Development Location within the Overall Site

The future SOFS Operations have been planned to ensure that new infrastructure is developed within existing disturbed or brownfield areas to minimise environmental impact. The final surface layout was designed to optimise operational efficiency while protecting sensitive E&S receptors.

Placement of new facilities was guided by the following principles:

- Avoidance of wetlands and watercourses to protect aquatic ecosystems and maintain natural drainage patterns.
- Use of existing access roads and servitudes to reduce the need for new linear infrastructure.
- Proximity to existing services to maximise integration with established infrastructure.
- Minimisation of community and agricultural land disturbance to maintain land use compatibility and limit socio-economic disruption.

13.6 Full Description of the Process Undertaken to Identify, Assess and Rank the Impacts and Risks the Activity will Impose on the Preferred Site (in Respect of the Final Site Layout Plan) Through the Life of the Activity

The impact assessment process was conducted through the following stages:

- Scoping and Screening – identification of environmental sensitivities, stakeholder issues, and regulatory triggers.
- Specialist Studies – independent investigations covering geology, hydrology, ecology, air quality, heritage, socio-economics, and noise.
- Significance Rating – application of the quantitative scoring system (Section 13.1) to each impact pre- and post-mitigation.
- Integration and Peer Review – consolidation of specialist results into an integrated environmental impact matrix reviewed by senior professionals.
- EMPr Development – translation of mitigation measures into enforceable commitments with performance indicators and monitoring requirements.
- Residual Risk Evaluation – assessment of cumulative, transboundary, and long term risks during operation, closure, and post closure phases.

13.7 Assessment of Each Identified Potentially Significant Impact and Risk for the Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

The EIA undertaken for the SOFS Operations (Phase 1 De Bron Merriespruit Project) identified and assessed the potential impacts arising from the proposed underground mining and associated surface infrastructure. The study evaluated the project across its three life cycle stages (construction, operational, and decommissioning) and considered the sensitivity of the receiving environment, the magnitude of anticipated changes, and the effectiveness of proposed mitigation measures. The Free State Goldfields is an established mining region, but the SOFS footprint extends into previously undeveloped agricultural land, requiring careful management to minimise environmental disturbance and maintain ecological and social integrity.

The findings below summarise the key environmental aspects assessed for the SOFS Operations. Each subsection outlines baseline environmental conditions, the potential impacts of project activities during different phases, the mitigation and management measures proposed to avoid or reduce those impacts, and the residual effects expected after rehabilitation and closure.

13.7.1 Topography

13.7.1.1 Construction Phase

The SOFS Operations area lies within the gently undulating plains typical of the Free State Goldfields. The natural topography exhibits low relief terrain sloping gradually from west to east, with elevations between approximately 1 330 m and 1 380 m amsl. The landscape has been shaped by ancient fluvial and aeolian processes, resulting in subdued ridgelines, shallow depressions, ephemeral drainage lines, and isolated pans that collect rainfall during the summer months. These landforms contribute to the region's visual uniformity and define surface water flow and soil stability.

During construction, large-scale earthworks for shaft sinking, box-cut excavation, access road construction, pipeline trenches, and the preparation of laydown areas will disturb the natural land surface. These activities will locally modify slopes and micro-relief, altering natural drainage patterns through cut-and-fill operations and creating temporary man-made mounds and depressions. The installation of storm water channels and compacted platforms for heavy equipment may accelerate runoff and increase the potential for gully formation or sediment deposition downstream. Visually, the construction landscape will contrast sharply with the surrounding flat plains due to exposed subsoils, temporary stockpiles, and machinery movement.

To minimise disturbance, earthworks will be confined to authorised areas within the approved layout plan. Cut-and-fill operations will be balanced to reduce material transport and to maintain the natural slope gradient. Storm water control systems will be designed to emulate pre-development flow regimes, ensuring that concentrated runoff does not create new erosion pathways. Exposed slopes will be stabilised using hydroseeding, erosion control mats, or contour ripping, and disturbed surfaces will be rehabilitated as soon as possible. Once construction concludes, temporary dumps

and stockpiles will be reshaped to follow the natural terrain, and topsoil will be replaced to promote vegetation regrowth.

Residual Impact: After rehabilitation, the modified landforms will integrate visually and functionally with the natural topography. The change will be confined to the immediate project footprint, with no lasting alteration of regional drainage or visual character. Overall significance — low.

13.7.1.2 Operational Phase

During the operational phase, permanent alterations to the landform will result from engineered structures such as shafts, access roads, haul routes, workshops, and waste management facilities including TSFs and WRDs. These features will introduce elevated embankments and engineered slopes into an otherwise level environment. Without proper design, these landforms could channel surface water and promote erosion or slope instability, particularly along unvegetated faces.

Mitigation measures include shaping all WRDs and TSFs to gentle, stable gradients (1:4 to 1:5), constructing berms and toe drains for storm water control, and applying concurrent rehabilitation to completed slopes. Progressive vegetation cover will reduce erosion, promote infiltration, and soften visual contrasts. Routine inspections following rainfall events will ensure that erosion control systems remain functional and that slope stability is maintained.

Residual Impact: The modified landforms will remain as permanent elements of the landscape but, once stabilised and vegetated, will blend visually with the surrounding terrain. Residual impact — low to moderate, long term but acceptable.

13.7.1.3 Decommissioning Phase

During decommissioning, the removal of infrastructure and the regrading of disturbed land will reduce the visual prominence of engineered features. WRDs and TSFs that remain as final landforms will be reshaped to match the surrounding terrain and covered with suitable growth medium. Backfilling of box-cuts and shafts will restore surface continuity, while the re-establishment of vegetation will aid long term erosion control and hydrological stability.

Residual Impact: Post closure landforms will be stable and visually assimilated into the regional landscape, with minor residual undulations acceptable within the post-mining context. Significance — low, permanent but environmentally acceptable.

13.7.2 Soils

13.7.2.1 Construction Phase

The project area is underlain predominantly by moderately deep to deep sandy loam and loamy soils belonging to the Avalon, Clovelly, Hutton, and Oakleaf forms, with shallower Mispah and Valsrivier soils along elevated ridges. These soils possess moderate to good fertility and are capable of supporting both dryland cropping and grazing. Top-soils are typically dark brown to reddish-brown with moderate organic content, while subsoils show clay enrichment and ferruginous nodules that influence drainage.

Construction activities such as clearing, excavation, and heavy vehicle movement will disturb and compact the soil profile, disrupting natural porosity and infiltration. Stripping and mixing of topsoil and subsoil will reduce biological activity and fertility, while exposed areas will be vulnerable to sheet and rill erosion during rainfall. Accidental fuel or lubricant spills pose contamination risks that could permanently degrade soil quality.

Mitigation measures include stripping topsoil to at least 150 mm, storing it separately from subsoil on level ground with erosion berms, and vegetating stockpiles with quick-growing indigenous grasses. Movement of heavy vehicles will be restricted to designated routes to minimise compaction. Temporary storm water controls such as silt fences and diversion channels will prevent sediment loss, and spill response protocols will ensure immediate containment and cleanup of contaminants.

Residual Impact: Following rehabilitation and revegetation, soil productivity will recover gradually through microbial and organic matter regeneration. Impacts will be localised, short-term, and of low residual significance.

13.7.2.2 Operational Phase

Operational impacts on soils will stem from continuous surface disturbance within the mining footprint, maintenance of access roads, and potential contamination from hydrocarbons, reagents, or process water. Windblown dust from WRDs and TSFs may alter soil texture and chemistry in adjacent areas, while long term compaction around infrastructure may inhibit vegetation regrowth.

Mitigation measures will include routine maintenance of haul roads, regular inspection of fuel and chemical storage facilities, prompt remediation of any contaminated soils using excavation or bioremediation, and progressive rehabilitation of inactive zones. Annual soil quality monitoring will track trends in pH, salinity, and hydrocarbon presence to inform adaptive management.

Residual Impact: With continuous monitoring and management, soil degradation will remain minimal and reversible. Residual impact significance — low.

13.7.2.3 Decommissioning Phase

Decommissioning will involve large-scale rehabilitation to restore soil functionality. Compacted surfaces will be ripped to relieve density, contaminated material removed, and stored topsoil evenly replaced. Fertility will be enhanced through organic amendments where required, and seeded vegetation will stabilise slopes and rebuild biological structure.

Residual Impact: Post closure soils are expected to return to near-baseline fertility and stability levels. The residual impact will be low, localised, and reversible, supporting long term sustainable land use.

13.7.3 Land Capability

13.7.3.1 Construction Phase

Baseline land capability across the SOFS Operations area ranges from moderate to high, supporting dryland cropping and livestock grazing. Construction activities — including clearing, excavation, and

material stockpiling — will temporarily reduce this capability by removing vegetation cover, compacting soils, and exposing the surface to erosion. Productive topsoil will be removed and stored, temporarily sterilising agricultural potential within the construction footprint.

Mitigation entails minimising the cleared area, separating and protecting topsoil for later reinstatement, implementing storm water and erosion control systems, and rehabilitating disturbed areas immediately once construction ends.

Residual Impact: The reduction in land capability will be temporary and reversible through successful rehabilitation. Post-construction, the land can return to its original agricultural potential. Significance — low.

13.7.3.2 Operational Phase

During operation, permanent mine infrastructure such as shafts, roads, workshops, and waste facilities will occupy portions of land previously suitable for agriculture, effectively sterilising them for the life of the mine. Surrounding land may also experience reduced capability due to altered drainage or dust deposition.

Mitigation involves confining the operational footprint to approved areas, maintaining buffer zones around high potential soils and watercourses, implementing progressive rehabilitation on inactive areas, and monitoring soil health.

Residual Impact: The decline in land capability will be long term but spatially confined. With rehabilitation, grazing potential can be restored over most areas. Residual impact significance — low to moderate.

13.7.3.3 Decommissioning Phase

At closure, rehabilitation will aim to restore the land's productive potential. Activities will include removal of surface infrastructure, recontouring of disturbed ground, replacement of topsoil, and re-establishment of vegetation using species suited to local soil and climate conditions. Final land capability will be determined by soil depth, fertility, and stability of rehabilitated slopes.

Residual Impact: The rehabilitated land is expected to achieve moderate to good grazing potential, consistent with pre-mining use. Minor residual changes in slope and soil profile may persist but will not constrain sustainable use. Significance — low, long term, and acceptable.

13.7.4 Land Use

13.7.4.1 Construction Phase

Existing land use within the SOFS Operations area consists mainly of agricultural activities, including crop cultivation and livestock grazing, interspersed with farmsteads and access roads. Construction will temporarily displace these activities, restrict movement, and generate dust that could affect crops and pastures near the project boundary.

Mitigation includes maintaining access routes for neighbouring landowners, clearly marking

construction boundaries, implementing dust suppression and erosion control, and rehabilitating affected farmland promptly. Engagement with landowners will ensure coordination of activities and minimise disruption.

Residual Impact: Land use impacts will be temporary, localised, and reversible. Following rehabilitation, agricultural use can resume with no long term restrictions. Significance — low.

13.7.4.2 Operational Phase

During operations, the land within the approved mining footprint will be permanently converted from agricultural to industrial use. This transition will include shaft complexes, WRDs, TSFs, and support infrastructure. Adjacent agricultural land may continue functioning but could experience indirect effects such as dust deposition, noise, or restricted access.

Mitigation measures will limit disturbance to authorised zones, maintain open communication with affected landowners, implement effective dust and noise control, and plan for eventual land use transition after closure.

Residual Impact: Land use change will be long term and confined to the operational footprint. Rehabilitation and post closure planning will ensure compatibility with regional development frameworks, yielding a low residual impact.

13.7.4.3 Decommissioning Phase

Upon closure, redundant infrastructure will be removed and the land rehabilitated for sustainable post-mining use, primarily grazing or other low intensity agriculture. Collaboration with local stakeholders and authorities will guide final land use allocation to ensure it aligns with municipal planning objectives.

Residual Impact: After rehabilitation, the land will support productive and environmentally compatible uses, contributing positively to the local economy and landscape integrity. Significance — low and beneficial.

13.7.5 Hydrogeology

13.7.5.1 Construction Phase

The SOFS Operations area is underlain by sedimentary formations of the Karoo Supergroup, consisting primarily of sandstones, shales, and mudstones of the Adelaide and Tarkastad Subgroups. These formations host a moderately developed secondary aquifer system characterised by fractures and bedding-plane discontinuities that control groundwater occurrence and flow. Shallow perched aquifers are typically encountered within 20–30 m bgl, while deeper confined aquifers may occur at depths exceeding 80 m bgl. Groundwater quality is generally good, with total dissolved solids (TDS) concentrations below 500 mg/L in most boreholes, though localised salinity and hardness increase in the vicinity of historical mining areas.

During construction, excavation for shafts, box-cuts, foundations, and service corridors may intersect these shallow aquifers, temporarily altering groundwater levels and flow directions.

Dewatering activities to maintain dry working conditions may induce a localised cone of depression within a 500–1 000 m radius around excavation zones. Groundwater drawdown could affect nearby farm boreholes or small wetlands if abstraction rates are not carefully controlled. In addition, accidental spills of fuel, lubricants, or cement wash-water could contaminate shallow aquifers through infiltration if not contained.

To mitigate these effects, groundwater abstraction will be limited to the minimum required for safe excavation. All construction dewatering will be monitored for volumes and quality and disposed of in accordance with licence conditions. Hydrocarbon and chemical storage areas will be bunded, lined, and located outside mapped recharge zones. Temporary cut-off trenches or sumps will collect seepage inflows, and any contaminated water will be pumped to lined holding facilities for treatment or reuse.

Residual Impact: Impacts on groundwater during construction will be short-term and localised, with minimal drawdown effects beyond the immediate excavation footprint. With mitigation implemented, the residual impact significance is low.

13.7.5.2 Operational Phase

During the operational phase, continuous groundwater abstraction will be required to maintain dry underground conditions. Long term dewatering may alter the regional groundwater table, potentially affecting recharge rates and hydraulic gradients. Prolonged abstraction can induce migration of lower-quality water from adjacent aquifers or spoil areas into cleaner zones, while seepage from WRDs, TSFs, or return water dams could degrade underlying aquifers through increased sulphate and chloride concentrations.

Mitigation includes maintaining a separation between clean and dirty water systems to minimise seepage and installing interceptor drains or recovery boreholes around potential contamination sources. A calibrated numerical groundwater model will be used to predict drawdown extents, enabling adaptive management of abstraction rates. Monitoring boreholes up- and downgradient of operational areas will be sampled quarterly for water level, EC, pH, sulphate, chloride, nitrate, and major ion chemistry.

Residual Impact: Groundwater drawdown will remain during active mining but will stabilise post closure as the aquifer gradually recharges. With ongoing containment and monitoring, residual impacts will be moderate during operations and low in the long term.

13.7.5.3 Decommissioning Phase

During decommissioning, the cessation of dewatering will allow groundwater rebound within underground workings. The rebound process may initially mobilise contaminants or alter redox conditions, resulting in temporary deterioration of water quality due to the oxidation of exposed sulphide-bearing materials. If uncontrolled, this could lead to surface seepage or discharge at low-lying areas.

Mitigation will include sealing all shafts and boreholes to prevent uncontrolled inflows or outflows, continued groundwater level and quality monitoring for at least two years post closure, and geochemical testing of underground materials to predict rebound water chemistry. Should monitoring reveal quality deterioration, active treatment or containment measures will be implemented.

Residual Impact: The groundwater system is expected to recover to near-baseline levels over time, with residual impacts low, localised, and reversible under a controlled closure programme.

13.7.6 Hydrology

13.7.6.1 Construction Phase

Surface water drainage in the SOFS Project area is primarily towards the Merriespruit and Sand River catchments. The landscape comprises ephemeral drainage lines and seasonal pans that are sensitive to increased sedimentation and altered flow. Baseline hydrology shows limited perennial flow, with runoff concentrated in short, intense summer rainfall events.

Construction activities such as clearing, excavation, and road development will increase impervious surfaces, alter natural drainage patterns, and expose soils to erosion. Stormwater runoff from disturbed areas may transport sediments and pollutants (including hydrocarbons, cement residues, or waste materials) into adjacent drainage lines. If unmanaged, these discharges can elevate turbidity, reduce water quality, and affect downstream aquatic habitats.

To minimise impacts, a comprehensive Stormwater Management Plan will be implemented to separate clean and dirty water. Silt fences, diversion berms, and temporary retention ponds will capture sediment-laden runoff. Construction will be timed for drier months where possible, and erosion control measures will be inspected regularly.

Residual Impact: Construction related impacts on surface water will be short-term, localised, and of low significance following effective implementation of the stormwater plan.

13.7.6.2 Operational Phase

Operational hydrological impacts will result from process water management, stormwater control, and the operation of WRDs, TSFs, and PCD. Impervious surfaces such as haul roads and plant areas reduce infiltration, increase runoff, and may alter natural catchment hydrology. Seepage or overtopping of polluted water structures during extreme rainfall events could introduce contaminants into natural systems.

Mitigation measures will include maintaining a strict “no discharge” policy, ensuring all dirty water remains within containment circuits. Clean water from undisturbed areas will be diverted around operational zones. PCD will be maintained with sufficient freeboard to accommodate a 1-in-50-year storm event, and all water quality parameters will be monitored monthly at upstream and downstream locations in accordance with WUL conditions.

Residual Impact: With containment and maintenance systems functioning effectively, residual

hydrological impacts during operation will be low and confined to the site.

13.7.6.3 Decommissioning Phase

Decommissioning will focus on draining and rehabilitating PCD, restoring natural drainage lines, and stabilising erodible areas. As containment structures such as TSFs and WRDs are capped and vegetated, the hydrological regime will progressively return to a natural state. Temporary turbidity increases may occur during rehabilitation, but these will subside as vegetation establishes.

Residual Impact: Surface water systems will stabilise and revert to near natural flow patterns within a few wet seasons. Residual effects will be low, localised, and short-term.

13.7.7 Wetlands

13.7.7.1 Construction Phase

Wetlands within the project area consist mainly of depressional pans and linear drainage line wetlands that form part of the Merriespruit catchment. These systems provide essential ecosystem services such as flood attenuation, sediment trapping, nutrient cycling, and habitat for aquatic species. They are hydrologically sensitive to changes in sediment input and flow regime.

Construction phase activities including vegetation clearance, road construction, and earthworks near drainage lines may disturb wetland margins or modify natural hydrology through altered runoff patterns. Increased sediment load from eroded soils can clog wetland channels, reducing infiltration and water-holding capacity. Accidental spills or leaks from construction vehicles also pose contamination risks to wetland soils and biota.

Mitigation measures will include maintaining buffer zones of 30–50 m around delineated wetlands, clearly marking “no-go” areas, installing sediment traps and diversion berms, and prohibiting refuelling within 100 m of any wetland. Disturbed wetland fringes will be rehabilitated immediately using indigenous hydrophytic species.

Residual Impact: Wetland impacts during construction will be localised and temporary. Residual significance will be low to moderate after mitigation, with no permanent loss of wetland area expected.

13.7.7.2 Operational Phase

Operational impacts on wetlands may arise from hydrological alterations, contaminated seepage from tailings facilities, and reduced inflow due to containment of dirty water within process circuits. These changes could modify hydroperiods, alter water quality, and reduce ecological functioning.

To manage these risks, the clean and dirty water separation system will be maintained throughout operations. Seepage collection drains and monitoring boreholes will be installed downgradient of TSFs and WRDs to intercept any contaminated flows. Vegetated buffer zones will be maintained to filter runoff, and invasive alien vegetation will be controlled to preserve natural composition.

Residual Impact: Wetland function is expected to remain intact with active management, and

residual significance is low after mitigation.

13.7.7.3 Decommissioning Phase

Decommissioning will provide an opportunity to restore hydrological connectivity and ecological integrity of affected wetlands. Rehabilitation will involve backfilling disturbed areas, re-establishing natural drainage patterns, and replanting native hydrophytic vegetation. Monitoring will continue for at least three years post closure to ensure successful re-establishment.

Residual Impact: Rehabilitated wetlands are expected to recover to functional status with enhanced stability and biodiversity. Long term residual impact — low and positive.

13.7.8 Flora

13.7.8.1 Construction Phase

The vegetation within the SOFS Operations area is representative of the Grassland Biome, dominated by secondary grassland interspersed with patches of natural vegetation associated with drainage lines, pans, and shallow depressions. Remnant grassland communities host several Species of Conservation Concern (SCCs), particularly bulbous and geophytic taxa that emerge seasonally after rainfall. Baseline assessments identified sensitive floral habitats supporting protected species such as *Boophone disticha* (Bushman's Poison Bulb), *Crinum bulbispermum* (Orange River Lily), *Eucomis autumnalis* (Pineapple Lily), and *Hypoxis hemerocallidea* (African Potato).

During the construction phase, vegetation clearing for infrastructure establishment, roads, and shaft preparation will result in direct loss of floral habitat, reduced species diversity, and potential removal of SCC individuals. Exposed areas will become susceptible to erosion and invasion by alien plant species such as *Tagetes minuta* (wild marigold / khaki bush) and *Conyza bonariensis* (flax-leaf fleabane / hairy fleabane). Construction activities may also compact soil, reducing the ability of native grasses to re-establish after disturbance.

To mitigate impacts, pre-construction botanical walkdowns will identify SCC individuals for rescue and relocation. Vegetation clearing will be limited to demarcated areas, and topsoil containing seed banks will be stockpiled and reused during rehabilitation. An alien plant management plan will be implemented from project inception, focusing on manual removal and ongoing monitoring. Progressive rehabilitation of disturbed areas will utilise indigenous seed mixes sourced from the local ecological zone.

Residual Impact: Floral impacts during construction will be localised and reversible with proper rehabilitation. Residual significance is assessed as low.

13.7.8.2 Operational Phase

Operational impacts on vegetation will result from continued surface disturbance, vehicle activity, and maintenance of cleared servitudes. Dust deposition from haul roads and WRDs may suppress plant growth by clogging stomata and reducing photosynthetic efficiency. In some areas, altered drainage may promote colonisation by alien or ruderal species, changing community structure and

composition.

Mitigation includes maintaining dust suppression on all unpaved roads, establishing vegetated buffer zones around infrastructure, and implementing annual botanical monitoring to track changes in species diversity and coverage. Progressive rehabilitation of inactive areas will continue throughout the operational phase.

Residual Impact: Vegetation disturbance will remain confined to the operational footprint and will not significantly alter regional plant diversity. Residual impact significance — low.

13.7.8.3 Decommissioning Phase

During decommissioning, rehabilitation of disturbed areas will aim to restore indigenous vegetation cover and ecological functionality. Stored topsoil will be reapplied, slopes stabilised, and revegetation undertaken using locally adapted grass and forb species. Alien invasive species will be continuously controlled during the initial succession period.

Residual Impact: With proper implementation of the rehabilitation plan, floral communities are expected to re-establish, restoring biodiversity and ecological resilience. Residual impact — low and positive.

13.7.9 Fauna

13.7.9.1 Construction Phase

Faunal communities within the project area include small mammals, reptiles, amphibians, and avifauna typical of Highveld grasslands and wetland environments. Common species include the *Lepus saxatilis* (scrub hare), *Xerus inauris* (Cape ground squirrel), various larks, and amphibians such as the *Pyxicephalus adspersus* (giant bullfrog), a SCCs.

Construction activities will lead to temporary habitat loss, noise and vibration disturbance, and increased human presence. Ground-nesting birds and small mammals are particularly vulnerable to displacement or mortality. Vehicle traffic may cause roadkill incidents, while artificial lighting could disturb nocturnal species.

Mitigation will include pre-construction faunal surveys and relocation of vulnerable species where feasible. Vegetation clearance will be phased to allow fauna to disperse naturally, and no night-time construction will be permitted except where safety-critical. Workers will be prohibited from hunting, trapping, or harassing wildlife.

Residual Impact: Faunal displacement during construction will be temporary, with recolonisation expected post-rehabilitation. Residual significance — low.

13.7.9.2 Operational Phase

During operations, habitat exclusion within the mining footprint will persist, with fauna avoiding active areas due to noise, movement, and lighting. Dust and water pollution may also indirectly affect amphibians and birds that rely on wetlands. Vehicle collisions remain a potential source of

mortality.

Mitigation measures will include restricting vehicle speeds, installing wildlife warning signage, managing lighting to reduce night-time disturbance, and maintaining vegetated buffer zones to provide alternative habitats and corridors.

Residual Impact: Faunal impacts during operation are long term but localised and reversible after closure. Residual impact — low.

13.7.9.3 Decommissioning Phase

Decommissioning activities such as demolition, recontouring, and revegetation will gradually improve habitat availability. As vegetation cover returns, small mammals, birds, and reptiles will recolonise rehabilitated zones. Ongoing monitoring will confirm the recovery of faunal diversity.

Residual Impact: Rehabilitated areas will provide functional habitat, supporting the natural return of fauna. Long term residual impact — low and positive.

13.7.10 Air Quality

13.7.10.1 Construction Phase

Air quality in the region is influenced primarily by agricultural activities, vehicle movement, and existing mining operations. Baseline dustfall rates are generally within national standards, but localised increases occur during dry, windy periods.

During construction, dust emissions will result from earthworks, topsoil stripping, material handling, and unpaved road traffic. These fugitive emissions may reduce visibility, create nuisance dust at nearby receptors, and settle on crops and vegetation. Fine particulate matter (PM_{10} and $PM_{2.5}$) can also temporarily affect respiratory health in workers and nearby residents.

To manage these effects, active dust suppression using water carts or chemical suppressants will be applied to exposed areas and haul roads. Vehicle speeds on unpaved roads will be limited to 30 km/h, and material stockpiles will be covered or vegetated. Construction activities will be suspended during high-wind events, and ambient dust monitoring will be conducted at boundary locations.

Residual Impact: With mitigation, construction related dust emissions will be short-term and localised, with no exceedance of ambient air quality limits. Residual impact — low.

13.7.10.2 Operational Phase

Operational air quality impacts will stem from continuous vehicle activity, exposed surfaces on WRDs and TSFs, and occasional material handling. No point-source emissions will occur since the project does not include mineral processing or smelting infrastructure.

Mitigation will involve regular watering of roads, application of crusting agents on inactive surfaces, and maintenance of vegetative cover. Dust monitoring stations will be maintained downwind of the site, and exceedances will trigger corrective action.

Residual Impact: Residual air quality impacts will be localised and remain within regulatory limits. Significance — low.

13.7.10.3 Decommissioning Phase

Decommissioning will involve the removal of infrastructure and large-scale earthworks for rehabilitation, temporarily increasing dust generation. However, once revegetation and capping are complete, dust levels will progressively decrease.

Residual Impact: Air quality will improve post closure as dust sources are stabilised. Long term residual impact — low and beneficial.

13.7.11 Noise

13.7.11.1 Construction Phase

Ambient noise levels in the area are typical of rural settings, dominated by natural sounds and occasional agricultural machinery. Construction activities, including clearing, excavation, and vehicle movement, will temporarily elevate noise levels, particularly during equipment operation and material transport.

Mitigation will include restricting noisy activities to daylight hours (07:00–18:00), equipping machinery with silencers, maintaining equipment to manufacturer standards, and providing hearing protection for workers. If sensitive receptors are identified nearby, temporary noise barriers or berms will be installed.

Residual Impact: Construction noise impacts will be short-term and reversible, with low significance after mitigation.

13.7.11.2 Operational Phase

During operation, noise will be generated by ventilation fans, haul trucks, and general plant activity. Given the separation distance to the nearest receptors, exceedances of SANS 10103:2008 thresholds are unlikely.

Mitigation includes regular maintenance of all stationary and mobile equipment, annual boundary noise monitoring, and operator awareness training to minimise unnecessary idling or revving.

Residual Impact: Noise during operations will remain within compliance limits, with residual significance — low.

13.7.11.3 Decommissioning Phase

Demolition and removal of infrastructure during closure will produce short-term noise similar to construction phase levels. These activities will be restricted to daytime hours and managed using the same controls applied during earlier phases.

Residual Impact: Post-decommissioning, noise levels will return to baseline rural conditions. Significance — negligible.

13.7.12 Traffic

13.7.12.1 Construction Phase

Traffic volumes on local roads, particularly the S239 and R30, will temporarily increase due to the transport of materials, equipment, and construction personnel. The movement of heavy vehicles could cause minor congestion, dust generation, and road surface wear.

Mitigation includes restricting heavy vehicles to approved routes, enforcing speed limits, scheduling deliveries to avoid peak traffic, maintaining clear signage, and applying dust suppression on gravel access roads. Coordination with the local municipality will ensure road safety and minimise disruption to other users.

Residual Impact: Traffic related impacts will be temporary, short-term, and of low significance following mitigation.

13.7.12.2 Operational Phase

During operation, traffic will reduce to routine employee transport, supply deliveries, and waste haulage. These activities will have negligible influence on regional road capacity.

Ongoing road maintenance and dust control will be required to preserve surface quality and safety.

Residual Impact: Traffic impacts during operation will be minimal and long term residual significance — low.

13.7.12.3 Decommissioning Phase

Closure and dismantling will temporarily increase the movement of heavy vehicles for removal of materials and transport of waste.

Mitigation includes careful scheduling of demolition transport, inspection of access roads, and coordination with local traffic authorities.

Residual Impact: Following closure, vehicle movement will decrease to pre-project levels. The residual traffic impact — negligible.

13.7.13 Heritage Resources

13.7.13.1 Construction Phase

A Phase 1 Heritage Impact Assessment identified archaeological, historical, and palaeontological resources within the broader SOFS Operations area. The region lies within the Free State Goldfields, which contains remnants of early agricultural settlement, disused mining infrastructure, and scattered stone artefacts. These heritage elements contribute to the cultural landscape's scientific and social value.

During construction, vegetation clearing, excavation, and grading may disturb subsurface archaeological deposits or historical foundations. Vibration from heavy machinery could also damage any nearby heritage structures. If not carefully managed, unrecorded artefacts might be displaced or destroyed.

To prevent loss of cultural material, all staff will receive heritage awareness training prior to ground-breaking. Construction activities will avoid mapped heritage sites, and “no-go” buffer zones of at least 30 m will be enforced. A Chance Find Procedure will be implemented so that any unexpected discoveries trigger the immediate suspension of work and notification of a qualified archaeologist for investigation and documentation in accordance with the National Heritage Resources Act (Act 25 of 1999).

Residual Impact: Construction phase impacts on heritage resources are expected to be minimal provided the chance find and buffer-zone measures are followed. Residual significance — low.

13.7.13.2 Operational Phase

Operational activities are confined to previously disturbed zones and are unlikely to affect additional heritage features. However, ongoing vibration, dust deposition, and restricted access could indirectly impact nearby graves or heritage structures if located close to haul routes.

Mitigation will include maintaining dust suppression near heritage sites, periodic inspection of known resources for physical degradation, and continued enforcement of exclusion areas.

Residual Impact: Heritage integrity will remain intact; residual significance — low.

13.7.13.3 Decommissioning Phase

Decommissioning will involve rehabilitation of disturbed land and removal of infrastructure. If any historical artefacts are revealed during excavation or backfilling, they will be managed under the established chance find protocol.

Residual Impact: Restoration activities will enhance landscape integrity and preserve any exposed cultural resources through proper documentation. Residual significance — low and positive.

13.7.14 Visual Aesthetics

13.7.14.1 Construction Phase

The SOFS Operations area is situated within an open agricultural landscape of low visual relief. Scenic value is moderate, derived from the expansive plains and scattered farmsteads. Construction will temporarily disrupt this setting through the introduction of heavy equipment, cranes, lighting, and stockpiles. Movement of vehicles and dust plumes will increase visual intrusion, particularly from nearby roads or homesteads.

Mitigation will include limiting night-time lighting, using downward-directed, low intensity luminaires, and positioning site offices and laydown areas away from visually sensitive viewpoints. Temporary stockpiles and waste areas will be shaped and vegetated where feasible to reduce glare and contrast.

Residual Impact: Construction related visual impacts will be short-term and reversible after demobilisation. Residual significance — low.

13.7.14.2 Operational Phase

During operation, permanent features such as WRDs, TSFs, shafts, and ventilation infrastructure will become part of the visible landscape. These structures will introduce geometric, colour, and height contrasts with the surrounding flat plains. At night, illumination from safety and security lighting will also contribute to light pollution if uncontrolled.

Mitigation will involve shaping waste facilities with naturalistic contours, vegetating slopes with indigenous grass species, and applying non-reflective surface finishes to buildings. Lighting design will follow dark-sky principles, with motion sensors and shielding to reduce glow. Visual screening through vegetation belts will be established along access roads and fence lines.

Residual Impact: Although the modified landforms will remain visible, they will blend progressively into the landscape as vegetation establishes. Residual significance — moderate to low and acceptable.

13.7.14.3 Decommissioning Phase

Decommissioning will greatly improve visual conditions as infrastructure is dismantled and disturbed areas are rehabilitated. Stabilised slopes and re-vegetated surfaces will restore the natural colour palette and texture of the surrounding environment.

Residual Impact: Post closure, the site will merge visually with adjacent agricultural land. The residual visual impact will be low and beneficial, representing a net aesthetic improvement.

13.7.15 Socio-Economic Environment

13.7.15.1 Construction Phase

The Free State Goldfields region is characterised by a mixed economy of mining, agriculture, and small-scale manufacturing. Local communities, including Virginia, Welkom, and Theunissen, experience moderate unemployment levels and depend heavily on the mining sector for livelihood opportunities.

During construction, positive socio-economic impacts will include the creation of short-term employment, demand for local goods and services, and the transfer of technical skills. Temporary accommodation and catering requirements may stimulate small business growth. Negative effects could include increased pressure on local services, noise, traffic, and potential social conflict if recruitment processes are not transparent.

Mitigation will focus on implementing fair labour practices, prioritising local hiring, and providing health and safety induction for all workers. Engagement with municipalities and community representatives will ensure alignment with local development priorities. A grievance mechanism will be established to address community concerns promptly.

Residual Impact: Construction will yield a short-term positive economic boost with manageable social pressures. Residual significance — low positive.

13.7.15.2 Operational Phase

The operational phase will generate sustained employment opportunities for skilled and semi-skilled workers, stimulating indirect job creation through procurement and service contracts. Increased household income will contribute to regional economic stability. Potential negative impacts include population influx, increased housing demand, and pressure on municipal infrastructure.

Mitigation measures include supporting local enterprise development, collaborating with the municipality on infrastructure planning, and maintaining continuous stakeholder engagement. Health, safety, and social investment programmes will address worker welfare and community wellbeing.

Residual Impact: Overall, operations will provide significant long term socio-economic benefits outweighing potential negatives. Residual significance — high positive.

13.7.15.3 Decommissioning Phase

Mine closure will reduce direct employment and local business activity, posing risks of job losses and economic contraction. However, closure planning from early in the mine life and retraining programmes can mitigate these effects. Opportunities for post-mining land use — such as agriculture, renewable energy projects, or small-scale enterprise — can sustain livelihoods beyond mine life.

Mitigation includes implementing a comprehensive SLP that provides for retraining, business diversification, and community development projects. Transparent communication and phased workforce downscaling will reduce social disruption.

Residual Impact: Although some economic decline is inevitable, effective implementation of the SLP and post closure initiatives will result in stable, long term socio-economic conditions. Residual significance — moderate positive.

13.7.16 Impact Tables

The following tables present a phase-specific summary of the anticipated environmental and socio-economic impacts associated with the proposed SOFS Operations. Each table addresses a distinct stage of the project life cycle (from pre-construction to closure) and outlines the corresponding mitigation and management measures required to ensure compliance with applicable environmental legislation and best practice standards.

Impacts were identified through a comprehensive EIA process, supported by specialist studies, baseline data, and stakeholder inputs. Each impact was assessed in accordance with the significance rating methodology described in Section 13.1, taking into account the magnitude, duration, probability, and spatial extent of potential effects, both before and after mitigation.

Table 13-1 to Table 13-4 therefore provide a concise, structured reference for environmental management across all project phases:

- Table 13-1: Pre-construction activities, including site establishment, surveys, and

preliminary earthworks.

- Table 13-2: Construction phase activities related to footprint clearance, access road establishment, and infrastructure development.
- Table 13-3: Operational phase activities focusing on underground mining, material handling, and associated surface processes.
- Table 13-4: Closure phase activities involving decommissioning, infrastructure removal, and site rehabilitation.

Table 13-1: Impacts and Management Measures for Pre-Construction Activities for the Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
Issues Relating to PERMITTING																				
Construction and mining related activities will only commence upon approval of the rezoning application from agricultural to mining. This may cause a delay with regards to the planned operational schedule of the DBM Project.	Rezoning of Land	0	0	0	0	0	N	N	Construction and mining related activities will only commence upon approval of the rezoning application from agricultural to mining.	0	0	0	0	0	N	N	• Apply for the rezoning of the area from agricultural to mining.	Prior to Construction	Project Manager/Applicant	Once off
Construction and mining related activities will only commence upon approval of all environmental authorisations as required by environmental legislation. This may cause a delay with regards to the planned operational schedule of the DBM Project.	Timeframe Delays	0	0	0	0	0	N	N	Construction and mining related activities will only be commenced upon approval of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) Environmental Impact Assessment (EIA) / Environmental Management Programme (EMPr), approved by the Department of Mineral and Petroleum Resources (DMPR).	0	0	0	0	0	N	N	• Compile MPRDA EIA/EMPr and obtain record of decision from the DMPR.	Prior to Construction	Project Manager/Applicant	Once off
									Construction and mining related activities will only be commenced upon approval of the MPRDA Social and Labour Plan (SLP) by the DMPR.								• Compile MPRDA SLP and obtain record of decision from the DMPR.	Prior to Construction	Project Manager/Applicant	Once off
									Construction and mining related activities will only be commenced upon approval of the NEMA EIA/EMPr by the Department of Forestry, Fisheries and the Environment (DFFE).								• Compile NEMA EIA/EMPr and obtain record of decision from the DEA.	Prior to Construction	Project Manager/Applicant	Once off
									Construction and mining related activities that trigger water uses in accordance with Section 21 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA) will only be commenced with upon approval of the NWA Integrated Water Use Licence (IWUL) by the Department of Water and Sanitation (DWS).								• Compile NWA IWUL and obtain record of decision from the DWS.	Prior to Construction	Project Manager/Applicant	Once off
Construction and mining related activities will only commence upon approval of all environmental authorisations as required by environmental legislation. This may cause a delay with regards to the planned operational schedule of the DBM Project.	Access to Electricity	0	0	0	0	0	N	N	Construction and mining related activities will only commence once an electricity source has been confirmed with the electricity provider and the necessary record of decision provided to the relevant authorities (i.e. DMPR and DFFE).	0	0	0	0	0	N	N	• Consult with Eskom regarding the opportunity to utilise power from the Theseus Substation located close to the site.	Prior to Construction	Project Manager/Applicant	Once off
																	• Ensure that the power lines established on site will not be impacted on by future mining operations and/or infrastructure expansions.	Prior to Construction	Project Manager/Applicant	Once off
Issues related to GEOLOGY																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to TOPOGRAPHY																				
Issues related to the blasting and vibration associated with shaft development on the surrounding land owners houses and other existing infrastructure on/around site.	Blasting and vibration	6	4	2	5	60	-	M	Undertake a blast and vibration assessment and crack survey on site and within a 2 km radius prior to the commencement of any construction activities.	4	4	2	4	40	-	M	• Undertake a blast and vibration assessment prior to any blasting activities taking place on site.	Prior to Construction	Project Manager/Applicant /Geotechnical Specialist	Once off (R 165 000.00)
																	• Undertake a crack survey of neighbouring properties to establish a baseline prior to undertaking any blasting activities on site. Undertake a follow-up crack survey after any blasting activities to confirm damage, if applicable, together with a photographic record.	Prior to Construction	Project Manager/Applicant /Geotechnical Specialist	R 95 000.00

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
Issues related to GEOHYDROLOGY																				
Baseline information is required for water quality and quantity monitoring purposes.	Baseline Monitoring	6	4	2	4	48	+	M	Groundwater quality monitoring networks must be set up prior to the construction phase so that any groundwater quality and quantity issues can be addressed accordingly.	8	4	2	5	70	+	H	• Groundwater quality sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMPr.	Monthly	Environmental Coordinator	R 91 000.00
																	• Determining potentiometric water level and aquifer potential of Witwatersrand aquifer.	Quarterly	Environmental Coordinator/Water Quality Specialist	Included in Operational Costs
																	• Quarterly groundwater monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental Coordinator/Water Quality Specialist	R 42 000.00
																	• In the event that water quality or quantity issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Coordinator/Water Quality Specialist	To be determined - depending on severity of incident
Issues related to HYDROLOGY																				
Baseline information is required for water quality monitoring purposes.	Baseline Monitoring	6	4	2	4	48	+	M	Surface water quality monitoring networks must be set up prior to the construction phase so that any surface water quality issues can be addressed accordingly.	8	4	2	5	70	+	H	• Surface water quality sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMPr.	Monthly	Environmental Coordinator	R 91 000.00
																	• Quarterly surface water monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental Coordinator/Water Quality Specialist	R 42 000.00
																	• In the event that water quality issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Coordinator/Water Quality Specialist	To be determined - depending on severity of incident
Clean water runoff from areas outside the dirty water footprint area of the mine could flow into this area and potentially become polluted.	SWMP development	6	4	3	4	52	-	M	Separation of clean and dirty water areas.	4	2	2	2	16	-	L	• Identify dirty water footprint area and separate clean and dirty water using a system of berms and drains.	Prior to Construction	Environmental Coordinator/Water Quality Specialist	R 150 000.00
Issues related to SOIL, LAND USE AND LAND CAPABILITY																				
Crop production and grazing on land will cease	Fencing-off of mine areas, potential resettlement of farmers	1	5	8	5	70	-	H	No mitigation measures possible until closure and decommissioning phase.	1	5	8	5	70	-	H	• No mitigation measures possible until closure and decommissioning phase.	N/A	N/A	N/A
Issues related to FAUNA AND FLORA																				
No significant pre-construction impacts are envisaged.		0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to AIR QUALITY																				
Baseline information is required in order to determine dust dispersion on site as a result of pre-mining activities as well as for ongoing air quality monitoring purposes.	Baseline Monitoring	6	4	2	4	48	+	M	A dust monitoring network must be set up prior to the construction phase so that any air quality or dust issues can be addressed accordingly.	8	4	2	5	70	+	H	• Dust sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMPr.	Monthly	Environmental Coordinator	R 92 000.00
																	• Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist.	Monthly	Environmental Coordinator/Air Quality Specialist	R 42 000.00
																	• In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to	In the event of occurrence	Environmental Coordinator/Air Quality Specialist	To be determined - depending on severity of incident

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	determine the best course of action to ameliorate the situation.			
Issues related to NOISE																				
No significant pre-construction impacts are envisaged.		0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to TRAFFIC																				
No significant pre-construction impacts are envisaged.		0	0	0	0	0	N	L	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to VISUAL																				
No significant pre-construction impacts are envisaged.		0	0	0	0	0	N	L	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to SOCIAL																				
Increase in population size	Population	10	4	3	4	68	-	H	Implement according to proposed action plan.	8	4	4	3	48	-	M	• Employment criteria should be communicated to the community in advance (e.g. in newspapers, community forum notice boards, etc); • Local labour should be employed as far as possible; • Verify the details of potential employees in order to ensure that local labour is employed; • Accommodation for members of the workforce, other than security personnel, must not be permitted on site; The only semi-permanent structures that should be allowed on site is guard houses for security personnel; • Camp followers / informal traders must not be allowed to congregate outside the construction site; • Temporary staff should be housed in the surrounding communities, i.e. Bed and Breakfast establishments, etc. to prevent the establishment of construction camps; and • The protocol for access to farms should be followed at all times.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Resettlement	Job Creation	10	2	1	3	39	-	M	Implement according to proposed action plan.	10	2	1	2	26	-	L	• Full disclosure and consultation with affected landowners; • Develop a relocation plan to address impacts of resettlement, which will address issues of compensation, etc.; and • Establish communication with affected landowners to ensure that their needs and preferences are taken into consideration.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Waged labour	Job Creation	6	3	3	4	48	+	M	Implement according to proposed action plan.	8	4	3	4	60	+	M	• Unskilled and unemployed labour should be sourced from the surrounding local communities as far as possible; • Skills development opportunities should be granted to community members and local job seekers, where needed; • Maximise employment opportunities for the local communities and reduce the influx of a foreign labour force while ensuring an effective construction and operational phase; • Capture all project relevant skills in the project area with the aim to ensure maximum local employment;	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	• Make use of any existing skills databases and include the local councillors and other representative community structures in the process; • Develop a Recruitment Manual to include a list of employment opportunities that will become available during the project planning, construction and post-construction phases and provide guidelines on procedures to be followed by aspiring employment seekers; • Establish an employment information desk to assist with the day to day management of project related labour issues; • Identify and maximise on appropriate training and skills transfer opportunities that will enhance the skills level of the local labour force during the pre-construction, during construction and during full operation. It is recommended that training and skills development activities start during the construction period; • Project contracts between Sibanye Gold and the main contractor should stipulate the use of local labour for unskilled and semi-skilled positions and tasks; • Ensure that local businesses, especially those of Historically Disadvantaged Individuals (HDI), women and of Small, Micro and Medium Enterprises (SMMEs) get allocated the maximum appropriate share of project related business opportunities; and • Ensure that the Labour Relations Amendment Act, 2002 (Act No. 12 of 2002) as well as the necessary policies and procedures are taken into consideration to ensure the correct procurement procedures.				
Increase in standard of living (broader community)	N/A	4	2	3	3	27	+	L		8	4	3	3	45	+	M	• To increase the standard of living locally, the contractors employed should aim to ensure that local or surrounding people are employed where possible. It is furthermore suggested that all the employees should be motivated to spend their earned income locally. This can be achieved by ensuring that the goods and services required by the employees are provided for locally (if possible). The onus will lie on local shop owners to ensure that the demanded for goods and services are met; and • The employment of local residents during operation (as far as practically possible) would increase the standard of living, since they would have a higher disposable income and less transportation costs.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Increase in standard of living (local farmers)	Job Creation	8	4	2	3	42	-	M		6	3	1	3	30	-	M	• The reduced standard of living of affected landowners should be taken into consideration when determining the appropriate compensation of landowners.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
Actual health	Health	8	4	2	4	56	-	M	Implement according to proposed action plan.	4	4	3	3	33	-	M	• In order to reduce the impact on the local community it is important to maximise the use of local labour as far as possible; • Local labour should be employed as far as possible to avoid additional pressure on the existing services; • HIV / Aids awareness campaigns should be initiated by Sibanye Gold and provided to all its mine employees on a regular basis; • Sibanye Gold should investigate how they could assist in implementing a community health awareness programme in liaison with the local municipalities; • Environmental pollution must be limited as far as possible and the requirements of the EMPr be implemented to reduce the impact on surrounding landowners; • Environmental pollution must be limited as far as possible and the requirements of the EMPr be implemented to reduce the impact on surrounding landowners; • The necessary safety precautions should be taken and first aid supplies should be made available on site; • All mine employees (including contractors) should undergo health and safety training on a regular basis; • The general health of employees should be monitored on an ongoing basis and employees should be given free access to clinic services; • It is advised that Sibanye Gold, through consultation with the local municipalities investigate ways in which their local economic development (LED) programmes and infrastructure development component of their SLP can assist in improving the overall health services within the communities; and • The required safety equipment should be provided to employees as well as on site and should be in a good working order.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Perceived health (prior to construction)	Health	8	4	2	4	56	-	M	Implement according to proposed action plan.	2	4	2	3	24	-	L	• Dust generation from surface stockpiles should be monitored and dust suppression measures be implemented; • Sufficient safety precautions should be put in place to limit the exposure of dust to mine workers; and • Continuous communication with affected landowners and community members should take place, informing them of the various mitigation measures put in place to limit the impact of dust on them.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Feelings in relation to the project	N/A	6	3	2	3	33	-	M	Implement according to proposed action plan.	6	2	2	2	20	-	L	• A comprehensive public participation process should be implemented to effectively consult and involve the affected landowners and communities; • Continuous consultation with the affected communities should take place to keep them informed; • Consultation with the surrounding residents should take place on a continuous basis to understand, assess	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	and mitigate their concerns where appropriate; • Sibanye Gold must be transparent about the areas they intend mining and the proposed mining method and technology; and • Information about the proposed mining methods should be made available to stakeholders to educate them about mining in general as well as the proposed mining methods.			
Aspirations for the future (local landowners)	N/A	10	3	1	3	42	-	M	Implement according to proposed action plan.	8	3	1	3	36	-	M	• It is critical that Sibanye Gold maintain an open and trusting relationship with the affected communities subsequent to the granting of the Mining Right.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Aspirations for the future (broader community)	N/A	4	2	2	3	24	+	L	Implement according to proposed action plan.	10	4	3	4	68	+	H	• Sibanye Gold must be honest and transparent about the potential economic benefits and employment opportunities that the proposed mine is likely to effect in these communities, in order to manage any undue expectations.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Physical quality of the living environment	N/A	10	4	2	4	64	-	H	Implement according to proposed action plan.	8	4	2	3	42	-	M	• Existing community forums must serve as liaison between the affected stakeholders and Sibanye Gold and can discuss traffic, dust, noise and construction related concerns with them; • Suppress dust by spraying water or non-contaminating palliative liquids on roads, crusher and screening plant, mills and vehicles; • Prevent dust blowing off transported materials by washing vehicles, wheels and covering loads; • Rehabilitate behind production with adequate top soiling, fertilisation, irrigation and correct choice of grasses to ensure year-round cover; • Prepare a noise reduction plan to cover all significant impacts at source and implement noise reduction and screening to limit exposure. Drilling and blasting is generally intermittent and should be limited to daylight hours when ambient noise levels are highest. A hearing conservation programme must be implemented where noise exceeds 85dB(A) in the mine or must not be more than 7dB(A) above ambient residual noise levels beyond mine boundary or nearest residential community; • The maximum acceptable night-time noise levels should not be exceeded; • Traffic calming measures should be put in place to minimise traffic noise; • Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders; • Mitigation and monitoring as recommended by the Water Quality Impact Assessments should be implemented; • Plant tall trees as barriers in gardens or in road reserve to reduce the visual and light intrusion, as well as noise impacts;	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	• Recommendations made in the EIA/EMPr and EMPr should be adhered to: • Rehabilitate behind production with adequate top soiling, fertilisation, irrigation and correct choice of grasses to ensure year-round cover; • Prepare a noise reduction plan to cover all significant impacts at source and implement noise reduction and screening to limit exposure. Drilling and blasting is generally intermittent and should be limited to daylight hours when ambient noise levels are highest. A hearing conservation programme must be implemented where noise exceeds 85dB(A) in the mine or must not be more than 7dB(A) above ambient residual noise levels beyond mine boundary or nearest residential community; • The maximum acceptable night-time noise levels should not be exceeded; • Traffic calming measures should be put in place to minimise traffic noise; • Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders; • Mitigation and monitoring as recommended by the Water Quality Impact Assessments should be implemented; • Plant tall trees as barriers in gardens or in road reserve to reduce the visual and light intrusion, as well as noise impacts; and • Recommendations made in the EIA/EMPr and EMPr should be adhered to.			
Aesthetic quality of the living environment	N/A	6	4	2	4	48	-	M	Implement according to proposed action plan.	4	4	2	4	40	-	M	• The design and specific positioning of the infrastructure should aim to minimise the possible negative visual impact of the mine on the surrounding property owners; • The design of the mine buildings should blend in with surrounding environment; • Implement revegetation as levels are abandoned to break the form, reduce colour contrast, dust generation or contaminated runoff; and • Recycle dumps or use as backfill with appropriate permission.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Availability and quality of housing	N/A	2	3	2	3	21	-	L	Implement according to proposed action plan.	8	4	3	3	45	+	M	• Employees should be educated with regards to their accommodation options; • Housing needs should be monitored and addressed in consultation and cooperation with the applicable local municipalities; • Maximise the employment of locals to limit the need for any additional housing infrastructure, as far as possible; • In consultation with the municipality and other mines operating in the area, ensure that the necessary planning for upgrades of social infrastructure, where lacking due to the proposed mine, take place;	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	• Involvement in upliftment programmes should be done according to the priority needs and projects identified as part of the local municipalities IDP, as well as in consultation with other stakeholders such as the local community representatives, ward committees and youth organisations;			
Adequacy and access to social infrastructure	N/A	6	3	2	2	22	-	L	Implement according to proposed action plan.	8	4	2	4	56	+	M	• Continuous involvement of the mine would be necessary and should be undertaken in a transparent and supportive manner; • Implement a regular and formalised consultation process with local government to ensure synergy between the mine's social development and LED focus; • Communication of the projects that Sibanye Gold would be involved in should filter through to all community levels to ensure maximum benefit to the community; and • Community development projects initiated by Sibanye Gold should avoid benefiting only a selected few but should follow a broad-based approach, while also taking budgeting constraints into consideration.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Personal safety and hazard exposure	N/A	6	4	2	4	48	-	M	Implement according to proposed action plan.	4	3	2	3	27	-	L	• Local, unemployed labour should be employed as far as possible; • Accommodation for members of the workforce, other than security personnel, must not be permitted on site; • The only semi-permanent structures that should be allowed on site is guard houses for security personnel; • Camp followers / informal traders must not be allowed to congregate outside the construction site; • Strict security measures should be put in place. Security personnel should be on site on a permanent basis; • Construction workers should be confined to the construction area and should wear uniforms or identity tags to be easily identified; • The mining area should be fenced to avoid unauthorised entry by humans or animals onto the mining area; • The contractor should communicate the construction schedule and vehicle movements to the neighbouring property owners in advance; • Workers must not be allowed to overnight on the premises and must be transported to their places of residence by bus on a daily basis; • Workers must not be allowed to leave the designated mining areas without permission; • A Health and Safety Plan should be implemented and it must be ensured that all managers are trained in First Aid and other relevant safety courses;	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	• Implement safety measures to limit fire hazards and implement fire breaks if possible; • Sibanye Gold should, in conjunction with the property owners, develop and implement emergency procedures; • Operational safety risks should be addressed as part of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996); • A Fire/Emergency Management Plan should be developed and implemented. It is important that this management plan and associated communication channels are developed at the outset of the construction phase. It would be important to regularly review the functionality and efficiency of such a plan in conjunction with the local emergency teams, mine management and neighbouring landowners; • Open fires for cooking and related purposes should not be allowed on site; • Appropriate firefighting equipment should be on site and construction workers should be appropriately trained for firefighting; • The construction sites should be clearly marked and “danger” and “no entry” signs should be erected; • Speed limits on the local roads surrounding the construction sites should be enforced; and • Speeding of construction vehicles must be strictly monitored.			
Crime and violence	N/A	4	3	3	2	20	-	L		4	2	3	2	18	-	L	• Local, unemployed labour should be employed as far as possible; • Sibanye Gold must liaise with the local municipalities and labour unions to establish a protocol for ensuring community safety; • Mine workers should be clearly identifiable by ensuring they wear uniforms and identification cards that should be exhibited in a visible place on their body; and • The AgriSA protocol for access to farms should be followed in all instances where access to farmers’ land is required.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Loss of natural and cultural heritage	N/A	8	5	1	3	42	-	M		8	2	1	1	11	-	L	• The recommendations of the Heritage Impact Assessment should be implemented; • Local residents and farmers should be consulted to determine any possible heritage sites not identified by the Heritage Impact Assessment; and • Local residents and farmers should inform mitigation measures when addressing any potential impact on cultural heritage sites or graves.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Social networks	N/A	6	3	2	3	33	-	M	Implement according to proposed action plan.	6	3	2	2	22	-	L	• Employ local residents as far as possible; • Make use of credible SMME’s for the provision of goods and services; and • Embark on regular communication efforts towards the community with regards to the mine’s involvement in the	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	communities. This could be done through an already established community forum.			
Functioning of government agencies	N/A	8	3	3	4	56	-	M	Implement according to proposed action plan.	6	4	3	3	39	-	M	• Assist the local municipalities with the diversification of the local economy; • Emphasise the use of local service providers and SMMEs and focus on the development of LED programmes; and • Institute a joint municipal coordinating and implementing committee to support the municipality's local economic and social develop needs and requirements, where feasible.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Impact equity (affected landowners)	N/A	8	4	1	3	39	-	M	Implement according to proposed action plan.	6	3	1	2	20	-	L	• Negative impacts on the local property owners should be limited as far as possible such as intrusion impacts (dust, noise, and air pollution). Mitigation measures from the specialist studies dealing with these issues should thus be strictly implemented; • Safety and security measures are critical to avoid any increase in criminal activities within the local study area; and • The use of local labour must be maximised as far as possible.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Impact equity (community members)	N/A	4	2	3	3	27	+	L	Implement according to proposed action plan.	8	4	3	3	45	+	M	• Skills training and development should be maximised to benefit as many local employees as possible; and • The use of local labour must be maximised as far as possible.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Gendered division of labour	N/A	4	3	3	2	20	+	L	Implement according to proposed action plan.	6	4	3	3	39	+	M	• Women must have equal employment opportunities; • Training and skills development should take place for women; • Salaries of women should be equal to that of men when undertaking the same job; • Commitments made in the SLP with regard to the employment of women should be adhered to; and • Institute a well designed gender equality strategy on the mine.	Ongoing	Environmental Control Officer	Included in Construction and Operational Costs
Issues related to safety and security of surrounding land owners must be addressed.	Access	10	4	2	5	80	-	H	Access to the plant area, TSF and equipment will be off limits to the public at all times during all phases of the project.	6	4	1	4	44	-	M	• Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing with any work. If proved insufficient for control, these shall be replaced by fencing.	Prior to construction	Health and Safety Officer	To be determined
																	• Security will be established at access points of the project area which will record entry and exit of vehicles.	Prior to construction	Health and Safety Officer	To be determined
									Safety and security impacts associated with the inflow of a workforce are sensitive issues which should be thoroughly addressed to limit any possible negative impacts on the surrounding landowners. A baseline of current criminal activity and safety/security risks must be established with input for the local municipality and the South African Police Service (SAPS).	6	4	1	3	33	-	M	• A community forum consisting of representatives of the project proponent, contractors, local leaders such as councillors, the Environmental Coordinator and the property owners should be established. The aim of such a forum would be to set up local safety and security measures to deal with the inflow of workers and possible jobseekers and to adapt the measures if and when required.	Prior to construction	Health and Safety Officer/Project Manager/ Environmental Coordinator	As required
Mining projects often attract jobseekers from within the study area or	Influx of jobseekers	8	2	2	5	60	-	M	Develop a strategy to minimise the influx of outsiders to the area. The	6	2	2	4	40	-	M	• Prior to construction commencing, community meetings and the local newspaper could be used to	Prior to construction	Health and Safety Officer/Human	As required

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
even from other areas even prior to construction commencing. This situation is usually worsened by exaggerated rumours of possible employment opportunities.									establishment of a labour desk to deal with jobseekers is critical.								communicate details of the project (actual skills and number of workers required) to minimise the influx of unqualified jobseekers to the project area.		Resources (HR) Manager	
Inflow of temporary workers from outside the local community and the potential for conflict between locals and these “outsiders”.	Inflow of temporary workers	8	2	2	5	60	-	M	Maximise the use of local labour and contractors where possible by developing a strategy to involve local labour in the construction process e.g. communicate the construction requirements through the local leaderships such as the ward committees, ward councillors and representatives of the local and, and advertise in the local newspapers in the local languages.	6	2	2	4	40	-	M	• Before construction commences, representatives from the local municipality, local leaders (e.g. councillors), community-based organisations, as well as neighbouring residents should be informed of the details of the construction company, size of the workforce and construction schedules.	Prior to construction	Project Manager/ Environmental Coordinator/HR Manager	As required
For the duration of the construction period, non-local and/or temporary contract workers forming part of the construction team of the main contractor will require accommodation.	Housing of workforce	8	3	3	5	70	-	H	Ensure that non-local and/or temporary contract workers are provided with accommodation for the duration of the construction period.	6	2	1	4	36	-	M	• Before construction commences, representatives from the local municipality, local leaders (e.g. councillors), community-based organisations, as well as affected property owners should be consulted regarding accommodation options for non-local and/or temporary workers. Construction activities and schedules, as well as the location of construction camps, if applicable, should be discussed and finalised with these representatives.	Prior to construction	Project Manager/ Environmental Coordinator	As required
									Ensure that non-local and/or temporary contract workers and other jobseekers do not “squat” within local settlements or on private properties.	4	2	1	4	28	-	L	• Undertake regular inspections of the project area and surrounding properties to determine if squatting is taking place. If squatting is observed, contact the local municipality and police immediately for assistance in addressing the situation.	Ongoing	Health and Safety Officer/Project Manager/ Environmental Coordinator	As required
Mining developments are usually perceived as a positive injection to the economic standard of an area as it could lead to further developments in the area. The proposed SOFS Operations would thus contribute to the economy due to the possible expenditure during the construction phase which could result in business opportunities for the local and regional economy, especially with regards to the local service industry. It is further anticipated that a large proportion of the wage bill earned by construction workers would be spent within the local municipal area resulting in local economic benefits with subsequent indirect spin-offs for local businesses.	Local Economic Contribution	8	2	3	4	52	+	M	Involve local companies in the procurement process as much as possible in order to ensure further indirect economic spin-offs and benefits to the local economy.	10	4	2	5	80	+	H	• Sibanye Gold should develop a database of local companies, including credible SMMEs that could qualify as potential service providers prior to the initiation of the tender process, to enable these local companies and SMMEs to be involved with the tender process. DBM should liaise with local stakeholders, as well as with representatives of the local municipality.	Already commenced	Procurement Manager/Project Manager/ HR Manager	To be determined
The effect the mining operation will have on	Property values	10	4	2	5	80	-	H	Minimise the impact of the mining operation on the surrounding land owners.	8	3	1	4	48	-	M	• Undertake a property evaluation of the surrounding properties prior to the initiation of construction activities so	Negotiations already commenced	Project Manager/Applicant	Once off

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
property values of surrounding land owners.																	that a baseline value can be identified and recorded. • Develop a strategy to address issues raised by surrounding land owners pertaining to impacts on property values that addresses how such issues will be addressed and managed, as well as potential compensation rates.	Prior to construction	Project Manager/Applicant	Ongoing
Issues related to HERITAGE																				
Evidence of 2 sites of archaeological/cultural importance occur within the greater project area. Potential impacts on these must be minimised.	N/A	6	3	2	4	44	-	M	Fence the identified areas off.	4	4	2	4	40	-	M	• Ensure that the identified sites are fenced off and the sites are not disturbed by pre-construction and/or mining activities.	N/A	N/A	N/A
Issues related to WETLANDS																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to RADIATION																				
No significant pre-construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A

Table 13-2: Impacts and Management Measures for Construction Phase Activities: Footprint Clearance and road establishment for the Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
Issues related to GEOLOGY																				
No significant construction impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to TOPOGRAPHY																				
Removal of vegetation and the associated shaping of the area to prepare footprint for construction will allow for increased surface water runoff, which may lead to change in topographical characteristics of the area.	Vegetation clearance	6	4	2	4	48	-	M	Construction areas must be clearly demarcated to control movement of personnel and vehicles, providing clear boundaries for construction sites in order to limit the spread of impacts.	4	4	1	3	27	-	L	• Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Removal of vegetation must be undertaken in a phased approach to limit surface exposure.								• The contractor will ensure that all activities, material and equipment storage and personnel movement take place within the designated area.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Erosion control measures must be implemented early in the construction phase.								• Employees and contractors will complete induction on the EMP, Environmental Awareness Plan and Emergency Response Plan prior to construction activities being undertaken. All workers will be made aware of the penalty systems for non-compliance.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Clean and dirty water separation must be implemented early in the construction phase, especially downgradient of construction areas.								• Draw up a procedure clearly reflecting the method and phases of clearance of vegetation only in areas where construction will take place.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Linear infrastructure must follow for as far as practically possible the natural contours of the area.								• The topsoil material will be stockpiled in a designated area for rehabilitation at closure/decommissioning.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
																	• Design and construct all structures to ensure clean and dirty water separation as stipulated in Regulation 704 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA).	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
																	• Maintain and monitor the implementation of dirty water separation.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
Issues related to GEOHYDROLOGY																				
Clearing topsoil for footprint areas can increase infiltration rates of water to the groundwater system and decrease buffering capacity of soils to absorb contaminants from spills on surface. This can increase the risk of contamination of the groundwater system (increases aquifer vulnerability).	Footprint clearance	8	2	2	5	60	-	M	Mitigation is not possible, but water quality monitoring is essential.	8	2	2	5	60	-	M	• Groundwater quality sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the Environmental Impact Assessment (EIA) / Environmental Management Programme (EMPr).	Monthly	Environmental Control Officer	R 91 000.00
																	• Quarterly groundwater monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental Control Officer/Water Quality Specialist	R 42 000.00
																	• In the event that water quality or quantity issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Control Officer/Water Quality Specialist	To be determined - depending on severity of incident.
Issues related to HYDROLOGY																				
	Baseline Monitoring	6	4	2	4	48	+	M	Surface water quality monitoring networks must be set up prior to the	8	4	2	5	70	+	H	• Surface water quality sampling will be undertaken on a monthly basis and	Monthly	Environmental Coordinator	R 91 000.00

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
Baseline information is required for water quality monitoring purposes.									construction phase so that any surface water quality issues can be addressed accordingly.								analysed according to the prescribed monitoring programme contained in the EIA/EMPr.			
																	• Quarterly surface water monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental Coordinator/Water Quality Specialist	R 42 000.00
																	• In the event that water quality issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Coordinator/Water Quality Specialist	To be determined - depending on severity of incident.
Footprint clearance activities will cause soil erosion to occur, and subsequent sediment transport and siltation of water courses or could obstruct natural runoff patterns.	Vegetation clearance	8	3	2	5	65	-	H	Temporary attenuation dams must be constructed downstream of the proposed area if construction will occur during the wet season. This measure is required to mitigate the sediment transport and erosion impact.	4	3	2	3	27	-	L	• Design and construct all structures to ensure clean and dirty water separation as stipulated in Regulation 704 of the NWA.	Prior to construction	Environmental Control Officer/ Project Manager	Included in construction costs.
																	• Maintain and monitor the implementation of dirty water separation infrastructure.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
																	• Construct the required erosion protection measures.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
Spillages on site may lead to surface water pollution.	Heavy vehicle movement	8	4	2	4	56	-	M	Employees and contractors will be educated to make them aware of the necessity to prevent spillages through the implementation of good housekeeping practices.	4	4	2	3	30	-	M	• Employees and contractors will complete induction on the EMP, Environmental Awareness Plan and Emergency Response Plan prior to construction activities being undertaken. All workers will be made aware of the penalty systems for non-compliance.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									The management of chemicals and hydrocarbons must form part of the emergency preparedness and response programme.								• Employees and contractors will complete induction prior to construction activities being undertaken and the Environmental Awareness Plan and Emergency Response Plan must be implemented.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
Vegetation and topsoil cleared from building sites and roadways could obstruct natural drainage, divert clean water into dirty water areas, cause waterlogging of adjacent areas or pollute water resources.	Footprint clearance	4	4	2	3	30	-	M	Rehabilitate taking into account natural drainage paths.	4	2	1	1	7	-	L	• Overburden that is removed should be spread at a suitable location and immediately rehabilitated, taking into account natural drainage paths, in accordance with appropriate drainage plans.	During construction phase	Environmental Control Officer	Included in construction costs.
Runoff water that is trapped and passes through culverts and drains could cause local soil erosion.	Drainage pathways	4	4	3	3	33	-	M	Control and manage water release.	4	2	2	1	8	-	L	• All water releases shall be controlled and flow channels shall be designed to an acceptable standard.	During construction phase	Environmental Control Officer	Included in construction costs.
Issues related to SOIL, LAND USE AND LAND CAPABILITY																				
Dilution of fertile topsoil component	Vegetation removal	1	5	8	5	70	-	H	Keep as much original landcover/topsoil as possible.					0	-	L	• Implement mitigation in accordance with the mitigation measures proposed.	During construction phase	Environmental Control Officer	Included in construction costs.
Loss of topsoil stabilisation	Vegetation removal	1	5	8	5	70	-	H	Keep as much original landcover/topsoil as possible.					0	-	L	• Implement mitigation in accordance with the mitigation measures proposed.	During construction phase	Environmental Control Officer	Included in construction costs.
Loss of grazing land capability	Vegetation removal	1	5	8	5	70	-	H	Rehabilitate land as close to the original land use as possible.					0	-	L	• Implement mitigation in accordance with the mitigation measures proposed.	During construction phase	Environmental Control Officer	Included in construction costs.
Soil compaction	Movement of vehicles over soil surface	2	4	6	4	48	-	M	Keep infrastructure localised to reduce footprint.					0	-	L	• Implement mitigation in accordance with the mitigation measures proposed.	During construction phase	Environmental Control Officer	Included in construction costs.
Removal and stripping of soil will allow for increased surface water runoff, which	Removal and stockpiling of soil	10	2	1	5	65	-	H	Soils of significantly different soil groups based on characteristics like clay content should be stockpiled separately. This is to ensure that their	6	2	1	3	27	-	L	• The top 500 mm of topsoil will be removed from the area where surface infrastructure is to be developed. The topsoil will be stored in berms along the	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.

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		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
may lead to an increased erosion potential.									characteristics are suitable for the drainage conditions once replaced. Soils should be separated into categories based on clay content, and into topsoil and subsoil horizons. The topsoil will be reused during the rehabilitation phase.								perimeter of the site. Care will be taken to ensure that the berm is not located within any surface water channels. The berms will not exceed 5 m in height.			
Removal of vegetation will expose soils and allow for increased surface water runoff, which may lead to an increased erosion potential.	Vegetation clearance	10	2	1	5	65	-	H	Areas must not be stripped of vegetation before the area will be needed for construction. Use phased approach in clearance activities.	6	2	1	3	27	-	L	• Draw up a procedure clearly reflecting the method and phases of clearance of vegetation only in areas where construction will take place.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
									Re-establishment of vegetation will be encouraged after construction. If area is exposed for longer than 18 months and no self-succession has taken place, other options must be investigated.								• Develop a monitoring programme for vegetation in the construction area. After 18 months assess area and determine if it is necessary to implement a revegetation plan for the area.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
									Effective dust management must be employed during the construction phase.								• Draw up a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility. Establish barriers/berms to limit runoff.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
Soil physical and chemical degradation will occur as a result of soil stripping and stockpiling, will lead to the loss of soil resource and will impact on soil characteristics.	Removal and stockpiling of soil	10	2	1	4	52	-	M	Topsoil and subsoil stripping will be conducted up to a suitable depth for construction purposes, at least 400 mm. Different soils must be stockpiled separately in designated areas.	6	2	1	2	18	-	L	• Designate specific areas for the stockpiling of topsoil and subsoil. Develop a soil stripping plan for immediate implementation and monitor the area post stripping.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
									Topsoil and subsoil stockpiles must be vegetated.								• Develop a monitoring programme for vegetation in the construction area. After 18 months assess area and determine if it is necessary to implement a revegetation plan for the area.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
									The topsoil that is collected will be stockpiled in such a way that dust and water erosion is limited. Stockpiles will be constructed in such a way to ensure stability and thereby preventing the possibility of wash down. Soils which are stripped could be used in the construction of berms or other storm water management measures.								• Draw up a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
									Erosion control measures must be implemented where height exceeds 1.5 m. A soil conservation guide should be developed and implemented. No vehicle movement will be permitted over any of the stockpile areas.								• Ensure the required erosion protection measures are maintained, monitored and corrected where necessary.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
The use of heavy machinery during the construction process will result in the compaction of soil, resulting in decreased infiltration of rain water and increased surface runoff volumes and velocities leading to a greater erosion risk.	Heavy vehicle movement	8	2	2	4	48	-	M	All areas not directly within the proposed infrastructure footprint area where the soil has been compacted will need to be ripped to break up the compacted soil surface. This will aid infiltration and decrease runoff.	4	2	1	2	14	-	L	• Develop a plan clearly defining the construction area. After construction activities determine which areas must be ripped and potentially re-vegetated. Implement the plan with proper measures in place not to compact new areas.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
									All ripped areas need to be re-vegetated with a suitable mix of plant species as determined by a qualified specialist. All re-vegetated areas should be monitored to ensure successful re-establishment of natural vegetation and to prevent invasion by alien species.								• Develop a monitoring programme for vegetation in the construction area. After 18 months assess area and determine if it is necessary to implement a revegetation plan for the area.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
Soil pollution due to the spillages of hydrocarbons along construction routes.	Heavy vehicle movement	8	2	2	4	48	-	M	Employees and contractors will be educated by means of training to make them aware of the necessity to prevent spillages through the implementation of good housekeeping practices. The	4	2	1	2	14	-	L	• Employees and contractors will complete induction on the EMP, Environmental Awareness Plan and Emergency Response Plan prior to construction activities being undertaken. All workers will be made	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.

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									management of chemicals and hydrocarbons should form part of the emergency response programme. No activities associated with hydrocarbons and or chemicals (i.e. wash bays etc.) may be undertaken outside of an effectively designed contained area.								aware of the penalty systems for non-compliance. • Employees and contractors will complete induction prior to construction activities being undertaken and the Environmental Awareness Plan and Emergency Response Plan must be implemented.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
General disturbance of the area.	Footprint clearance	6	2	2	4	40	-	M	A combination of mining and agriculture should be considered as part of the land use plan.	4	2	1	3	21	-	L	• Implement the rehabilitation plan as developed and required.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
Loss of agricultural and grazing land capability.	Land Capability Change	6	2	2	4	40	-	M	The grazing and wilderness land capability of the proposed site will be lost once the topsoil has been stripped.	2	2	1	2	10	-	L	• Implement the rehabilitation plan as developed and required to restore grazing and wilderness land capability.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.
Issues related to FAUNA AND FLORA																				
Direct impacts on flora species of conservation importance.	Vegetation clearance	8	5	4	5	85	-	H	Exclude sensitive areas and provide protection for nearby sensitive areas.	8	5	4	1	17	-	L	• Develop environmental monitoring plans that identify and address issues of concern as well as include relevant aspects in awareness training.	Seasonal/Bi-annual	Environmental Control Officer/Ecologist/ Proponent	Included in construction costs.
Direct impacts on fauna species of conservation importance.	Vegetation clearance	8	5	4	5	85	-	H	Exclude sensitive areas and provide protection for nearby sensitive areas.	8	5	4	1	17	-	L	• Develop environmental monitoring plans that identify and address issues of concern as well as include relevant aspects in awareness training.	Seasonal/Bi-annual	Environmental Control Officer/Ecologist/ Proponent	Included in construction costs.
Loss or disruption of mammal migration routes.	Vegetation clearance	6	5	2	5	65	-	H	Ensure minimal footprint clearance; ensure minimal human/animal conflict potential; implement awareness programmes; allow for natural crossings where possible; control movement of personnel; and limit speeds of vehicles.	6	4	2	3	36	-	M	• Develop and implement awareness programmes aimed at ensuring that persistent and deliberate impacts on animals in nearby natural habitat are prevented.	Ongoing	Environmental Control Officer/Health & Safety Officer/Contractor/Site Manager	Included in construction costs.
Direct impacts on sensitive/pristine habitat types.	Vegetation clearance	8	5	3	3	48	-	M	Exclude sensitive areas and provide protection for nearby sensitive areas; limit the spread of impacts to nearby sensitive areas.	8	5	3	2	32	-	M	• Develop environmental monitoring plans that identify and address issues of concern as well as include relevant aspects in awareness training.	Seasonal/Bi-annual	Environmental Control Officer	Included in construction costs.
Direct impacts on common fauna species of the study area.	Vegetation clearance	4	4	2	5	50	-	M	Ensure minimal footprint clearance; ensure minimal human/animal conflict potential; implement awareness programmes; control movement of personnel; and limit speeds of vehicles.	4	4	2	4	40	-	M	• Develop and implement awareness programmes aimed at ensuring that persistent and deliberate impacts on animals in nearby natural habitat are prevented.	Ongoing	Environmental Control Officer/Health & Safety Officer/Contractor/Site Manager	Included in construction costs.
Faunal interaction with structures, servitudes and/or personnel.	Vegetation clearance	4	5	3	4	48	-	M	Ensure minimal footprint clearance; ensure minimal human/animal conflict potential; implement awareness programmes; control movement of personnel; and limit speeds of vehicles.	4	4	2	3	30	-	M	• Develop and implement awareness programmes aimed at ensuring that persistent and deliberate impacts on animals in nearby natural habitat are prevented.	Ongoing	Environmental Control Officer/Health & Safety Officer/Contractor/Site Manager	Included in construction costs.
Impacts on surrounding habitat/species, including ecosystem functioning.	Vegetation clearance	6	4	2	3	36	-	M	Limit spread of impacts to adjacent areas and provide adequate protection for nearby sensitive areas.	6	4	2	2	24	-	L	• Develop environmental monitoring plans that identify and address issues of concern as well as include relevant aspects in awareness training.	Seasonal/Bi-annual	Environmental Control Officer/Health & Safety Officer	Included in construction costs.
Issues related to AIR QUALITY																				
Fugitive dust emissions as a result of the movement of vehicles and removal of material for construction purposes will have a negative impact in terms of visual characteristics/air quality.	Heavy vehicle movement	6	2	2	4	40	-	M	The impact during construction phase is limited to a short period only. All mine haul roads will be treated with dust suppressant chemicals or watered in order to reduce the impact of dust on the aesthetics of the surrounding area.	2	2	2	3	18	-	L	• Establish a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility.	Daily	Environmental Control Officer	Included in construction costs.
Generation of windblown dust	Exposure of underlying soil	4	2	2	3	24	-	L	Recover exposed land promptly, where possible.	2	2	2	3	18	-	L	• Establish a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility.	Daily	Environmental Control Officer	Included in construction costs.
Issues related to NOISE																				

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Noise will be generated as a result of the removal of vegetation, transportation and stockpiling of topsoil and subsoil's.	Heavy vehicle movement	6	2	2	4	40	-	M	At this stage construction activities are planned to take place during daytime period only. This may change to a 24 hour 7 day a week approach depending on the outcome of the Bankable Feasibility Study.	4	2	2	3	24	-	L	• Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									The use of noise barriers or earth berms and screening of noise at individual source where an activity can be clearly heard at the boundary will be implemented.								• Machinery with low noise levels and maintained in a good order to be used and to comply with the International Finance Corporation's (IFC) Health and Safety Regulations.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
																	• Use mufflers on engine exhausts and compressor components, and vibration isolation for mechanical equipment.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
Issues related to TRAFFIC																				
Potential access road S239	Heavy vehicle movement	6	5	3	5	70	-	H	Geometry and surfacing of access road.	2	4	3	2	18	-	L	• Construct road and surfacing.	Once plus maintenance	Project Manager	R100 000 - R4 000 000 every 5 - 10 years.
Mine access	Heavy vehicle movement	2	4	2	4	32	-	M	Geometry and surfacing of mine access road.	2	4	2	2	16	-	L	• Construct access.	Once plus maintenance	Project Manager	R10 000 - R1 000 000 every 5 - 10 years.
Railway line level crossing	Heavy vehicle movement	8	5	3	5	80	-	H	Provide alternative access from R73.	3	4	1	2	16	-	L	• Provide and construct alternative access.	Once plus maintenance	Project Manager	R10 000 - R1 000 000 every 5 - 10 years.
									Provide road signs, flash lights, control booms & height restriction.	3	4	3	2	20	-	L	• Provide road signs, flash lights, control booms & height restriction.	Once plus maintenance	Project Manager	R10 000 - R500 000 every 20 - 30 years.
Public transport facility	Heavy vehicle movement	2	4	2	3	24	-	L	Provision of public transport facility.	2	4	3	2	18	-	L	• Construction of public transport facility.	Once plus maintenance	Project Manager	R10 000 - R500 000 every 10 - 15 years.
Street lights at access intersection	Heavy vehicle movement	2	4	2	3	24	-	L	Provision of street lights.	2	4	1	2	14	-	L	• Provision of street lights.	Once plus maintenance	Project Manager	R10 000 - R500 000 every 10 - 15 years.
Increase in vehicular movement on site will impact traffic volumes in the project area.	Heavy vehicle movement	8	4	4	5	80	-	H	As part of the construction requirements access roads will have to be established and/or upgraded.	6	4	3	3	39	-	M	• Ensure that road construction meets the requirements of the operation.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Enforce speed limit restrictions on all vehicles.								• Speed enforcement must be implemented (40 km/hr for heavy vehicles and 60 km/hr for light vehicles on gravel roads). Implement a strict penalty system for non-compliance.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									Do not allow pedestrian pick-ups on any roads.								• Implement a strict penalty system for non-compliance.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
An informal intersection is in place at the S239 Road/access point.	Heavy vehicle movement	6	5	3	5	70	-	H	Upgrading of intersection at the S239 Road/access point.	4	5	2	3	33	+	M	• Upgrade the intersection of the S239 Road/access point.	Once off	Project Manager/Applicant	Included in construction costs.
Impacts on vehicle safety (i.e. access spacing, road alignment, lighting, etc).	Heavy vehicle movement	6	4	2	4	48	-	M	Provision of light at sufficient standards at the intersection of the S239 Road/access point. Do not allow on-street pick up/drop offs at the intersection of the S239/access road to the development (drop- offs/pickup should be done on site).	2	5	2	4	36	+	M	• Provide sufficient light at the S239 Road/access point intersection.	Once off	Project Manager/Applicant	Included in construction costs.
Issues related to VISUAL																				
Fugitive dust emissions as a result of vegetation clearance and associated bare areas may have a	Heavy vehicle movement	8	2	2	5	60	-	M	Effective dust management must be employed during the construction phase.	4	2	1	3	21	-	L	• Draw up a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility.	During construction phase	Environmental Control Officer/ Project Manager	Included in construction costs.

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negative impact in terms of air quality and visual characteristics.																				
Issues related to SOCIAL																				
Increase in population size		10	4	3	4	68	-	H	Implement according to proposed action plan.	8	4	4	3	48	-	M	• Employment criteria should be communicated to the community in advance (e.g. in newspapers, community forum notice boards, etc); • Local labour should be employed as far as possible; • Verify the details of potential employees in order to ensure that local labour is employed; • Accommodation for members of the workforce, other than security personnel, must not be permitted on site; The only semi-permanent structures that should be allowed on site is guard houses for security personnel; • Camp followers / informal traders must not be allowed to congregate outside the construction site; • Temporary staff should be housed in the surrounding communities, i.e. Bed and Breakfast establishments, etc. to prevent the establishment of construction camps; and • The AgriSA protocol for access to farms should be followed at all times.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Effect of temporary workers on social dynamics		8	4	3	3	45	-	M	Implement according to proposed action plan.	4	3	3	3	30	-	M	• Chemical latrines or ablution facilities must be provided to workers in close proximity to the site; • Employ local labour as far as possible (within a 20 km radius); • Avoid the establishment of camps, hostels or temporary accommodation for workers. Accommodation should be provided at suitable locations in Virginia and Welkom and surrounds; and • Ensure that during the project construction process and the operational phase of the project, employees receive adequate health support from the project team for work-related health problems.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Waged labour		6	3	3	4	48	-	M	Implement according to proposed action plan.	8	4	3	4	60	-	M	• Unskilled and unemployed labour should be sourced from the surrounding local communities as far as possible; • Skills development opportunities should be granted to community members and local job seekers, where needed; • Maximise employment opportunities for the local communities and reduce the influx of a foreign labour force while ensuring an effective construction and operational phase; • Capture all project relevant skills in the project area with the aim to ensure maximum local employment; • Make use of any existing skills databases and include the local councillors and other representative community structures in the process; • Develop a Recruitment Manual to include a list of employment opportunities that will become available during the project	Ongoing	Environmental Control Officer	Included in construction and operational costs.

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																	planning, construction and post-construction phases and provide guidelines on procedures to be followed by aspiring employment seekers; • Establish an employment information desk to assist with the day to day management of project related labour issues; • Identify and maximise on appropriate training and skills transfer opportunities that will enhance the skills level of the local labour force during the pre-construction, during construction and during full operation. It is recommended that training and skills development activities start during the construction period; • Project contracts between Sibanye Gold and the main contractor should stipulate the use of local labour for unskilled and semi-skilled positions and tasks; • Ensure that local businesses, especially those of Historically Disadvantaged Individuals (HDI), women and of Small, Micro and Medium Enterprises (SMMEs) get allocated the maximum appropriate share of project related business opportunities; and • Ensure that the Labour Relations Amendment Act, 2002 (Act No. 12 of 2002) as well as the necessary policies and procedures are taken into consideration to ensure the correct procurement procedures.			
Conversion and diversification of economic activities (local economy)		4	3	3	3	30	+	M	Implement according to proposed action plan.	6	3	3	3	36	+	M	• Consideration should be given to the fact that agricultural practices will be compromised and that it may become impractical, as well as uneconomical to continue; • Affected landowners must be consulted to establish means to continue farming practices, i.e. as part of a local economic development project to supply the mine with produce; • Economic development should take place in line with the Local Municipality's IDP, as well as their Spatial Development Framework; and • The establishment of new businesses should comply with zoning and local by-law requirements.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Conversion and diversification of economic activities (farmers)		10	4	2	3	48	-	M	Implement according to proposed action plan.	8	3	1	3	36	-	M	• The placement of mine infrastructure should avoid splintering farms, and should be done in consultation with affected landowners; • Consideration should be given to buying out properties in its entirety to reduce the risk of dissolving the economic unit of the farm; • Consideration should be given to the fact that agricultural practices will be compromised and that it may become impractical, as well as uneconomical to continue; and	Ongoing	Environmental Control Officer	Included in construction and operational costs.

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		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	• Affected landowners must be consulted to establish means to continue farming practices, i.e. as part of a local economic development project to supply the mine with produce.			
Increase in standard of living (broader community)		4	2	3	3	27	-	L	Implement according to proposed action plan.	8	4	3	3	45	-	M	• To increase the standard of living locally, the contractors employed should aim to ensure that local or surrounding people are employed where possible. It is furthermore suggested that all the employees should be motivated to spend their earned income locally. This can be achieved by ensuring that the goods and services required by the employees are provided for locally (if possible). The onus will lie on local shop owners to ensure that the demanded for goods and services are met; and • The employment of local residents during operation (as far as practically possible) would increase the standard of living, since they would have a higher disposable income and less transportation costs.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Increase in standard of living (local farmers)		8	4	2	3	42	-	M	Implement according to proposed action plan.	6	3	1	3	30	-	M	• The reduced standard of living of affected landowners should be taken into consideration when determining the appropriate compensation of landowners.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Employment creation and decrease in unemployment		4	3	3	3	30	+	M	Implement according to proposed action plan.	6	4	3	3	39	+	M	• It is suggested that non-locals should only be hired when specialist skills, which are not available locally, are required and local business providing such skills cannot be created. The following aspects in this regard should receive priority: ○ Labour based construction methods should be used whenever practically possible; ○ Local residents and communities should be employed, wherever possible; ○ Local construction companies should be used whenever possible, especially for subcontracting work; and ○ Local suppliers should be used as far as possible.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Conversion and diversification of land use		6	4	3	4	52	-	M	Implement according to proposed action plan.	4	4	3	4	44	-	M	• Educate landowners in terms of their rights and responsibilities prior to the project going ahead; • Assist landowners in identifying ways to adapt their land uses; • Plan to avoid splitting agricultural land and natural habitats; • Integrate the mining area with regional land use planning objectives where possible; and • Take into account surrounding land uses and design post-mining land use options to support and enhance long term development options.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Transportation and rural accessibility		4	4	3	2	22	-	L	Implement according to proposed action plan.	6	4	3	4	52	+	M	• Employ local labour as far as possible to limit the negative impacts on the infrastructure and services within the area (e.g. roads); • Sibanye Gold should, in liaison with the relevant Roads and Traffic Department,	Ongoing	Environmental Control Officer	Included in construction and operational costs.

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		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	assist with the regular maintenance of the roads frequently used by construction and mine traffic; • Speed limits on the local roads surrounding the mining site should be enforced; • Appropriate traffic management measures should be planned for and implemented, especially during the construction phase with the expected increase in heavy vehicle traffic; and • The mitigation measures proposed by the Traffic Impact Assessment should be implemented, where relevant.			
Capacity building (skills transfer)		6	2	3	4	44	+	M	Implement according to proposed action plan.	10	3	3	4	64	+	H	• Recruit and train local residents to supply unskilled labour during the construction and operational phase; • The use of diverse activities should be stimulated, allied with, but not reliant on, construction related activities such as outsourcing catering activities to local businesses. The local municipality could assist local residents and business owners to garner the benefit associated with the spin-offs emanating from the proposed mine; • Stakeholders should be mutually accountable for increased opportunities regarding skills and competency development (general education and technical training). This will enable active participation, not only in the construction sector, but also in other spheres of the economy, as well as providing opportunities for career enhancement; • Training should be concentrated on skills that can be readily transferred to other employment opportunities in the local area to avoid persons with trained skills leaving the area for work elsewhere; • The project implementers and/or the contractors should identify the required jobs to be undertaken prior to the construction phase to enable local recruitment and/or some form of basic training; • It is recommended that a comprehensive programme for recruiting, hiring, training, orienting and counselling be established. The nature of the training provided does not need to be limited to specific project related tasks and can include financial planning, bookkeeping, general arithmetic etc; • The principles of the Expanded Public Works Programme must be adhered to and effective labour based construction technologies must be used to increase the positive effects of job creation; • Ensure that stakeholders have knowledge of the support of legislation and regulations;	Ongoing	Environmental Control Officer	Included in construction and operational costs.

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																	• The implementation of the Social and Labour Plan (SLP) should be monitored on an annual basis; • Ensure compliance to the Broad-Based Socio-Economic Empowerment Charter for the Mining and Minerals Industry (BBSEEC) and Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA); and • Ensure that the employment and training of Historically Disadvantaged South Africans (HDSAs) and women meet the requirements of the BBSEC.			
Social behaviour		6	4	2	3	36	-	M	Implement according to proposed action plan.	6	2	2	3	30	-	M	• Establish a code of conduct for construction and mine workers with strict control measures; • Require mine personnel to wear identification badges to distinguish them from trespassers or unwanted loiterers; • Liaise with the South African Police Service (SAPS) in order to implement effective crime prevention strategies; and • Liaise with existing forums in the community to communicate information to the community and to assist in the monitoring of compliance.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Nutrition		8	4	4	4	64	-	H	Implement according to proposed action plan.	6	3	3	4	48	-	M	• In relation to exposures from any particular source of mining, protection and safety shall be optimised in order that the magnitude of individual doses, the number of people exposed and the likelihood of incurring exposures all be kept as low as reasonably achievable, economic and social factors being taken into account, within the restriction that the doses to individuals delivered by the source be subject to dose constraints; • Implement a radiation monitoring programme and establish means of isolating radiogenic materials; • Implement the recommendations from the Radiological Study; • Preparation of Radiation Management Plan; • Establish and maintain a safety culture to encourage a questioning and learning attitude to protection and safety and to discourage complacency; • Establish policies and procedures that identify protection and safety and makes it of highest priority; • Promptly identify and correct problems affecting protection and safety; • Safety assessments related to protection and safety measures for sources of radiation associated with mining shall be made at different stages; • All employees on site, as well as surrounding landowners, should receive general radiation safety training to maintain a safe working and living environment for all; and • Establish procedures that ensure there is as little exposure as possible of the workforce and of the public to dust	Ongoing	Environmental Control Officer	Included in construction and operational costs.

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	contaminated with radioactive material during mining.			
Actual health		8	4	2	4	56	-	M	Implement according to proposed action plan.	4	4	3	3	33	-	M	• In order to reduce the impact on the local community it is important to maximise the use of local labour as far as possible; • Local labour should be employed as far as possible to avoid additional pressure on the existing services; • HIV / Aids awareness campaigns should be initiated by Sibanye Gold and provided to all its mine employees on a regular basis; • Sibanye Gold is to investigate how they could assist in implementing a community health awareness programme in liaison with the local municipalities; • Environmental pollution must be limited as far as possible and the requirements of the EMPr be implemented to reduce the impact on surrounding landowners; • Environmental pollution must be limited as far as possible and the requirements of the EMPr be implemented to reduce the impact on surrounding landowners; • The necessary safety precautions should be taken and first aid supplies should be made available on site; • All mine employees (including contractors) should undergo health and safety training on a regular basis; • The general health of employees should be monitored on an ongoing basis and employees should be given free access to clinic services; • It is advised that Sibanye Gold, through consultation with the local municipalities investigate ways in which their LED programmes and infrastructure development component of their SLP can assist in improving the overall health services within the communities; and • The required safety equipment should be provided to employees as well as on site and should be in a good working order.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Feelings in relation to the project		6	3	2	3	33	-	M	Implement according to proposed action plan.	6	2	2	2	20	-	L	• A comprehensive public participation process should be implemented to effectively consult and involve the affected landowners and communities; • Continuous consultation with the affected communities should take place to keep them informed; • Consultation with the surrounding residents should take place on a continuous basis to understand, assess and mitigate their concerns where appropriate; • Sibanye Gold must be transparent about the areas they intend mining and the proposed mining method and technology; and • Information about the proposed mining methods should be made available to stakeholders to educate them about mining in general as well as the proposed mining methods.	Ongoing	Environmental Control Officer	Included in construction and operational costs.

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
Aspirations for the future (local landowners)		10	3	1	3	42	-	M	Implement according to proposed action plan.	8	3	1	3	36	-	M	• It is critical that Sibanye Gold maintain an open and trusting relationship with the affected communities prior and subsequent to the granting of the Mining Right.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Aspirations for the future (broader community)		4	2	2	3	24	+	L	Implement according to proposed action plan.	10	4	3	4	68	+	H	• Sibanye Gold must be honest and transparent about the potential economic benefits and employment opportunities that the proposed mine is likely to effect in these communities, in order to manage any undue expectations.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Physical quality of the living environment		10	4	2	4	64	-	H	Implement according to proposed action plan.	8	4	2	3	42	-	M	• Existing community forums must serve as liaison between the affected stakeholders and Sibanye Gold and can discuss traffic, dust, noise and construction related concerns with them; • Suppress dust by spraying water or non-contaminating palliative liquids on roads, crusher and screening plant, mills and vehicles; • Prevent dust blowing off transported materials by washing vehicles, wheels and covering loads; • Rehabilitate behind production with adequate top soiling, fertilisation, irrigation and correct choice of grasses to ensure year-round cover of the open pit; • Prepare a noise reduction plan to cover all significant impacts at source and implement noise reduction and screening to limit exposure. Drilling and blasting is generally intermittent and should be limited to daylight hours when ambient noise levels are highest. A hearing conservation programme must be implemented where noise exceeds 85dB(A) in the mine or must not be more than 7dB(A) above ambient residual noise levels beyond mine boundary or nearest residential community; • The maximum acceptable night-time noise levels should not be exceeded; • Traffic calming measures should be put in place to minimise traffic noise; • Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders; • Mitigation and monitoring as recommended by the Water Quality Impact Assessments should be implemented; • Plant tall trees as barriers in gardens or in road reserve to reduce the visual and light intrusion, as well as noise impacts; • Recommendations made in the EMPr and EMPr should be adhered to; • Rehabilitate behind production with adequate top soiling, fertilisation, irrigation and correct choice of grasses to ensure year-round cover; • Prepare a noise reduction plan to cover all significant impacts at source and implement noise reduction and screening to limit exposure. Drilling and blasting is	Ongoing	Environmental Control Officer	Included in construction and operational costs.

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	generally intermittent and should be limited to daylight hours when ambient noise levels are highest. A hearing conservation programme must be implemented where noise exceeds 85dB(A) in the mine or must not be more than 7dB(A) above ambient residual noise levels beyond mine boundary or nearest residential community; • The maximum acceptable night-time noise levels should not be exceeded; • Traffic calming measures should be put in place to minimise traffic noise; • Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders; • Mitigation and monitoring as recommended by the Water Quality Impact Assessments should be implemented; • Plant tall trees as barriers in gardens or in road reserve to reduce the visual and light intrusion, as well as noise impacts; and • Recommendations made in the EMPr and EMPr should be adhered to.			
Aesthetic quality of the living environment		6	4	2	4	48	-	M	Implement according to proposed action plan.	4	4	2	4	40	-	M	• The design and specific positioning of the infrastructure should aim to minimise the possible negative visual impact of the mine on the surrounding property owners; • The design of the mine buildings should blend in with surrounding environment; • Implement revegetation as levels are abandoned to break the form, reduce colour contrast, dust generation or contaminated runoff; and • Recycle dumps or use as backfill with appropriate permission.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Availability and quality of housing		2	3	2	3	21	-	L	Implement according to proposed action plan.	8	4	3	3	45	+	M	• Employees should be educated with regards to their accommodation options; • Housing needs should be monitored and addressed in consultation and cooperation with the applicable local municipalities; and • Maximise the employment of locals to limit the need for any additional housing infrastructure, as far as possible.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Adequacy of physical infrastructure		10	4	3	4	68	-	H	Implement according to proposed action plan.	8	4	3	3	45	+	M	• Ensure that the needed public services and capital facilities are in place before the peak construction occurs. This will ensure that demand for these services do not exceed supply; • The provision of infrastructural services must be integrated with the economic needs of the community; • Sibanye Gold, in liaison with the local municipalities should proactively plan for enough infrastructure and services to meet the maximum potential of the mine in terms of service and infrastructure demand; • Measures must be taken to address infrastructure development as part of future planning;	Ongoing	Environmental Control Officer	Included in construction and operational costs.

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		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	• The relevant authorities, and bodies involved in the supply of bulk services should be informed about the proposed project to ensure that it gets incorporated into their demand projections; • Promote local procurement of suppliers and contractors for the transport system.			
Adequacy and access to social infrastructure		6	3	2	2	22	-	L	Implement according to proposed action plan.	8	4	2	4	56	+	M	• In consultation with the municipality and other mines operating in the area, ensure that the necessary planning for upgrades of social infrastructure, where lacking due to the proposed mine, take place; • Involvement in upliftment programmes should be done according to the priority needs and projects identified as part of the local municipalities IDP, as well as in consultation with other stakeholders such as the local community representatives, ward committees and youth organisations; • Continuous involvement of the mine would be necessary and should be undertaken in a transparent and supportive manner; • Implement a regular and formalised consultation process with local government to ensure synergy between the mine's social development and LED focus; • Communication of the projects that Sibanye Gold would be involved in should filter through to all community levels to ensure maximum benefit to the community; and • Community development projects initiated by Sibanye Gold should avoid benefiting only a selected few but should follow a broad-based approach, while also taking budgeting constraints into consideration.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Personal safety and hazard exposure		6	4	2	4	48	-	M	Implement according to proposed action plan.	4	3	2	3	27	-	L	• Local, unemployed labour should be employed as far as possible; • Accommodation for members of the workforce, other than security personnel, must not be permitted on site; • The only semi-permanent structures that should be allowed on site is guard houses for security personnel; • Camp followers / informal traders must not be allowed to congregate outside the construction site; • Strict security measures should be put in place. Security personnel should be on site on a permanent basis; • Construction workers should be confined to the construction area and should wear uniforms or identity tags to be easily identified; • The mining area should be fenced to avoid unauthorised entry by humans or animals onto the mining area; • The contractor should communicate the construction schedule and vehicle	Ongoing	Environmental Control Officer	Included in construction and operational costs.

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		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	movements to the neighbouring property owners in advance; • Workers must not be allowed to overnight on the premises and must be transported to their places of residence by bus on a daily basis; • Workers must not be allowed to leave the designated mining areas without permission; • A Health and Safety Plan should be implemented and it must be ensured that all managers are trained in First Aid and other relevant safety courses; • Implement safety measures to limit fire hazards and implement fire breaks if possible; • Sibanye Gold should, in conjunction with the property owners, develop and implement emergency procedures; • Operational safety risks should be addressed as part of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996); • A Fire/Emergency Management Plan should be developed and implemented. It is important that this management plan and associated communication channels are developed at the outset of the construction phase. It would be important to regularly review the functionality and efficiency of such a plan in conjunction with the local emergency teams, mine management and neighbouring landowners; • Open fires for cooking and related purposes should not be allowed on site; • Appropriate fire fighting equipment should be on site and construction workers should be appropriately trained for fire fighting; • The construction sites should be clearly marked and “danger” and “no entry” signs should be erected; • Speed limits on the local roads surrounding the construction sites should be enforced; and • Speeding of construction vehicles must be strictly monitored.				
Crime and violence		4	3	3	2	20	-	L	Implement according to proposed action plan.	4	2	3	2	18	-	L	• Local, unemployed labour should be employed as far as possible; • Sibanye Gold must liaise with the local municipalities and labour unions to establish a protocol for ensuring community safety; • Mine workers should be clearly identifiable by ensuring they wear uniforms and identification cards that should be exhibited in a visible place on their body; and • The AgriSA protocol for access to farms should be followed in all instances where access to farmers’ land is required.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Loss of natural and cultural heritage		8	5	1	3	42	-	M	Implement according to proposed action plan.	8	2	1	1	11	-	L	• The recommendations of the Heritage Impact Assessment should be implemented;	Ongoing	Environmental Control Officer	Included in construction and operational costs.

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		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	• Local residents and farmers should be consulted to determine any possible heritage sites not identified by the Heritage Impact Assessment; and • Local residents and farmers should inform mitigation measures when addressing any potential impact on cultural heritage sites or graves.			
Social networks		6	3	2	3	33	-	M	Implement according to proposed action plan.	6	3	2	2	22	-	L	• Employ local residents as far as possible; • Make use of credible SMME's for the provision of goods and services; and • Embark on regular communication efforts towards the community with regards to the mine's involvement in the communities. This could be done through an already established community forum.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Functioning of government agencies		8	3	3	4	56	-	M	Implement according to proposed action plan.	6	4	3	3	39	-	M	• Assist the local municipalities with the diversification of the local economy; • Emphasise the use of local service providers and SMMEs and focus on the development of LED programmes; and • Institute a joint municipal coordinating and implementing committee to support the municipality's local economic and social develop needs and requirements, where feasible.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Impact equity (affected landowners)		8	4	1	3	39	-	M	Implement according to proposed action plan.	6	3	1	2	20	-	L	• Negative impacts on the local property owners should be limited as far as possible such as intrusion impacts (dust, noise, and air pollution). Mitigation measures from the specialist studies dealing with these issues should thus be strictly implemented; • Safety and security measures are critical to avoid any increase in criminal activities within the local study area; and • The use of local labour must be maximised as far as possible.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Impact equity (community members)		4	2	3	3	27	+	L	Implement according to proposed action plan.	8	4	3	3	45	+	M	• Skills training and development should be maximised to benefit as many local employees as possible; and • The use of local labour must be maximised as far as possible.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Gendered division of labour		4	3	3	2	20	+	L	Implement according to proposed action plan.	6	4	3	3	39	+	M	• Women must have equal employment opportunities; • Training and skills development should take place for women; • Salaries of women should be equal to that of men when undertaking the same job; • Commitments made in the SLP with regard to the employment of women should be adhered to; and • Institute a well designed gender equality strategy on the mine.	Ongoing	Environmental Control Officer	Included in construction and operational costs.
Surrounding farm owners have indicated that they are not all in favour of the mine being established due to the potential impacts it may have on their lives.	Construction activities	10	4	1	5	75	-	H	An issues and complaints register containing contact details of the complainant and a description of the issue/complaint received will be established and kept on site.	6	4	1	4	44	-	M	• Continually update the issues and response register as and when complaints/issues are received.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
The possible discrepancies between locally available skills and the requirements	Employment Opportunities	8	2	3	4	52	-	M	Maximise the use of local labour and Employees and contractors where possible by developing a strategy to	4	2	2	3	24	-	L	• It is recommended that local individuals applying for work should submit their Curriculum Vitae (CV's) directly to the	During construction phase	Environmental Control Officer/ Project	Included in construction costs.

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		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
of the project within the more skilled levels could be responsive to training and skills development prior to the construction phase.	and Skills Inequities								involve local labour in the construction process.								mine. Some proof of residence should be attached.		Manager/HR Manager	
																	• Make use of any existing databases of available workers and include the local councillor and other representative community structures in the process.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
																	• Project contracts between the developer and the main contractor should stipulate the use of local labour for unskilled and semi-skilled positions and tasks.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
																	• Enhance on a capacity building and skills development strategy to lessen any possible skills disparity between the local skills available and the requirements of the project.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
																	• Project requirements should be discussed with community representatives to avoid unrealistic expectations among local community members.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
																	• Remuneration packages should take cognisance of existing remuneration provided to local labourers and skills/experience of labourers.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
																	• Farm workers should be informed of the possible negative impacts of discarding their long term employment positions as farm workers for short-term positions that could possibly have some short-term financial benefits, without long term guarantees.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
Construction related projects often attract jobseekers from within the study area or even from other provinces even prior to construction commencing. This situation is usually worsened by exaggerated rumours of possible employment opportunities. The impact of in-migration as a direct result of the proposed project is, expected to occur both prior and during the construction phases of the proposed development.	Influx of jobseekers	8	4	3	4	60	-	M	Develop a strategy to minimise the influx of outsiders to the area. The establishment of a labour desk to deal with jobseekers is critical. The existing HR policy can be amended to address this aspect.	6	4	3	3	39	-	M	• No temporary workers should be employed from jobseekers gathering at the construction site.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
																	• The unskilled and semi-skilled positions should be filled by permanent residents from the surrounding areas where possible. Proof of residence should be provided when applying for jobs.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
																	• The Applicant and Employees and contractors should ensure a fair and transparent recruiting process to limit the potential for conflict between locals in search of employment.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
																	• Focused communication efforts to the local communities are critical so that unrealistic expectations regarding the number of temporary workers required are not created.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
																	• Informal vendors at the construction site should be strictly managed to avoid conflict, as well as environmental pollution. The provision of formal stalls for vendors would assist in minimising this impact.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
Issues related to safety and security of surrounding land owners must be addressed.	Access	10	4	2	5	80	-	H	Access to the plant area, TSF and equipment will be off limits to the public at all times during all phases of the project.	4	3	2	4	36	-	M	• Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing with any	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.

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		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	work. If proved insufficient for control, these shall be replaced by fencing.			
																	• Security will be established at access points of the project area which will record entry and exit of vehicles.	During construction phase	Environmental Control Officer/ Project Manager/HR Manager	Included in construction costs.
									Safety and security impacts associated with the inflow of a workforce are sensitive issues which should be thoroughly addressed to limit any possible negative impacts on the surrounding landowners. A baseline of current criminal activity and safety/security risks must be established with input for the local municipality and the SAPS.								• A community forum consisting of representatives of the Company, Employees and contractors, local leaders such as councillors, the Environmental Control Officer and the property owners should be established. The aim of such a forum would be to set up local safety and security measures to deal with the inflow of workers and possible jobseekers and to adapt the measures if and when required.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
Mining projects often attract jobseekers from within the study area or even from other areas even prior to construction commencing. This situation is usually worsened by exaggerated rumours of possible employment opportunities.	Influx of jobseekers	10	3	3	5	80	-	H	Develop a strategy to minimise the influx of outsiders to the area. The establishment of a labour desk to deal with jobseekers is critical.	6	3	2	3	33	-	M	• Prior to construction commencing, community meetings and the local newspaper could be used to communicate details of the project (actual skills and number of workers required) to minimise the influx of unqualified jobseekers to the project area.	During construction phase	Health and Safety Officer/HR	Included in construction costs.
Inflow of temporary workers from outside the local community and the potential for conflict between locals and these “outsiders”.	Inflow of temporary workers	10	3	2	5	75	-	H	Maximise the use of local labour and Employees and contractors where possible by developing a strategy to involve local labour in the construction process e.g. communicate the construction requirements through the local leaderships such as the ward committees, ward councillors and representatives of the local and, and advertise in the local newspapers in the local languages.	6	3	2	4	44	-	M	• Before construction commences, representatives from the local municipality, local leaders (e.g. councillors), community-based organisations, as well as neighbouring residents should be informed of the details of the construction company, size of the workforce and construction schedules. A community forum should also be actively involved in this process.	During construction phase	Project Manager/ Environmental Control Officer/HR	Included in construction costs.
The potential in-migration of workers is likely to result in other cumulative impacts, such as conflict with existing community members, social inconveniences and / or problems and pressures on existing infrastructure. This process of potential in-migration is anticipated to have a major effect on the farmers in close proximity to the proposed mine.	Effect of temporary workers on social dynamics	6	4	3	3	39	-	M	Ensure that non-local and/or temporary contract workers are provided with accommodation for the duration of the construction period. Employ local labour as far as possible (within a 20 km radius). Avoid the establishment of camps, hostels or temporary accommodation for workers. Accommodation should be provided at suitable locations in Virginia, Theunissen, Welkom and surrounds.	4	3	2	3	27	-	L	• Before construction commences, representatives from the local municipality, local leaders (e.g. councillors), community-based organisations, as well as affected property owners should be consulted regarding accommodation options for non-local and/or temporary workers. Construction activities and schedules, as well as the location of construction camps, if applicable, should be discussed and finalised with these representatives.	During construction phase	Project Manager/ Environmental Control Officer	Included in construction costs.
									Chemical latrines or ablution facilities must be provided to workers in close proximity to the site.								• Undertake regular inspections of the project area and surrounding properties to determine if squatting is taking place. If squatting is observed, contact the local municipality and police immediately for assistance in addressing the situation.	Ongoing	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
									Ensure that during the project construction process and the operational phase of the project, Employees and Employees and contractors receive adequate health support from the project team for work-related health problems.											
Mining developments are usually perceived as a positive injection to the economic standard of an area as it could lead to	Local Economic Contribution	6	4	2	4	48	+	M	Involve local companies in the procurement process as much as possible in order to ensure further indirect economic spin-offs and benefits to the local economy.	8	4	3	4	60	+	M	• Sibanye Gold should develop a database of local companies, including credible SMMEs that could qualify as potential service providers prior to the initiation of the tender process, to enable these local	During construction phase	Procurement Manager/Project Manager/HR Manager	Included in construction costs.

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further developments in the area. The proposed SOFS Operations would thus contribute to the economy due to the possible expenditure during the construction phase which could result in business opportunities for the local and regional economy, especially with regards to the local service industry. It is further anticipated that a large proportion of the wage bill earned by construction workers would be spent within the local municipal area resulting in local economic benefits with subsequent indirect spin-offs for local businesses.																	companies and SMMEs to be involved with the tender process. DBM should liaise with local stakeholders, as well as with representatives of the local municipality.			
Even though the area is not known for various tourist facilities and the study area is not situated within a tourist node, it is still expected that the local hospitality industry could benefit through the provision of accommodation and meals to a large part of the professional construction team members (e.g. engineers, managers, consultants and product representatives) who would stay in the area for the duration of the construction phase.	Local Tourism Industry					0	+	L	The local hospitality industry should receive preference should accommodation facilities be required.					0	-	L	• Implement contractual requirement for Employees and contractors to procure goods and services locally as far as possible.	During construction phase	Procurement Manager/Project Manager/HR Manager	Included in construction costs.
The majority of property owners consulted indicated that they cultivate crops on their properties. These activities falling within the footprint area would be severely negatively affected due to the development footprint and would have to come to a halt. The cultivation of crops in close proximity to the site could also be negatively affected by dust creation due to the use of the gravel roads on site, possible blasting and the initial site earthworks (especially during harvesting times).	Construction activities	8	2	2	4	48	+	M	A dust monitoring network must be set up prior to the construction phase so that any air quality or dust issues can be addressed accordingly.	8	4	2	5	70	+	H	• Dust sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMPr.	Monthly	Environmental Control Officer	R 92 000.00
																	• Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist.	Monthly	Environmental Control Officer/Air Quality Specialist	R 42 000.00
																	• In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Control Officer/Air Quality Specialist	To be determined - depending on severity of incident.
The possibility of crop and equipment losses due to theft as well as potential damage to farming infrastructure during the construction phase is a grave concern.	Construction activities	6	3	2	3	33	-	M	Strict security measures should be put in place to prevent crop theft, equipment theft and infrastructure damage. Security personnel should be on site on a permanent basis.	2	2	2	3	18	-	L	• A community forum consisting of representatives of the project proponent, Employees and contractors, local leaders such as councillors, the Environmental Control Officer and the property owners should be established. The aim of such a forum would be to set up local safety and	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.

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		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																	security measures to deal with the potential for crop theft, equipment theft and infrastructure damage and to adapt the measures if and when required.			
																	• Personnel at the mine need to be informed of protocols for reporting suspicious activities.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
																	• The construction schedule should be available to any local policing forum as well as the South African Police Force.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
Access to the mine would increase the risk of vehicle and pedestrian accidents in the vicinity of the access point. Movement of construction vehicles and possible speeding by these vehicles have been raised as a concern. Large numbers of construction related traffic could thus have negative impacts on the daily living and movement patterns of the farmers especially where these vehicles would pass in close proximity to their dwellings or access internal roads on their properties.	Heavy vehicle movement	4	2	2	3	24	-	L	Construction material to be transported with road-worthy vehicles that are well maintained and a speed limit of 40 km/h to be maintained.	2	2	2	3	18	-	L	• The contractor should communicate the construction schedule and vehicle movements to the neighbouring property owners. Implement a strict penalty fine system for speeding incidents.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
The development of the proposed mine could increase the crime levels within the surrounding area thereby severely affected the quality of life of current property owners.	Safety and Security Risks	6	3	2	3	33	-	M	Strict security measures should be developed and implemented. Security personnel should be on site on a permanent basis.	2	2	2	3	18	-	L	• As far as possible, the movement of construction workers should be confined to the work site to avoid any increased safety and security risks.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
																	• Before construction commences, representatives from the local municipality and community-based organisations, as well as neighbouring residents should be informed of the details of the construction company, size of the workforce and construction schedules.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
																	• Construction workers should be easily identified as part of the construction team by e.g. wearing specific clothing and/or identity tags.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
																	• Ensure adequate housing facilities for outside workers and transportation to and from the construction site.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
																	• Criminal incidents should be communicated to the workforce and mine Employees and Employees and contractors to ensure a general awareness of the safety situation in the area.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
																	• Operational safety risks should be addressed as part of the Occupational Health and Safety Act (1993).	During construction phase	Health and Safety Officer/Project Manager/	Included in construction costs.

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
																			Environmental Control Officer	
A major concern in terms of public health is HIV/Aids as it is known that the disease spreads with the influx of outside workers to an area. Young male mineworkers could be classified as those in the "high risk" categories. If a significant proportion of the construction workforce are affected by HIV/Aids, it can lead to lower productivity, increased health related expenses and negative implications to replace workers.	Health Impacts	6	4	3	4	52	-	M	The general health of construction workers should be monitoring on an ongoing basis.	4	3	2	3	27	-	L	• Local labour should be employed as far as possible to avoid additional pressure of outsiders on the existing services.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
									Develop an HIV/AIDS awareness and support programme, with specific focus on those in and nearby the construction site.								• HIV/Aids awareness campaigns should be focused on contract workers.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
																	• First aid supplies should be available at various points at the construction site.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
																	• Emergency and health services should be notified of the construction schedule and peak construction periods.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
The impact on the sense of place relates to the change in the landscape character and visual impact of the proposed mine during the construction phase.	Sense of Place	8	3	2	4	52	-	M	Visual impacts of the construction site, however, are temporary and should respond to mitigation.	4	2	2	3	24	-	L	• The construction site should be kept litter free.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
																	• Site rehabilitation on certain sections of the site should occur as soon as the construction process allows.	During construction phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in construction costs.
During the construction phase, general construction activities create different types of noise, such as noise associated with the movement of construction vehicles, the reverse indicator of trucks, the loading or movement of material and activities of workers at a construction site such as shouting, loud music (especially after hours) and so forth. These types of noises would have different nuisance impacts on those within the construction site and on nearby dwellings.	Noise	8	2	2	4	48	-	M	At this stage construction activities are planned to take place during daytime period only. This may change to a 24 hour 7 day a week approach depending on the outcome of the BFS.	4	2	1	2	14	-	L	• Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
									The use of noise barriers or earth berms and screening of noise at individual source where an activity can be clearly heard at the boundary will be implemented.								• Machinery with low noise levels and maintained in a good order to be used and to comply with the IFC's Health and Safety Regulations.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
																	• Use mufflers on engine exhausts and compressor components, and vibration isolation for mechanical equipment.	During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs.
Damage to property as a result of blast and vibration.	Blasting and vibration	10	2	2	4	56	-	M	Undertake a detailed blast and vibration assessment and crack survey prior to each blasting event.	4	2	1	2	14	-	L	• Notify neighbouring land owners of a blasting event prior to such an event taking place (at least 2 days prior).	During construction phase	Environmental Control Officer	Included in construction costs.
																	• Undertake a crack survey before and after a blasting event.	During construction phase	Environmental Control Officer	Included in construction costs.
Issues related to HERITAGE																				
Evidence of 2 sites of archaeological/cultural importance occur within the greater project area. Potential impacts on these must be minimised.	Graves/ grave yards	8	4	2	3	42	-	M	Should it be directly impacted on by the mine the graves may be exhumed and the human remains reburied. Before this may happen the necessary advertising, possible social consultation and permitting applications should be implemented. Should the graves	4	4	2	2	20	-	L	• It is possible that more cultural sites may be present. Also, the subterranean presence of archaeological and/or historical sites, features or artefacts are always a distinct possibility. Care should also be taken when development work commences that if any more artefacts are	Ongoing	Environmental Control Officer	N/A

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
									however not be impacted on directly, there will definitely be a secondary impact. The graves should then be fenced in a management plan for the preservation and maintenance thereof be written.								uncovered, a qualified archaeologist be called in to investigate.			
Issues related to WETLANDS																				
Two hillslope seepage wetlands will be directly impacted by the proposed surface infrastructure layout and will likely be completely and permanently destroyed during site clearing activities preceding construction. The affected wetlands are wetland units 3 and 4 (Figure 13). In addition, the existing gravel road crossing over wetland unit 2 will be upgraded as the main access road to the mine shaft. Upgrading and widening of this road will result in further wetland loss. All of the affected wetlands have been significantly impacted by agricultural activities, especially wetland unit 4 which has been completely cultivated, limiting the associated loss of biodiversity. The affected wetlands are also all isolated systems that are not directly linked to any drainage network. The impact will thus be restricted to the wetlands in question.	Site Clearance	6	1	5	5	60	-	M	The impact could be avoided by adjusting the surface infrastructure layout to exclude all wetland areas from the development footprint. However, this is considered unlikely. Alternatively, the loss of these wetlands could be offset through the implementation of a wetland management and rehabilitation plan for the remaining wetlands within the study area that aims to improve the condition of these wetlands and the role they play in especially biodiversity support, which is considered to be the most important function of the wetlands on site.	4	5	1	5	50	-	M	• Implement mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in construction costs.
Disturbances to the soils within the wetland catchments during vegetation clearing and site preparation could result in increased sediment movement off the site and into downslope wetland areas. However, as most of the site is already cultivated and the soils are regularly disturbed through ploughing activities, the construction activities are unlikely to significantly increase sediment movement unless undertaken during the rainy season	Site Clearance	6	5	1	3	36	-	M	Earthworks and vegetation clearing activities on site should ideally be undertaken during the dry season to minimise sediment transport during surface runoff following rainfall events. Earthworks and vegetation clearing activities should also be phased to minimise the extent of disturbed areas at any one time. Temporary toe berms should be installed on the downslope side of large bare soils areas and any soil stockpiles to trap sediments eroded odd these areas. The site should be monitored for erosion and sediment movement during and after rainfall events and suitable interventions put in place to repair any erosion damage and to prevent further sediment movement off the site. Following completion of construction activities, bare soil areas should be ripped, scarified, landscaped and re-vegetated as soon as possible. Re-vegetated areas should be monitored to ensure successful re-	4	5	1	2	20	-	L	• Implement mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in construction costs.

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
									establishment of vegetation. Ideally, 70 % cover should be obtained after 3 months. A mixture of indigenous grass species should be used.											
Clearing of vegetation and soil disturbance could lead to mobilisation of sediments and dust which may be blown or washed into receiving water bodies (wetlands and pans) within the vicinity. This would lead to increased turbidity (decreased water quality) which may have a negative impact on aquatic fauna. When the suspended solids (soil particles) settle out on the substrates in the wetlands, it leads to further deterioration in habitat quality. Sediments are colonised by Typha reeds or alien weeds, causing a decline in habitats during the wet season. This may result in a decline in overall biodiversity. Water quality impacts, resulting from spills, leaks, dust or dirty stormwater, will result in the loss of taxa that may be sensitive to water quality. In addition, altered hydrology, in terms of timing, duration and quantity of water will affect habitat availability. Reduced flows or shorter periods of inundation may reduce both the availability and suitability of habitats and will have an impact on aquatic fauna.	Site Clearance	6	4	2	4	48	-	M	Implementation of all mitigation measures listed above for erosion control and water quality management will reduce the severity of impacts. An emergency preparedness plan should be compiled and implemented in the event of major spills (e.g. fuel, mine water or sewage spill). Dust suppression measures should be used. A biomonitoring plan should be compiled and implemented and should include assessments of water quality, habitats and aquatic macroinvertebrates. Sampling sites further down in the Doring River catchment should be included to assess impacts on downstream ecosystems. All mitigation measures relating to water quality should be audited with prompt follow-up action taken in the event of non-compliances.	6	4	1	2	22	-	L	• Implement mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in construction costs.
The existing gravel road crossing over wetland unit 2 will be upgraded as the assumed main access road to the mine shaft. Upgrading and widening of this road will result in further wetland loss. Two hillslope seepage wetlands will be directly impacted by the proposed surface infrastructure layout and will likely be completely and permanently destroyed during site clearing activities preceding construction. The affected wetlands are wetland units 3 and 4	Loss of wetland habitat	6	5	1	5	60	-	M	The loss of these wetlands could be offset through the implementation of a wetland management and rehabilitation plan for the remaining wetlands within the study area that aims to improve the condition of these wetlands and the role they play in especially biodiversity support, which is considered to be the most important function of the wetlands on site.	4	5	1	5	50	-	M	• Develop a wetland management and rehabilitation plan, and implement throughout the construction, operation and closure phases of the mine.	Ongoing	Environmental Control Officer	N/A
Disturbances to the soils within the wetland		6	5	1	3	36	-	M	Earthworks and vegetation clearing activities on site should ideally be	4	5	1	1	10	-	L	• Develop a wetland management and rehabilitation plan, and implement	Ongoing	Environmental Control Officer	N/A

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
catchments during vegetation clearing and site preparation could result in increased sediment movement off the site and into down slope wetland areas. However, as most of the site is already cultivated and the soils are regularly disturbed through ploughing activities, the construction activities are unlikely to significantly increase sediment movement unless undertaken during the rainy season.	Increased sediment movement								undertaken during the dry season to minimise sediment transport during surface runoff following rainfall events. Earthworks and vegetation clearing activities should also be phased to minimise the extent of disturbed areas at any one time. Temporary toe berms should be installed on the down slope side of large bare soils areas and any soil stockpiles to trap sediments eroded odd these areas.								throughout the construction, operation and closure phases of the mine. • Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing. • The contractor will ensure that all activities, material and equipment storage and personnel movement take place within the designated area. • Employees and contractors will complete induction on the EMP, Environmental Awareness Plan and Emergency Response Plan prior to construction activities being undertaken. All workers will be made aware of the penalty systems for non-compliance. • Draw up a procedure clearly reflecting the method and phases of clearance of vegetation only in areas where construction will take place. • The topsoil material will be stockpiled in a designated area for rehabilitation at closure/decommissioning. • Design and construct all structures to ensure clean and dirty water separation as stipulated in Regulation 704 of the NWA. • The site should be monitored for erosion and sediment movement during and after rainfall events and suitable interventions put in place to repair any erosion damage and to prevent further sediment movement off the site.	During construction phase During construction phase During construction phase During construction phase During construction phase During construction phase During construction phase	Environmental Control Officer/ Project Manager/Health & Safety Officer Environmental Control Officer/ Project Manager/Health & Safety Officer Environmental Control Officer/ Project Manager/Health & Safety Officer Environmental Control Officer/ Project Manager/Health & Safety Officer Environmental Control Officer/ Project Manager/Health & Safety Officer Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in construction costs. Included in construction costs. Included in construction costs. Included in construction costs. Included in construction costs. Included in construction costs.
During construction of the surface infrastructure large areas will be covered with impermeable surfaces such as buildings, roads, paving etc., significantly increasing the generation of surface runoff from these areas, as well as the velocity of surface runoff. Infiltration and recharge of the shallow perched water table within the soil profile will decrease as a result. These changes within the runoff characteristics of the landscape will translate into changes to the supporting hydrology of the wetlands and lead to further degradation of receiving wetlands through increasing flood peaks and decreasing low flows, resulting in	Altered Hydrology	6	2	2	5	50	-	M	To minimise the changes to the runoff characteristics of the landscape, the extent of hardened surfaces on site should be kept as small as possible. In addition, connectivity between areas of hardened surfaces should be minimised and such areas should ideally be separated by vegetated strips that encourage infiltration of rainwater into the soil. Care should however be taken to only allow clean water to infiltrate the soils. Dirty water areas should ideally be bunded and all runoff from these areas should be captured and used within the mining operations, with zero discharge of dirty water.	6	2	1	3	27	-	L	• Design and construct all structures to ensure clean and dirty water separation as stipulated in Regulation 704 of the NWA. • Maintain and monitor the implementation of dirty water separation infrastructure. • Construct the required erosion protection measures.	Prior to construction During construction phase During construction phase	Environmental Control Officer/ Project Manager Environmental Control Officer/ Project Manager Environmental Control Officer/ Project Manager	Included in construction costs. Included in construction costs. Included in construction costs.

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP				
changed seasonality of the affected wetlands. Wetland units 5 and a further pan immediately to the north of the infrastructure area (but outside the study area) are likely to be most affected.																				
Clearing of vegetation and soil disturbance could lead to mobilisation of sediments and dust which may be blown or washed into receiving water bodies (wetlands and pans) within the vicinity. This would lead to increased turbidity (decreased water quality) which may have a negative impact on aquatic fauna. When the suspended solids (soil particles) settle out on the substrates in the wetlands, it leads to further deterioration in habitat quality. Sediments are colonised by Typha reeds or alien weeds, causing a decline in habitats during the wet season. This may result in a decline in overall biodiversity. Water quality impacts, resulting from spills, leaks, dust or dirty storm water, will result in the loss of taxa that may be sensitive to water quality. In addition, altered hydrology, in terms of timing, duration and quantity of water will affect habitat availability. Reduced flows or shorter periods of inundation may reduce both the availability and suitability of habitats and will have an impact on aquatic fauna.	Decline in habitats and biota	6	4	2	4	48	-	M	The loss of these wetlands could be offset through the implementation of a wetland management and rehabilitation plan for the remaining wetlands within the study area that aims to improve the condition of these wetlands and the role they play in especially biodiversity support, which is considered to be the most important function of the wetlands on site.	6	4	1	2	22	-	L	• Develop a wetland management and rehabilitation plan, and implement throughout the construction, operation and closure phases of the mine.	Ongoing	Environmental Control Officer	N/A
Issues related to RADIATION																				
Impact on public safety as a result of exposure to radioactivity.	Radioactive elements	10	4	2	5	80	-	H	Develop a Radiation Management Plan.	6	4	1	4	44	-	M	• Implement the Radiation Management Plan throughout the life of mine and monitor exposure of the public to radioactivity in accordance therewith.	Ongoing	Environmental Control Officer/Health & Safety officer	Included in Construction and Operational Costs.

Table 13-3: Impacts and Management Measures for Operational Phase Activities: Mining of Gold for the Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Issues related to GEOLOGY																				
Removal of gold resources will permanently alter the geology of the area.	Mining	10	5	2	5	85	-	H	No mitigation measures are possible, as mining permanently destroys the geological strata. The mining operations will remain within the limits of the designated mining rights area.	10	5	2	5	85	-	H	• The mine will make optimal use of the gold resources which forms part of the mining rights area.	N/A	N/A	N/A
The potential sterilisation of other resources due to the establishment of infrastructure on potential mineral resources.	Mining	8	5	2	4	60	-	M	The mine must undertake detailed geological investigations to determine the extent of the resources and ensure that no mining infrastructure is located on areas of potential mineral resources. The mine must ensure to optimally utilise all available gold resources. Should additional gold resources be identified outside the boundaries as stipulated within this report, the necessary applications must be made to the relevant authorities, who will include, but are not limited to the Department of Mineral and Petroleum Resources (DMPR) (for mining), Department of Forestry, Fisheries and the Environment (DFFE) (for listed activities); Department of Water and Sanitation (DWS) (for water related issues), National Department of Agriculture(NDA) (for potential impacts on land use and capability), South African Heritage Resources Agency (SAHRA) (for potential impact on unidentified graves or culturally important sites).	8	5	2	3	45	-	M	• Phased mine plans must be developed within legal mining rights area. All mining activities will be undertaken in line with the approved Mining Works Programme and the Environmental Management Programme (EMPr).	Ongoing	Project Manager	Included in Operational Costs
Issues related to TOPOGRAPHY																				
Structures such as stockpiles and waste rock dumps will change the natural topography of the area.	Stockpiling	10	5	2	5	85	-	H	Ensure that stockpiles and waste rock dumps are designed taking the topography of the area into consideration.	8	4	2	3	42	-	M	• The waste rock dump will either be shaped and rock cladded or shaped and grassed. This will be dependent on the optimal utilisation of these resources in the future.	During Operation	Environmental Control Officer/Project Manager	Included in Operational Costs
Potential subsidence as a result of dewatering.	Dewatering	10	5	2	4	68	-	H	Ongoing monitoring must be undertaken of the surface area to determine whether any subsidence is taking place. Should subsidence be detected it must be made safe and rehabilitated as soon as possible.	6	5	2	3	39	-	M	• The mine will ensure to backfill area of subsistence as soon as possible after it occurred.	During Operation	Environmental Control Officer/Project Manager	Included in Operational Costs
Issues related to GEOHYDROLOGY																				
Dewatering of the aquifer	Mining	6	4	3	4	52	-	M	No mitigation can be implemented during this phase.	6	4	3	4	52	-	M	• Monitoring of groundwater quality.	Quarterly. Entire operational phase of mine	Mine Environmental Manager	Included in Operational and Closure Costs
Deterioration in water quality for the surrounding farm owners, wetland and other water users.	Mining	10	5	2	4	68	-	H	Groundwater quality monitoring networks must be set up prior to the construction phase so that any groundwater quality and quantity issues can be addressed accordingly.	8	2	2	5	60	-	M	• Groundwater quality sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the Environmental Impact Assessment (EIA) /EMPr.	Monthly	Environmental Control Officer/Project Manager	R 91 000.00
																	• Quarterly groundwater monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental Control Officer/Water Quality Specialist	R 42 000.00
																	• In the event that water quality or quantity issues are identified based on the	In the event of occurrence	Environmental Control	To be determined -

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.		Officer/Water Quality Specialist	depending on severity of incident
Polluting the groundwater system from Acid Mine Drainage (sulphates, iron and low pH). Exposure of geological strata will result in geochemical changes and the contamination of the groundwater system.	Mining	10	5	3	4	72	-	H	Disturbing geological strata is a result of mining. Mining areas need to be kept as dry as possible to reduce contact time of water and oxygen with exposed rock and therefore keep contamination to a minimum.	6	4	2	4	48	-	M	• Implement water management structures on site.	Ongoing	Environmental Control Officer/Project Manager	Included in Operational Costs
Groundwater contamination as a result from seepage from not-compacted Waste Rock Dump.	Groundwater contamination	8	4	2	4	56	-	M	Compact Waste rock Dump footprint area prior to dumping.	6	4	1	3	33	-	M	• Sufficient compaction of waste rock dump area prior to dumping to prevent infiltration of potential seepage. Divert runoff to dirty water return water dam.	One-off compaction; constant diversion of runoff	Site engineers supervise compaction to required level	Included in Operational Costs
Seepage into underlying aquifer.	Groundwater contamination	8	4	3	4	60	-	M	Lining of facility including installation of drains.	6	4	2	3	36	-	M	• Lining of Brownfield's evaporation ponds area, before disposal of tailings commences.	One-off construction, constant treatment of seepage	Mine Environmental unit manages treatment of seepage	Included in Operational Costs
Issues related to HYDROLOGY																				
Contamination of clean water catchment at the plant area.	Product handling	8	3	2	4	52	-	M	Implement clean and dirty water separation.	6	3	2	3	33	-	M	• Install clean and dirty water separation channels on site and maintain them throughout the life of mine.	Ongoing	Environmental Control Officer/Project Manager	Included in Operational Costs
Deterioration in water quality is a concern for the surrounding users.	Mining	10	5	2	4	68	-	H	Surface water quality monitoring networks must be set up prior to the construction phase so that any surface water quality issues can be addressed accordingly.	6	4	2	3	36	-	M	• Surface water quality sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMPr.	Monthly	Environmental Control Officer/Project Manager	R 91 000.00
																	• Quarterly surface water monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental Control Officer/Water Quality Specialist	R 42 000.00
																	• In the event that water quality issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Control Officer/Water Quality Specialist	To be determined - depending on severity of incident
Drainage water from underground and polluted water from processing plants could pollute river systems.	Disposal of surplus water	6	5	3	4	56	-	M	Water treatment.	6	4	2	4	48	+	M	• Polluted surface water must be treated to a better quality standard than that of natural streamflow and released into streams to benefit downstream users (if appropriate licencing is obtained in terms of the NWA).	Ongoing	Environmental Control Officer	Included in Operational Costs
Runoff from dirty water footprint areas could pollute streams.	Runoff	4	4	3	4	44	-	M	Contain dirty water.	4	5	1	2	20	-	L	• Dirty water runoff must be contained and captured in a well designed pollution control dam and treated, reused or lost to evaporation as determined applicable.	Ongoing	Environmental Control Officer	Included in Operational Costs
Issues related to SOIL, LAND USE AND LAND CAPABILITY																				
Soil compaction	Construction of infrastructure	2	4	6	4	48	-	M	Keep infrastructure localised to reduce footprint.	2	4	4	4	40	-	M	• Implement Mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in Operational Costs
Soil erosion	Vegetation removal during construction and operations	1	5	8	4	56	-	M	Keep as much original landcover/topsoil as possible.	1	3	4	4	32	-	M	• Implement Mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in Operational Costs
Issues related to FAUNA AND FLORA																				
Loss or disruption of mammal migration routes.	Mining activities	8	5	3	2	32	-	M	Prevent access and impacts within areas of high ecological sensitivity.	8	5	3	1	16	-	L	• Develop an environmental monitoring plan aimed at identifying and addressing issues of concern and include relevant aspects in awareness training.	Seasonal/Bi-annual	Environmental Control Officer/Health & Safety officer/	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																			Ecologist/ Proponent	
Direct impacts on sensitive/pristine habitat types.	Mining activities	8	5	3	2	32	-	M	Prevent access and impacts within areas of high ecological sensitivity.	8	5	3	1	16	-	L	• Develop an environmental monitoring plan aimed at identifying and addressing issues of concern and include relevant aspects in awareness training.	Seasonal/Bi-annual	Environmental Control Officer/Health & Safety officer/ Ecologist/ Proponent	Included in Operational Costs
Direct impacts on common fauna species of the study area.	Mining activities	4	4	2	4	40	-	M	Prevent spread of construction related impacts to nearby areas of natural habitat.	4	4	2	2	20	-	L	• Develop and implement awareness programmes and prevent persistent and deliberate impacts on animals in nearby natural habitats.	Ongoing	Environmental Control Officer/Health & Safety officer/ Ecologist/ Contractor/Site Manager	Included in Operational Costs
Faunal interaction with structures, servitudes and/or personnel.	Mining activities	6	4	2	4	48	-	M	Ensure minimal human/animal conflict potential; implement awareness programmes; control movement of personnel; limit speeds of vehicles; avoid open waste areas that could be targeted by rodents and scavengers.	6	4	2	2	24	-	L	• Develop and implement awareness programmes and prevent persistent and deliberate impacts on animals in nearby natural habitats.	Ongoing	Environmental Control Officer/Health & Safety officer/ Ecologist/ Contractor/Site Manager	Included in Operational Costs
Impacts on surrounding habitat/species, including ecosystem functioning.	Mining activities	4	4	2	4	40	-	M	Prevent spread of construction related impacts to nearby areas of natural habitat.	4	4	2	3	30	-	M	• Develop and implement awareness programmes; provide adequate waste disposal facilities; manage operational issues with regard to hygiene, ablution and food provision; develop hydrocarbon spill reaction and cleanup action plans.	Seasonal/Bi-annual	Environmental Control Officer/Health & Safety officer/ Ecologist/ Contractor/Site Manager	Included in Operational Costs
Issues related to AIR QUALITY																				
All activities associated with the mining of gold has the potential to release dust.	Mining activities	10	4	2	4	64	-	H	A dust monitoring network must be set up prior to the construction phase so that any air quality or dust issues can be addressed accordingly.	6	4	2	4	48	-	M	• Dust sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMPr.	Monthly	Environmental Control Officer	R 92 000.00
																	• Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist.	Monthly	Environmental Control Officer/Air Quality Specialist	R 42 000.00
																	• In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Control Officer/Air Quality Specialist	To be determined - depending on severity of incident
																	• Ensure optimal implementation and maintenance of the dust suppression programme.	Ongoing	Environmental Control Officer	Included in Operational Costs
																	• The road surface to be maintained on a weekly basis.	Weekly	Environmental Control Officer	Included in Operational Costs
Fugitive dust emissions as a result of the movement of vehicles and removal of material for construction purposes will have a negative impact in terms of visual characteristics/air quality.	Ore handling	6	2	2	4	40	-	M	The impact during construction phase is limited to a short period only. All mine haul roads will be treated with dust suppressant chemicals or watered in order to reduce the impact of dust on the aesthetics of the surrounding area.	2	2	2	3	18	-	L	• Establish a dust management plan in consultation with the environmental manager and include dust suppression as part of the contractor's responsibility.	Ongoing	Environmental Control Officer	Included in Operational Costs
Issues related to NOISE																				
Noise disturbances will be present due to the operation of general mining related activities.	Mining activities	10	4	2	5	80	-	H	The use of noise barriers or earth berms and screening of noise at individual source where an activity can be clearly heard at the boundary.	6	4	1	3	33	-	M	• Ventilation design to be addressed in Final Mine Plan which will be approved by all relevant authorities prior to construction activities taken place.	Prior to construction	Environmental Control Officer/Project Manager	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
									All parts or equipment such as the gearboxes, rotating parts, hydraulics and electric motors to be maintained, serviced, and acoustically screened of where possible.								• Develop and implement the acoustic screening plan.	During Construction	Environmental Control Officer/Project Manager	Included in Operational Costs
																	• Construct an earth berm around the plant, if necessary.	During Construction	Environmental Control Officer/Project Manager	Included in Operational Costs
Issues related to TRAFFIC																				
Fugitive dust emissions from ore transportation activities will have a negative air quality impact.	Transportation	10	4	3	3	51	-	M	Dust suppression methods must be implemented around the stockpiling areas and transfer stations and it is recommended that a dust monitoring network be established to monitor levels of dust dispersion. Should it be found that the stockpiles create excessive dust, measures must be implemented to reduce this impact.	6	4	2	3	36	-	M	• Ensure optimal implementation and maintenance of the dust suppression programme and monitoring programme.	Ongoing	Environmental Control Officer/Project Manager	Included in Operational Costs
																	• The road surface to be maintained on a weekly basis.	Weekly	Environmental Control Officer/Project Manager	Included in Operational Costs
Vehicle Safety (access spacing, road alignments, speed differential, lighting).	Transportation	6	4	3	4	52	-	M	Provision of light at sufficient standards at key intersections and the access to the development.	2	4	3	2	18	-	L	• Inspect that lighting fixtures are in working order and replace when necessary.	Weekly inspection	Environmental Control Officer/Project Manager	Included in Operational Costs
									No speeding or on-street pick up/drop offs at key intersections and the access to the development (drop offs/pickup should be done on site).								• Implement a strict penalty fine system for rule breaking.	Ongoing	Environmental Control Officer/Project Manager	N/A
Issues related to VISUAL																				
Light pollution should be seriously and carefully considered and kept to a minimum wherever possible as light at night travels great distances.	Mining activities	8	4	2	4	56	-	M	Security flood lighting and operational lighting should only be used where absolutely necessary and carefully directed, preferably away from sensitive viewing areas, i.e. the residential areas within falling within the viewshed and the roads in close proximity to the site.	6	4	2	3	36	-	M	• Wherever possible, lights should be directed downwards so as to avoid illuminating the sky and minimising light spills.	During Construction	Project Manager	N/A
Issues related to SOCIAL																				
Increase in population size	In-migration	10	4	3	4	68	-	H	Implement according to proposed action plan.	8	4	4	3	48	-	M	• Employment criteria should be communicated to the community in advance (e.g. in newspapers, community forum notice boards, etc); • Local labour should be employed as far as possible; • Verify the details of potential employees in order to ensure that local labour is employed; • Accommodation for members of the workforce, other than security personnel, must not be permitted on site; The only semi-permanent structures that should be allowed on site is guard houses for security personnel; • Camp followers / informal traders must not be allowed to congregate outside the construction site; • Temporary staff should be housed in the surrounding communities, i.e. Bed and Breakfast establishments, etc. to prevent the establishment of construction camps; and • The AgriSA protocol for access to farms should be followed at all times.	Ongoing	Environmental Control Officer	Included in Operational Costs
Effect of temporary workers on social dynamics	Local labour	8	4	3	3	45	-	M	Implement according to proposed action plan.	4	3	3	3	30	-	M	• Chemical latrines or ablution facilities must be provided to workers in close proximity to the site;	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	• Employ local labour as far as possible (within a 20 km radius); • Avoid the establishment of camps, hostels or temporary accommodation for workers. Accommodation should be provided at suitable locations in Virginia and Welkom and surrounds; and • Ensure that during the project construction process and the operational phase of the project, employees receive adequate health support from the project team for work-related health problems.			
Waged labour	Job Creation	6	3	3	4	48	+	M	Implement according to proposed action plan.	8	4	3	4	60	+	M	• Unskilled and unemployed labour should be sourced from the surrounding local communities as far as possible; • Skills development opportunities should be granted to community members and local job seekers, where needed; • Maximise employment opportunities for the local communities and reduce the influx of a foreign labour force while ensuring an effective construction and operational phase; • Capture all project relevant skills in the project area with the aim to ensure maximum local employment; • Make use of any existing skills databases and include the local councillors and other representative community structures in the process; • Develop a Recruitment Manual to include a list of employment opportunities that will become available during the project planning, construction and post-construction phases and provide guidelines on procedures to be followed by aspiring employment seekers; • Establish an employment information desk to assist with the day to day management of project related labour issues; • Identify and maximise on appropriate training and skills transfer opportunities that will enhance the skills level of the local labour force during the pre-construction, during construction and during full operation. It is recommended that training and skills development activities start during the construction period; • Project contracts between Sibanye Gold and the main contractor should stipulate the use of local labour for unskilled and semi-skilled positions and tasks; • Ensure that local businesses, especially those of Historically Disadvantaged Individuals (HDI), women and of Small, Micro and Medium Enterprises (SMMEs) get allocated the maximum appropriate share of project related business opportunities; and • Ensure that the Labour Relations Amendment Act, 2002 (Act No. 12 of 2002) as well as the necessary policies and procedures are taken into consideration to	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	ensure the correct procurement procedures.			
Conversion and diversification of economic activities (local economy)	Mining	4	3	3	3	30	+	M	Implement according to proposed action plan.	6	3	3	4	48	+	M	• Consideration should be given to the fact that agricultural practices will be compromised and that it may become impractical, as well as uneconomical to continue; • Affected landowners must be consulted to establish means to continue farming practices, i.e. as part of a local economic development project to supply the mine with produce; • Economic development should take place in line with the Local Municipality's IDP, as well as their Spatial Development Framework; and • The establishment of new businesses should comply with zoning and local by-law requirements.	Ongoing	Environmental Control Officer	Included in Operational Costs
Conversion and diversification of economic activities (farmers)	Mining	10	4	2	3	48	-	M	Implement according to proposed action plan.	8	3	1	3	36	-	M	• The placement of mine infrastructure should avoid splintering farms, and should be done in consultation with affected landowners; • Consideration should be given to buying out properties in its entirety to reduce the risk of dissolving the economic unit of the farm; • Consideration should be given to the fact that agricultural practices will be compromised and that it may become impractical, as well as uneconomical to continue; and • Affected landowners must be consulted to establish means to continue farming practices, i.e. as part of a local economic development project to supply the mine with produce.	Ongoing	Environmental Control Officer	Included in Operational Costs
Increase in standard of living (broader community)	Job Creation	4	2	3	3	27	+	L	Implement according to proposed action plan.	8	4	3	3	45	+	M	• To increase the standard of living locally, the contractors employed should aim to ensure that local or surrounding people are employed where possible. It is furthermore suggested that all the employees should be motivated to spend their earned income locally. This can be achieved by ensuring that the goods and services required by the employees are provided for locally (if possible). The onus will lie on local shop owners to ensure that the demanded for goods and services are met; and • The employment of local residents during operation (as far as practically possible) would increase the standard of living, since they would have a higher disposable income and less transportation costs.	Ongoing	Environmental Control Officer	Included in Operational Costs
Increase in standard of living (local farmers)	Job Creation	8	4	2	3	42	-	M	Implement according to proposed action plan.	6	3	1	3	30	-	M	• The reduced standard of living of affected landowners should be taken into consideration when determining the appropriate compensation of landowners.	Ongoing	Environmental Control Officer	Included in Operational Costs
Employment creation and decrease in unemployment	Job Creation	4	3	3	3	30	+	M	Implement according to proposed action plan.	6	4	3	3	39	+	M	• It is suggested that non-locals should only be hired when specialist skills, which are not available locally, are required and local business providing such skills cannot be created. The following aspects in this regard should receive priority:	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	○ Labour based construction methods should be used whenever practically possible; ○ Local residents and communities should be employed, wherever possible; ○ Local construction companies should be used whenever possible, especially for subcontracting work; and ○ Local suppliers should be used as far as possible.			
Conversion and diversification of land use	Mining	6	4	3	4	52	-	M	Implement according to proposed action plan.	4	4	3	4	44	-	M	• Educate landowners in terms of their rights and responsibilities prior to the project going ahead; • Assist landowners in identifying ways to adapt their land uses; • Plan to avoid splitting agricultural land and natural habitats; • Integrate the mining area with regional land use planning objectives where possible; and • Take into account surrounding land uses and design post-mining land use options to support and enhance long term development options.	Ongoing	Environmental Control Officer	Included in Operational Costs
Transportation and rural accessibility	Transportation	4	4	3	2	22	-	L	Implement according to proposed action plan.	6	4	3	4	52	-	M	• Employ local labour as far as possible to limit the negative impacts on the infrastructure and services within the area (e.g. roads); • Sibanye Gold should, in liaison with the relevant Roads and Traffic Department, assist with the regular maintenance of the roads frequently used by construction and mine traffic; • Speed limits on the local roads surrounding the mining site should be enforced; • Appropriate traffic management measures should be planned for and implemented, especially during the construction phase with the expected increase in heavy vehicle traffic; and • The mitigation measures proposed by the traffic impact assessment should be implemented, where relevant.	Ongoing	Environmental Control Officer	Included in Operational Costs
Physical splintering	N/A	8	5	3	4	64	-	H	Implement according to proposed action plan.	6	4	3	4	52	-	M	• Sibanye Gold should consult with other service providers, government institutions and the local and district municipality to determine and mitigate these impacts; • Avoid unnecessary subdivision of land and activities that could be sited on already disturbed land; • Create infrastructure corridors for pipelines, roads, power lines etc; and • Refer to mitigation measures indicated for "Conversion and diversification of land use".	Ongoing	Environmental Control Officer	Included in Operational Costs
Capacity building (skills transfer)	N/A	6	2	3	4	44	+	M	Implement according to proposed action plan.	10	3	3	4	64	+	H	• Recruit and train local residents to supply unskilled labour during the construction and operational phase; • The use of diverse activities should be stimulated, allied with, but not reliant on, construction related activities such as outsourcing catering activities to local businesses. The local municipality could assist local residents and business owners to garner the benefit associated with the	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	spin-offs emanating from the proposed mine; • Stakeholders should be mutually accountable for increased opportunities regarding skills and competency development (general education and technical training). This will enable active participation, not only in the construction sector, but also in other spheres of the economy, as well as providing opportunities for career enhancement; • Training should be concentrated on skills that can be readily transferred to other employment opportunities in the local area to avoid persons with trained skills leaving the area for work elsewhere; • The project implementers and/or the contractors should identify the required jobs to be undertaken prior to the construction phase to enable local recruitment and/or some form of basic training; • It is recommended that a comprehensive programme for recruiting, hiring, training, orienting and counselling be established. The nature of the training provided does not need to be limited to specific project related tasks and can include financial planning, bookkeeping, general arithmetic etc; • The principles of the Expanded Public Works Programme must be adhered to and effective labour based construction technologies must be used to increase the positive effects of job creation; • Ensure that stakeholders have knowledge of the support of legislation and regulations; • The implementation of the Social and Labour Plan (SLP) should be monitored on an annual basis; • Ensure compliance to the Broad-Based Socio-Economic Empowerment Charter for the Mining and Minerals Industry (BBSEEC) and Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA); and • Ensure that the employment and training of Historically Disadvantaged South Africans (HDSAs) and women meet the requirements of the BBSEC.			
Social behaviour	N/A	6	4	2	3	36	-	M	Implement according to proposed action plan.	6	2	2	3	30	-	M	• Establish a code of conduct for construction and mine workers with strict control measures; • Require mine personnel to wear identification badges to distinguish them from trespassers or unwanted loiterers; • Liaise with the SAPS in order to implement effective crime prevention strategies; and • Liaise with existing forums in the community to communicate information to the community and to assist in the monitoring of compliance.	Ongoing	Environmental Control Officer	Included in Operational Costs
Nutrition	N/A	8	4	4	4	64	-	H	Implement according to proposed action plan.	6	3	3	4	48	-	M	• In relation to exposures from any particular source of mining, protection and safety shall be optimised in order that the	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	magnitude of individual doses, the number of people exposed and the likelihood of incurring exposures all be kept as low as reasonably achievable, economic and social factors being taken into account, within the restriction that the doses to individuals delivered by the source be subject to dose constraints; • Implement a radiation monitoring programme and establish means of isolating radiogenic materials; • Implement the recommendations from the Radiological Study; • Preparation of Radiation Management Plan; • Establish and maintain a safety culture to encourage a questioning and learning attitude to protection and safety and to discourage complacency; • Establish policies and procedures that identify protection and safety and makes it of highest priority; • Promptly identify and correct problems affecting protection and safety; • Safety assessments related to protection and safety measures for sources of radiation associated with mining shall be made at different stages; • All employees on site, as well as surrounding landowners, should receive general radiation safety training to maintain a safe working and living environment for all; and • Establish procedures that ensure there is as little exposure as possible of the workforce and of the public to dust contaminated with radioactive material during mining.			
Actual health	N/A	8	4	2	4	56	-	M	Implement according to proposed action plan.	4	4	3	3	33	-	M	• In order to reduce the impact on the local community it is important to maximise the use of local labour as far as possible; • Local labour should be employed as far as possible to avoid additional pressure on the existing services; • HIV / Aids awareness campaigns should be initiated by Sibanye Gold and provided to all its mine employees on a regular basis; • Sibanye Gold should investigate how they could assist in implementing a community health awareness programme in liaison with the local municipalities; • Environmental pollution must be limited as far as possible and the requirements of the EMPr be implemented to reduce the impact on surrounding landowners; • Environmental pollution must be limited as far as possible and the requirements of the EMPr be implemented to reduce the impact on surrounding landowners; • The necessary safety precautions should be taken and first aid supplies should be made available on site; • All mine employees (including contractors) should undergo health and safety training on a regular basis; • The general health of employees should be monitored on an ongoing basis and	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	employees should be given free access to clinic services; • It is advised that Sibanye Gold, through consultation with the local municipalities investigate ways in which their LED programmes and infrastructure development component of their SLP can assist in improving the overall health services within the communities; and • The required safety equipment should be provided to employees as well as on site and should be in a good working order.			
Feelings in relation to the project	N/A	6	3	2	3	33	-	M	Implement according to proposed action plan.	6	2	2	2	20	-	L	• A comprehensive public participation process should be implemented to effectively consult and involve the affected landowners and communities; • Continuous consultation with the affected communities should take place to keep them informed; • Consultation with the surrounding residents should take place on a continuous basis to understand, assess and mitigate their concerns where appropriate; • Sibanye Gold must be transparent about the areas they intend mining and the proposed mining method and technology; and • Information about the proposed mining methods should be made available to stakeholders to educate them about mining in general as well as the proposed mining methods.	Ongoing	Environmental Control Officer	Included in Operational Costs
Aspirations for the future (local landowners)	N/A	10	3	1	3	42	-	M	Implement according to proposed action plan.	8	3	1	3	36	-	M	• It is critical that Sibanye Gold maintain an open and trusting relationship with the affected communities subsequent to the granting of the Mining Right.	Ongoing	Environmental Control Officer	Included in Operational Costs
Aspirations for the future (broader community)	N/A	4	2	2	3	24	+	L	Implement according to proposed action plan.	10	4	3	4	68	+	H	• Sibanye Gold must be honest and transparent about the potential economic benefits and employment opportunities that the proposed mine is likely to effect in these communities, in order to manage any undue expectations.	Ongoing	Environmental Control Officer	Included in Operational Costs
Physical quality of the living environment	N/A	10	4	2	4	64	-	H	Implement according to proposed action plan.	8	4	2	3	42	-	M	• Existing community forums must serve as liaison between the affected stakeholders and Sibanye Gold and can discuss traffic, dust, noise and construction related concerns with them; • Suppress dust by spraying water or non-contaminating palliative liquids on roads, crusher and screening plant, mills and vehicles; • Prevent dust blowing off transported materials by washing vehicles, wheels and covering loads; • Rehabilitate behind production with adequate top soiling, fertilisation, irrigation and correct choice of grasses to ensure year-round cover; • Prepare a noise reduction plan to cover all significant impacts at source and implement noise reduction and screening to limit exposure. Drilling and blasting is generally intermittent and should be limited to daylight hours when ambient noise levels are highest. A hearing	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	conservation programme must be implemented where noise exceeds 85dB(A) in the mine or must not be more than 7dB(A) above ambient residual noise levels beyond mine boundary or nearest residential community; • The maximum acceptable night-time noise levels should not be exceeded; • Traffic calming measures should be put in place to minimise traffic noise; • Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders; • Mitigation and monitoring as recommended by the Water Quality Impact Assessments should be implemented; • Plant tall trees as barriers in gardens or in road reserve to reduce the visual and light intrusion, as well as noise impacts; • Recommendations made in the EMPr and EMPr should be adhered to; • Rehabilitate behind production with adequate top soiling, fertilisation, irrigation and correct choice of grasses to ensure year-round cover; • Prepare a noise reduction plan to cover all significant impacts at source and implement noise reduction and screening to limit exposure. Drilling and blasting is generally intermittent and should be limited to daylight hours when ambient noise levels are highest. A hearing conservation programme must be implemented where noise exceeds 85dB(A) in the mine or must not be more than 7dB(A) above ambient residual noise levels beyond mine boundary or nearest residential community; • The maximum acceptable night-time noise levels should not be exceeded; • Traffic calming measures should be put in place to minimise traffic noise; • Adequate monitoring of the biophysical impacts should occur in order to address any unnecessary inconveniences to stakeholders; • Mitigation and monitoring as recommended by the Water Quality Impact Assessments should be implemented; • Plant tall trees as barriers in gardens or in road reserve to reduce the visual and light intrusion, as well as noise impacts; and • Recommendations made in the EMPr and EMPr should be adhered to.			
Aesthetic quality of the living environment	N/A	6	4	2	4	48	-	M	Implement according to proposed action plan.	4	4	2	4	40	-	M	• The design and specific positioning of the infrastructure should aim to minimise the possible negative visual impact of the mine on the surrounding property owners; • The design of the mine buildings should blend in with surrounding environment; • Implement revegetation as levels are abandoned to break the form, reduce colour contrast, dust generation or contaminated runoff; and	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	• Recycle dumps or use as backfill with appropriate permission.			
Availability and quality of housing	N/A	2	3	2	3	21	-	L	Implement according to proposed action plan.	8	4	3	3	45	+	M	• Employees should be educated with regards to their accommodation options; • Housing needs should be monitored and addressed in consultation and cooperation with the applicable local municipalities; and • Maximise the employment of locals to limit the need for any additional housing infrastructure, as far as possible.	Ongoing	Environmental Control Officer	Included in Operational Costs
Adequacy of physical infrastructure	N/A	10	4	3	4	68	-	H	Implement according to proposed action plan.	8	4	3	3	45	+	M	• Ensure that the needed public services and capital facilities are in place before the peak construction occurs. This will ensure that demand for these services do not exceed supply; • The provision of infrastructural services must be integrated with the economic needs of the community; • Sibanye Gold, in liaison with the local municipalities should proactively plan for enough infrastructure and services to meet the maximum potential of the mine in terms of service and infrastructure demand; • Measures must be taken to address infrastructure development as part of future planning; • The relevant authorities, and bodies involved in the supply of bulk services should be informed about the proposed project to ensure that it gets incorporated into their demand projections; • Promote local procurement of suppliers and contractors for the transport system.	Ongoing	Environmental Control Officer	Included in Operational Costs
Adequacy and access to social infrastructure	N/A	6	3	2	2	22	-	L	Implement according to proposed action plan.	8	4	2	4	56	+	M	• In consultation with the local municipalities and other mines operating in the area, ensure that the necessary planning for upgrades of social infrastructure, where lacking due to the proposed mine, take place; • Involvement in upliftment programmes should be done according to the priority needs and projects identified as part of the local municipalities IDP, as well as in consultation with other stakeholders such as the local community representatives, ward committees and youth organisations; • Continuous involvement of the mine would be necessary and should be undertaken in a transparent and supportive manner; • Implement a regular and formalised consultation process with local government to ensure synergy between the mine's social development and LED focus; • Communication of the projects that Sibanye Gold would be involved in should filter through to all community levels to ensure maximum benefit to the community; and • Community development projects initiated by Sibanye Gold should avoid benefiting only a selected few but should follow a broad-based approach, while also taking budgeting constraints into consideration.	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Personal safety and hazard exposure	N/A	6	4	2	4	48	-	M	Implement according to proposed action plan.	4	3	2	3	27	-	L	• Local, unemployed labour should be employed as far as possible; • Accommodation for members of the workforce, other than security personnel, must not be permitted on site; • The only semi-permanent structures that should be allowed on site is guard houses for security personnel; • Camp followers / informal traders must not be allowed to congregate outside the construction site; • Strict security measures should be put in place. Security personnel should be on site on a permanent basis; • Construction workers should be confined to the construction area and should wear uniforms or identity tags to be easily identified; • The mining area should be fenced to avoid unauthorised entry by humans or animals onto the mining area; • The contractor should communicate the construction schedule and vehicle movements to the neighbouring property owners in advance; • Workers must not be allowed to overnight on the premises and must be transported to their places of residence by bus on a daily basis; • Workers must not be allowed to leave the designated mining areas without permission; • A Health and Safety Plan should be implemented and it must be ensured that all managers are trained in First Aid and other relevant safety courses; • Implement safety measures to limit fire hazards and implement fire breaks if possible; • Sibanye Gold should, in conjunction with the property owners, develop and implement emergency procedures; • Operational safety risks should be addressed as part of the Mine Health and Safety Act, 1996 (Act No. 29 of 1996); • A Fire/Emergency Management Plan should be developed and implemented. It is important that this management plan and associated communication channels are developed at the outset of the construction phase. It would be important to regularly review the functionality and efficiency of such a plan in conjunction with the local emergency teams, mine management and neighbouring landowners; • Open fires for cooking and related purposes should not be allowed on site; • Appropriate fire fighting equipment should be on site and construction workers should be appropriately trained for fire fighting; • The construction sites should be clearly marked and “danger” and “no entry” signs should be erected;	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	• Speed limits on the local roads surrounding the construction sites should be enforced; and • Speeding of construction vehicles must be strictly monitored.			
Crime and violence	N/A	4	3	3	2	20	-	L	Implement according to proposed action plan.	4	2	3	2	18	-	L	• Local, unemployed labour should be employed as far as possible; • Sibanye Gold must liaise with the local municipalities and labour unions to establish a protocol for ensuring community safety; • Mine workers should be clearly identifiable by ensuring they wear uniforms and identification cards that should be exhibited in a visible place on their body; and • The AgriSA protocol for access to farms should be followed in all instances where access to farmers' land is required.	Ongoing	Environmental Control Officer	Included in Operational Costs
Loss of natural and cultural heritage	N/A	8	5	1	3	42	-	M	Implement according to proposed action plan.	8	2	1	1	11	-	L	• The recommendations of the Heritage Impact Assessment should be implemented; • Local residents and farmers should be consulted to determine any possible heritage sites not identified by the Heritage Impact Assessment; and • Local residents and farmers should inform mitigation measures when addressing any potential impact on cultural heritage sites or graves.	Ongoing	Environmental Control Officer	Included in Operational Costs
Social networks	N/A	6	3	2	3	33	-	M	Implement according to proposed action plan.	6	3	2	2	22	-	L	• Employ local residents as far as possible; • Make use of credible SMME's for the provision of goods and services; and • Embark on regular communication efforts towards the community with regards to the mine's involvement in the communities. This could be done through an already established community forum.	Ongoing	Environmental Control Officer	Included in Operational Costs
Functioning of government agencies	N/A	8	3	3	4	56	-	M	Implement according to proposed action plan.	6	4	3	3	39	-	M	• Assist the local municipalities with the diversification of the local economy; • Emphasise the use of local service providers and SMMEs and focus on the development of LED programmes; and • Institute a joint municipal coordinating and implementing committee to support the local municipalities local economic and social develop needs and requirements, where feasible.	Ongoing	Environmental Control Officer	Included in Operational Costs
Impact equity (affected landowners)	N/A	8	4	1	3	39	-	M	Implement according to proposed action plan.	6	3	1	2	20	-	L	• Negative impacts on the local property owners should be limited as far as possible such as intrusion impacts (dust, noise, and air pollution). Mitigation measures from the specialist studies dealing with these issues should thus be strictly implemented; • Safety and security measures are critical to avoid any increase in criminal activities within the local study area; and • The use of local labour must be maximised as far as possible.	Ongoing	Environmental Control Officer	Included in Operational Costs
Impact equity (community members)	N/A	4	2	3	3	27	+	L	Implement according to proposed action plan.	8	4	3	3	45	+	M	• Skills training and development should be maximised to benefit as many local employees as possible; and • The use of local labour must be maximised as far as possible.	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Gendered division of labour	N/A	4	3	3	2	20	+	L	Implement according to proposed action plan.	6	4	3	3	39	+	M	• Women must have equal employment opportunities; • Training and skills development should take place for women; • Salaries of women should be equal to that of men when undertaking the same job; • Commitments made in the SLP with regard to the employment of women should be adhered to; and • Institute a well designed gender equality strategy on the mine.	Ongoing	Environmental Control Officer	Included in Operational Costs
Employment opportunities will be created during the operational phase of the mine.	Employment Opportunities and Skills Inequities	8	4	2	4	56	+	M	The recruitment process would thus only commence once the Mining Right has been awarded and will be guided by Sibanye Gold 's recruitment policies which promote the employment of local labour by the mine as well as by any appointed contractors. The employment of locals should be maximised as far as possible.	8	4	3	4	60	+	M	• In order to recruit as much of the employees locally as possible, a skills audit process should be undertaken. The general practice should be that if the mine is not able to appoint a local person with the necessary skills, they would employ an “outsider”. The intent is to identify local individuals who should be trained to take over the specialised skill from that person.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• Training and skills development policy and programmes to enhance the employability of locals should be initiated during the build-up phase to ensure long term employment benefits.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• A recruitment policy should be adopted to enhance employment positive impacts, limit in-migration of outside jobseekers and mitigate the potential impact of residual in-migration.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• The mine should clearly communicate their anticipated employment figures and job categories to the communities.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• To limit opportunities for conflict and ensure equity in the workplace, it is advised that The Mine follow a transparent process and develop a local employment procedure and recruitment process in consultation with the local municipality and community representatives.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• The safety of women employees should be guaranteed. Proactive safety measures should be put in place to limit any possible conflict between the male and female employees.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
During the operational phase of the mine, the workforce would require accommodation. These employees should be assisted by the mine to achieve home ownership through housing subsidies within the nearest existing residential areas or community systems. This could place some additional pressure on the existing housing infrastructure in the area.	Accommodation of Permanent Workforce	6	3	3	4	48	-	M	As employees would also be recruited locally (whether appointed as contractors or as permanent personnel) it is anticipated that these employees would already own houses within the nearest communities. Those recruited from within the region, however, would require some form of housing subsidy or be compensated for transport costs.	6	3	2	4	44	-	M	• Employees should be educated with regards to their accommodation options.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• Housing needs should be monitored and addressed in consultation and cooperation with the local municipality.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• Maximise the employment of locals to limit the need for any additional housing infrastructure, as far as possible.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• Maximise the employment of locals to limit the possibility of informal settlements developing in or near the mine; or in or	Prior to operation	Environmental Control Officer/Project	Included in Social and

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	near existing settlements in the Virginia area.		Manager/HR Manager	Labour Plan costs
																	• Employees from within the region could receive some housing subsidy or be compensated for transport costs. Salary packages should thus address this issue.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
Impact equity refers to fairness of the distribution of the impacts (positive and negative) across the community. Ideally it must be ensured that the people who will benefit from the development must also share in carrying the costs. The project will lead to gain on a regional level, whereas the local people who will be impacted on such as the local farming community will not necessarily benefit in terms of financial benefits and employment opportunities.	Impact equity	6	4	3	4	52	-	M	Should the proposed skills training and development through the Learnership Programmes be undertaken in a comprehensive manner, then some local employees could benefit from this development.	6	4	2	3	36	-	M	• Negative impacts on the local property owners should be limited as far as possible such as intrusion impacts (dust, noise, and air pollution). Mitigation measures from the specialist studies dealing with these issues should thus be strictly implemented.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• Safety and security measures are critical to avoid any increase in criminal activities within the local study area.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• Skills training and development should be maximised to benefit as many local employees as possible.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
To ensure local economic development, the amine should assist the local communities to become involved in the local procurement process by identifying business opportunities and linking SMMEs to these.	Local Economic Contribution and Procurement	6	4	2	4	48	+	M	The mine must formulate a Procurement Policy to provide Historically Disadvantaged South Africans (HDSAs) and surrounding communities with a preferred supplier status in all three levels of procurement, namely capital goods, consumables and services. The company is also committed to assist potential HDSA suppliers and SMMEs, through mentoring, to become part of the mine's supply chain.	6	4	3	4	52	+	M	• The mine should adopt a Procurement Plan whereby they aim to provide HDSAs and SMME's with the opportunity to become involved in the procurement of capital goods, consumables and services. This Plan should be implemented in conjunction with the local municipality and their LED targets. These programmes could focus on providing support and technical advice to entrepreneurs and/or SMMEs to enable them to supply goods and materials for operations at the future mine.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
Although education and training is mainly the responsibility of government, there is increased pressure on the business sector in South Africa to increase the development and skills of their workforce.	Capacity Building and Skills Training	6	4	2	3	36	+	M	In accordance with the Human Resources Development Strategy for South Africa (2010-2030), a Workplace Skills Plan (WSP) will be submitted to the DMPR within three months upon mine production.	6	4	3	4	52	+	M	• The WSP will contain the number of employees, levels of skills and types of skills development programmes that are developed specifically for the proposed mine and can only be compiled after the workforce for the mine has been sourced.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
									The Mine should ensure that employees have the opportunities to improve their existing qualifications.								• The mine should ensure that the quality of life of the employees and their families are improved through the provision of capacity building and skills training programmes.	Prior to operation	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
									The implementation of the Career Development and Progression Plan; the Skills Development Plan; the Mentorship and Coaching Plan; the Internship / Bursary Plan; and Employment Equity Plan should be monitored on an annual basis to ensure that it is comprehensively attended to and implemented as stipulated as part of the updated Social and Labour Plan.								• Appoint a specialist to conduct annual audits on the Social and Labour Plan.	Annually	Environmental Control Officer/Project Manager/HR Manager	R 87 500.00
																	• The above learnership programmes should be implemented in such a manner that it would ensure statutory compliance, recognition of prior learning and certification according to the South African Qualifications Authority process and requirements.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• Portable skills training should be identified in consultation with the affected employees. The provision of portable skills is critical to prepare employees for possible retrenchments and/or decommissioning.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
																	• ·n-house training through learnerships to fill the hard-to-fill vacancies would be crucial for long term capacity building and skills development within the local communities.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• Ensure compliance to Mining Charter and MPRDA through annual audits.	Annually	Environmental Control Officer/Project Manager/HR Manager	R 68 000.00
																	• Ensure that HDSA and women are considered and determine the required staff component in this regard.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
The mine will result in social development and social services support through their investments and interventions within the communities through skills training and capacity building, community development projects, infrastructure support as well as local economic development.	Social Development and Social Services Support	6	4	2	3	36	+	M	The mine intends to adhere to corporate responsibility principles, which include fulfilling responsibilities to the communities surrounding the mine and from their labour sending areas. This will be done through the local economic development (LED) programmes, which are a requirement of a SLP for the approval of the DMPR. Inputs from the local Department of Health, Department of Agriculture, Department of Education and the district municipality should be obtained to propose and agree on sustainable development projects for implementation by the mine.	6	4	3	4	52	+	M	• All projects should be designed in line with the local municipality's IDP priorities, and the projects should be proposed on this basis. Projects are thus envisaged to be initiated and sustained by local community members and in this way, the community could build its own skills base and have ownership of projects from the outset.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• Implement a regular and formalised consultation process with local government to ensure synergy between the mine's social development and LED focus, and that of the local municipality.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
Due to the mining industry's general history and negative track-record, the mine is also regarded in this negative light. The mine is therefore perceived as an outside agency that contributes minimally towards benefits for the local community (i.e. farmers). The mine is seen to make decisions that would negatively impact on the neighbouring landowners quality of life which may result in the formation of interest groups against the project due to uncertainty, annoyance and failure to deliver promised benefits to the local community.	Conflict between locals and the mine	8	4	3	4	60	-	M	The mine should embark on a transparent communication process with the surrounding property owners.	6	4	2	3	36	-	M	• The establishment of a community forum consisting of representatives of the project proponent, contractors, local leaders such as councillors, the Environmental Control Officer and the property owners could be established. One of the aims of such a forum would be to provide an opportunity and forum for open discussions regarding possible hostile relationships.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
If a large number of outsiders with different values, beliefs and practices migrate to the area during the operational phase and settle within the communities, it could result in the disruption of the existing social networks. Overall, this impact would result in challenges with regards to the provision of infrastructure and services	Impact on social networks	8	4	3	3	45	+	M	Embark on regular communication efforts with the community with regards to the mine's involvement in the communities. This could be done through an established forum.	6	4	3	3	39	-	M	• The establishment of a community forum consisting of representatives of the project proponent, contractors, local leaders such as councillors, the Environmental Control Officer and the property owners could be established. One of the aims of such a forum would be to provide an opportunity and forum for open discussions regarding possible hostile relationships.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
and increased expectations in this regard.																				
Construction of the proposed gold mine could impact on property values of surrounding properties.	Change in property values	10	5	2	5	85	-	H	Mitigation measures as proposed by all the specialist studies should be strictly implemented especially those related to impacts that could affect property prices negatively, such as noise, air quality, security and traffic related impacts.	6	4	2	4	48	-	M	• The mine will implement all mitigation measures as required in the specialist studies.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
The possible impact on the water quality and quantity are of concern to the neighbouring land owners. The livelihood of the farmers and land owners in the area depends on their water quality and quantity.	Water impacts	8	5	3	4	64	-	H	Water remains a scarce commodity and any decrease in the water tables would result in severe negative impacts on the neighbours activities with subsequent economic losses. The issue of water and the possible impact on the water sources would remain a critical issue and needs to be addressed to avoid social mobilisation against the proposed project.	6	4	2	3	36	-	M	• Surface water quality sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMPr.	Monthly	Environmental Control Officer/Project Manager	R 91 000.00
																	• Quarterly surface water monitoring reports will be generated by the mine or through a qualified water quality specialist.	Quarterly	Environmental Control Officer/Water Quality Specialist	R 42 000.00
																	• In the event that water quality issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Control Officer/Water Quality Specialist	To be determined - depending on severity of incident
The proposed project will have positive impacts on the local municipality as it would ensure continued job creation for the life of mine, continued ore production with resulting regional and local economic benefits and by creating other economic spin-offs benefiting the entire region.	Impact on the local municipality	6	4	2	4	48	+	M	The municipality's input would be required to identify and implement feasible community and social development projects and ensure compliance to the regulations and EMPr. The presence of the proposed mine and implementation of social development support would require inputs in terms of the planning processes of the local municipality.	8	4	2	4	56	+	M	• Institute a joint municipal coordinating and implementing committee to support the municipality's local economic and social develop needs and requirements, where feasible.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
Occupational health and safety risks associated with mining operations are always a source of concern. Existing health services such as the clinics in nearby towns would come under additional pressure with the growth in the workforce in the area as well as due to the possible increase in the prevalence of HIV/Aids among the local population. The prevalence of HIV/Aids among the mine employees would be a threat to a stable mining environment necessary to sustain operations. If a significant number of mineworkers are affected and are classified as physically unfit, it could lead to lower productivity, increased health related expenses (e.g. health insurance, sick leave, funeral benefits) and higher training costs to replace workers.	Health Risks	8	4	2	3	42	-	M	The general health of employees should be monitoring on an ongoing basis.	6	3	2	3	33	-	M	• HIV / Aids awareness campaigns should be focused on the mine employees.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• Local labour should be employed as far as possible to avoid additional pressure of outsiders on the existing services.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• Environmental pollution must be limited and the mine should be managed and operated according to International Best Practice.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• The mine could assist in implementing a community health awareness plan.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs
																	• The mine could, through LED programmes and infrastructure development assist in improving the overall health services within the communities.	Ongoing	Environmental Control Officer/Project Manager/HR Manager	Included in Social and Labour Plan costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Property owners relate the development of mines in the area to the increase in criminal activities within the area due to the increase in outsiders to the current setting. It is thus the viewpoint that the development of the new proposed mine would increase the crime levels within the surrounding area thereby severely affected the quality of life of the property owners.	Safety and Security Risks	8	3	2	4	52	-	M	Strict security measures should be put in place. Security personnel should be on site on a permanent basis.	6	3	2	3	33	-	M	• As far as possible, the movement of workers should be confined to the work site to avoid any increased safety and security risks.	During Operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• Before operations commences, representatives from the local municipality and community-based organisations, as well as neighbouring residents should be informed of the details of the size of the workforce and operational schedules.	During Operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• Mining employees should be easily identified as part of the mining team by e.g. wearing specific clothing and/or identity tags.	During Operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• Ensure adequate housing facilities for outside workers and transportation to and from the mine site.	During Operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• Criminal incidents should be communicated to the workforce and mine employees to ensure a general awareness of the safety situation in the area.	During Operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
																	• Operational safety risks should be addressed as part of the Occupational Health and Safety Act (1993).	During Operation	Environmental Control Officer/Project Manager/HR Manager	Included in Operational Costs
Issues related to HERITAGE																				
Evidence of 2 sites of archaeological/cultural importance occur within the greater project area. Potential impacts on these must be minimised.	Graves/ grave yards	8	4	2	4	56	-	M	Should it be directly impacted on by the mine the graves may be exhumed and the human remains reburied. Before this may happen the necessary advertising, possible social consultation and permitting applications should be implemented. Should the graves however not be impacted on directly, there will definitely be a secondary impact. The graves should then be fenced in a management plan for the preservation and maintenance thereof be written.	4	3	1	3	24	-	L	• It is possible that more cultural sites may be present. Also, the subterranean presence of archaeological and/or historical sites, features or artefacts are always a distinct possibility. Care should also be taken when development work commences that if any more artefacts are uncovered, a qualified archaeologist be called in to investigate.	Ongoing	Environmental Control Officer	N/A
Issues related to WETLANDS																				
Water quality deterioration where contaminated groundwater emerges at surface waterbodies. Typically, salt and metal concentrations will increase and pH will decrease. This may cause a loss of sensitive biota. This impact is likely to be greater after closure than during the operational phase.	Subsidence	10	3	3	4	64	-	H	Do not pump water from underground workings directly into surface water ecosystems, but rather into pollution control facilities. Ensure adequate monitoring. Wetlands should not be undermined, so as to avoid subsidence and pooling of water. At the very least pillar extraction should not take place under any wetlands. Ensure water treatment and pumping facilities are adequately maintained and have adequate capacity.	6	5	3	4	56	-	M	• Implement mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in Operational Costs
River banks and dam walls may be destabilised by blasting - especially those banks that have become exposed by cattle watering or alien invasion.	Blasting	6	2	1	4	36	-	M	Implement alien vegetation control programme and protect banks from vegetation removal. Stabilise and rehabilitate unstable dam/river banks in close proximity to blasting areas.	4	2	1	3	21	-	L	• Implement mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in Operational Costs

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	TOTAL	STATUS	SP		M	D	S	P	TOTAL	STATUS	SP				
Water that is removed from underground mined areas is effectively removed from the landscape, resulting in decreased base flows, longer no-flow periods and reduced summer flows as well as longer seasonal drying in temporary pans. Flow-sensitive biota may be lost. Water quality impacts will also be exacerbated.	Decreased flow in rivers/wetlands	10	5	3	4	72	-	H	Wetlands should ideally not be undermined, so as to avoid subsidence and pooling of water. At the very least pillar extraction should not take place under any wetlands. Ensure water treatment and pumping facilities are adequately maintained and have adequate capacity. Ensure water treatment and pumping facilities are adequately maintained and have adequate capacity. Treated water should ideally be returned to surface ecosystems (if compliant with water quality requirements) in a diffuse way that does not cause erosion or result in sudden changes in flows. Flow rates in rivers should be monitored and should comply with DWS recommendations.	8	5	3	3	48	-	M	• Implement mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in Operational Costs
Undermining of wetlands could result in wetland loss and degradation where surface subsidence occurs. Fractures in the strata underlying the wetlands could result in loss of surface water to groundwater, leading to decreased base flows, desiccation of wetlands and changes in species composition.	Subsidence	8	5	3	3	48	-	M	Wetlands should ideally not be undermined, so as to avoid subsidence and pooling of water that can cause acid mine drainage. At the very least pillar extraction should not take place under any wetlands. Ensure water treatment and pumping facilities are adequately maintained and have adequate capacity. Monitor flows in rivers and valley-bottom wetlands to comply with DWS recommendations.	6	5	3	2	28	-	L	• Implement mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in Operational Costs
Decreased abundance and diversity of aquatic biota due to changes in water quality and flows.	Loss of biodiversity	8	5	3	4	64	-	H	Apply all mitigation above. Water quality monitoring and biomonitoring should be implemented throughout the operational phase and non-compliance with target values should trigger immediate auditable interventions.	6	5	3	3	42	-	M	• Implement mitigation in accordance with the mitigation measures proposed.	Ongoing	Environmental Control Officer	Included in Operational Costs
Issues related to RADIATION																				
Impact on public safety as a result of exposure to radioactivity.	Radioactive elements	10	4	2	5	80	-	H	Develop a Radiation Management Plan. Obtain a Certificate of Registration from the NNR.	6	4	1	4	44	-	M	• Implement the Radiation Management Plan throughout the life of mine and monitor exposure of the public to radioactivity in accordance therewith.	Ongoing	Environmental Control Officer/Health & Safety officer	Included in Construction and Operational Costs

Table 13-4: Impacts and Management Measures for Closure Phase Activities: Removal of Infrastructure for the Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	P				
Issues related to GEOLOGY																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to TOPOGRAPHY																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to GEOHYDROLOGY																				
Contaminant soil could impact on groundwater quality.	Plant, PCD's, workshops, other infrastructure	4	5	1	3	30	-	M	Removal of dirty soil to landfill.	2	5	1	2	16	-	L	• Removal of dirty soil to landfill.	At closure	Mine Environmental Manager	Included in closure costs.
Issues related to HYDROLOGY																				
Erosion control over rehabilitated areas and the prevention of erosion gullies.	Erosion	8	2	2	4	48	-	M	The topography of all disturbed areas must be rehabilitated in such a manner that the surrounding natural area blends naturally with the rehabilitated areas well as to be free-draining. This will reduce soil erosion and improve natural revegetation.	6	2	2	3	30	-	M	• Sibanye Gold will implement the approved rehabilitation plan and monitor progress by maintaining a photographic record.	Monthly	Environmental Control Officer	Included in closure costs.
Contamination of surface water as a result of removal of infrastructure.	Pollution	8	2	2	4	48	-	M	The detailed waste management strategy implemented during the construction and operation phases must be continuously implemented throughout the closure and decommissioning phase.	6	2	1	2	18	-	L	• Sibanye Gold will continue to implement the waste management strategy and monitor the effectiveness thereof to the activities taking place on site.	Ongoing	Environmental Control Officer	Included in closure costs.
Rubble and waste from site could pollute local water resources.	Pollution	4	5	2	3	33	-	M	Waste that is not removed from site should be spread, covered and suitably rehabilitated.	4	5	2	1	11	-	L	• Sibanye Gold will continue to implement the waste management strategy and monitor the effectiveness thereof to the activities taking place on site.	Ongoing	Environmental Control Officer	Included in closure costs.
Issues related to SOIL, LAND USE AND LAND CAPABILITY																				
The utilisation of hydrocarbons and other chemicals during the removal of infrastructure may lead to the contamination of soils.	Hydrocarbon spillage	6	2	2	4	40	-	M	The detailed waste management strategy implemented during the construction and operation phases must be continuously implemented throughout the closure and decommissioning phase.	4	2	1	3	21	-	L	• Sibanye Gold will continue to implement the waste management strategy and monitor the effectiveness thereof to the activities taking place on site.	Ongoing	Environmental Control Officer	Included in closure costs.
The decommissioning activities may lead to increased sediment movement off the site and soil compaction.	Infrastructure removal	6	2	2	4	40	-	M	Decommissioning activities should as far as possible take place in winter.	4	2	1	3	21	-	L	• Draw up a plan clearly defining the area where the removal of infrastructure should take place. Implement the plan with sufficient measures in place not to compact new areas.	Ongoing	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
									Restrict vehicle movement to haul roads.								• Implement a strict penalty fine system for rule breaking with regard to vehicular movement.	Ongoing	Health and Safety Officer/Project Manager/ Environmental Control Officer	N/A
									Clean and dirty water systems should be maintained until closure or when the area is free-draining.								• Maintain clean and dirty water systems and undertake regular monitoring and maintenance thereof.	Ongoing	Health and Safety Officer/Project	Included in closure costs.

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	P				
																			Manager/ Environmental Control Officer	
Issues related to FAUNA AND FLORA																				
Direct impacts on flora species of conservation importance.	Infrastructure removal	8	5	3	2	32	-	M	Limit activities to development footprint; prevent the spread of impacts; prohibit any activity within areas of nearby natural habitat.	8	5	3	1	16	-	L	• Implement awareness training; develop suitable waste/infrastructure removal routes that makes use of existing roads; and prevent access to nearby areas of natural habitat.	Ongoing	Environmental Control Officer/Contractor/Site Manager/Proponent	Included in closure costs.
Direct impacts on fauna species of conservation importance.	Infrastructure removal	8	5	3	2	32	-	M	Limit activities to development footprint; prevent the spread of impacts; prohibit any activity within areas of nearby natural habitat.	8	5	3	1	16	-	L	• Implement awareness training; develop suitable waste/infrastructure removal routes that makes use of existing roads; and prevent access to nearby areas of natural habitat.	Ongoing	Environmental Control Officer/Contractor/Site Manager/Proponent	Included in closure costs.
Loss/disruption of mammal migration routes.	Infrastructure removal	4	4	2	2	20	-	L	Limit activities to development footprint; prevent the spread of impacts; prohibit any activity within areas of nearby natural habitat.	4	4	2	1	10	-	L	• Implement awareness training; develop suitable waste/infrastructure removal routes that makes use of existing roads; and prevent access to nearby areas of natural habitat.	Ongoing	Environmental Control Officer/Contractor/Site Manager/Proponent	Included in closure costs.
Direct impacts on sensitive/pristine habitat types.	Infrastructure removal	4	4	2	2	20	-	L	Limit activities to development footprint; prevent the spread of impacts; prohibit any activity within areas of nearby natural habitat.	4	4	2	1	10	-	L	• Implement awareness training; develop suitable waste/infrastructure removal routes that makes use of existing roads; and prevent access to nearby areas of natural habitat.	Ongoing	Environmental Control Officer/Contractor/Site Manager/Proponent	Included in closure costs.
Direct impacts on common fauna species of the study area.	Infrastructure removal	4	4	2	3	30	-	M	Limit activities to development footprint; prevent the spread of impacts; prohibit any activity within areas of nearby natural habitat.	4	4	2	2	20	-	L	• Implement awareness training; develop suitable waste/infrastructure removal routes that makes use of existing roads; and prevent access to nearby areas of natural habitat.	Ongoing	Environmental Control Officer/Contractor/Site Manager/Proponent	Included in closure costs.
Faunal interaction with structures, servitudes and/or personnel.	Infrastructure removal	4	4	2	3	30	-	M	Limit activities to development footprint; prevent the spread of impacts; prohibit any activity within areas of nearby natural habitat.	4	4	2	2	20	-	L	• Implement awareness training; develop suitable waste/infrastructure removal routes that makes use of existing roads; and prevent access to nearby areas of natural habitat.	Ongoing	Environmental Control Officer/Contractor/Site Manager/Proponent	Included in closure costs.
Impacts on surrounding habitat/species, including ecosystem functioning.	Infrastructure removal	4	4	2	2	20	-	L	Limit activities to development footprint; prevent the spread of impacts; prohibit any activity within areas of nearby natural habitat.	4	4	2	1	10	-	L	• Implement awareness training; develop suitable waste/infrastructure removal routes that makes use of existing roads; and prevent access to nearby areas of natural habitat.	Ongoing	Environmental Control Officer/Contractor/Site Manager/Proponent	Included in closure costs.
Increase in alien vegetation establishment on site.	Infrastructure removal	8	3	2	4	52	-	M	The detailed alien vegetation management plan implemented during the construction phase should be maintained for minimum of three years following decommissioning of the mine.	4	2	1	3	21	-	L	• The alien vegetation management plan must be implemented and the applicability thereof assessed through bi-annual audits by a suitably qualified flora specialist.	Bi-annually	Environmental Control Officer	R 150 000.00
Issues related to AIR QUALITY																				
All activities associated with the removal of infrastructure and rehabilitation has the	Rehabilitation activities	6	3	2	4	44	-	M	The dust monitoring network and dust suppression programme established during the construction phase of the project will be maintained throughout the	6	2	2	3	30	-	M	• Dust sampling will be undertaken on a monthly basis and analysed according to the prescribed monitoring programme contained in the EIA/EMPr.	Monthly	Environmental Control Officer	R 92 000.00

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	P				
potential to release dust.									closure phase of the mine. With respect to haul road dust levels, it is recommended to limit vehicle speeds, especially during high risk periods of high winds, high temperature and low humidity.								• Monthly monitoring reports will be generated by the mine or through a suitably qualified air quality specialist.	Monthly	Environmental Control Officer/Air Quality Specialist	R 42 000.00
																	• In the event that air quality or dust issues are identified based on the monitoring programme, an independent specialist should be appointed to determine the best course of action to ameliorate the situation.	In the event of occurrence	Environmental Control Officer/Air Quality Specialist	To be determined - depending on severity of incident.
																	• Ensure optimal implementation and maintenance of the dust suppression programme.	Ongoing	Environmental Control Officer	Included in closure costs.
																	• The road surface will to be watered on a daily basis.	Daily	Environmental Control Officer	Included in closure costs.
																	• The road surface will to be maintained on a weekly basis.	Weekly	Environmental Control Officer	Included in closure costs.
Fugitive dust emissions as a result of dust entrainment.	Rehabilitation activities	6	5	2	4	52	-	M	Revegetation of dumps on closure.	2	5	2	4	36	-	M	• Allocation of resources to ensure revegetation and cladding of dump at closure.	On closure/annually	Environmental Control Officer	Included in closure costs.
Issues related to NOISE																				
All activities associated with the removal of infrastructure and rehabilitation has the potential to generate noise.	Rehabilitation activities	8	2	2	4	48	-	M	The removal of all infrastructure is to take place during daytime periods only.	6	2	2	3	30	-	M	• Where noise becomes a nuisance, management measures will be investigated and implemented to address these.	Ongoing	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
																	• Machinery with low noise levels and maintained in a good order to be used and to comply with the IFC's Health and Safety Regulations.	Ongoing	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
Issues related to TRAFFIC																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to VISUAL																				
Fugitive dust emissions as a result of infrastructure removal and associated exposed/bare areas may have an impact in terms of air quality and visual characteristics.	Infrastructure removal	8	2	2	4	48	-	M	Effective dust suppression measures, such as regular road wetting and/or the use of dust suppression chemicals, must be implemented.	6	2	2	3	30	+	M	• Establish and implement a dust suppression plan in consultation with the Environmental Control Officer and an air quality specialist as part of the contractor's responsibility.	Ongoing	Environmental Control Officer	Included in closure costs.
The rehabilitation (ripping, topsoil replacement and landscaping) will remove the visual incongruity.	Infrastructure removal	6	5	2	4	52	+	M	An overall visual improvement will be noticed once all mining related infrastructure has been demolished and the area has been landscaped and re-vegetated.	8	5	2	4	60	+	M	• Demarcate the decommissioning area and limit the decommissioning activities as far as possible.	Prior to Decommissioning Phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
																	• Final shaping will be implemented such that the final profile of the	During Closure Phase	Environmental Control	Included in closure costs.

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	P				
																	rehabilitated areas are formed to emulate natural contours of the area.		Officer/Project Manager	
																	• Foundations will be removed to a depth of 1 m below the surface and the area rehabilitated.	During Closure Phase	Environmental Control Officer/Project Manager	Included in closure costs.
																	• All material recovered from the demolition of buildings and/or structures will either be transported to a permitted disposal site or made available to the local community as building materials (provided they are in a satisfactory condition following demolition).	During Closure Phase	Environmental Control Officer/Project Manager	Included in closure costs.
																	• Linear infrastructure constructed by the mine (i.e. roads, conveyors and power lines) will be removed if it proves to inhibit land use at decommissioning.	During Closure Phase	Environmental Control Officer/Project Manager	Included in closure costs.
																	• All fences erected around the mine will be dismantled and disposed of at a permitted disposal site.	During Closure Phase	Health and Safety Officer/Project Manager/ Environmental Control Officer	Included in closure costs.
Issues related to SOCIAL																				
Disruption and nuisance factors associated with the actual decommissioning such as noise, visual and traffic related impacts.	Nuisance	8	3	2	4	52	-	M	Local residents, with the focus on the surrounding landowners, should receive accurate information with regards to the project status, timeframes for decommissioning and other relevant information about issues that could influence their daily living and movement patterns.	6	2	2	3	30	-	M	• The community forum established during the construction phase and implemented throughout the operational phase of the DBM Mine should continue, through which issues can be addressed, and a representative from DBM should become involved.	Ongoing	Environmental Control Officer	N/A
Issues related to HERITAGE																				
No significant closure and decommissioning impacts are envisaged.	N/A	0	0	0	0	0	N	N	N/A	0	0	0	0	0	N	N	N/A	N/A	N/A	N/A
Issues related to WETLANDS																				
Removal of surface infrastructure following mine closure will largely result in similar impacts to the initial establishment of infrastructure, as soils are disturbed and exposed to erosion.	Increased sediment movement	6	5	1	3	36	-	L	Earthworks and vegetation clearing activities should also be phased to minimise the extent of disturbed areas at any one time. Earthworks and vegetation clearing activities on site should ideally be undertaken during the dry season to minimise sediment transport during surface runoff following rainfall events.	4	5	1	1	10	-	L	• Develop a wetland management and rehabilitation plan, and implement throughout the construction, operation and closure phases of the mine.	Ongoing	Environmental Control Officer	N/A
																	• Markers and pegs will be erected and maintained along the boundaries of the working areas, access roads, haul roads and paths before commencing any work. If proved insufficient for control, these shall be replaced by fencing.	During closure and decommissioning phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in closure costs.
																	• The contractor will ensure that all activities, material and equipment storage and personnel movement take place within the designated area.	During closure and decommissioning phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in closure costs.

Potential Environmental Impact	Activity	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation							Action Plan	Frequency	Responsible Person	Annual Management Cost
		M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	P				
																	• Contractors will complete induction on the EMP, Environmental Awareness Plan and Emergency Response Plan prior to construction activities being undertaken. All workers will be made aware of the penalty systems for non-compliance.	During closure and decommissioning phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in closure costs.
									Temporary toe berms should be installed on the down slope side of large bare soils areas and any soil stockpiles to trap sediments eroded odd these areas.								• The site should be monitored for erosion and sediment movement during and after rainfall events and suitable interventions put in place to repair any erosion damage and to prevent further sediment movement off the site.	During closure and decommissioning phase	Environmental Control Officer/ Project Manager/Health & Safety Officer	Included in closure costs.
Clearing of vegetation and soil disturbance could lead to mobilisation of sediments and dust which may be blown or washed into receiving water bodies (wetlands and pans) within the vicinity. This would lead to increased turbidity (decreased water quality) which may have a negative impact on aquatic fauna. When the suspended solids (soil particles) settle out on the substrates in the wetlands, it leads to further deterioration in habitat quality. Sediments are colonised by Typha reeds or alien weeds, causing a decline in habitats during the wet season. This may result in a decline in overall aquatic biodiversity.	Decline in habitats and biota	6	4	2	4	48	-	M	A biomonitoring plan should be compiled and implemented and should include assessments of water quality, habitats and aquatic macroinvertebrates. Sampling sites further down in the During River catchment should be included to assess impacts on downstream ecosystems.	6	4	1	2	22	-	L	• Develop a biomonitoring plan, and implement throughout the construction, operation and closure phases of the mine.	Ongoing	Environmental Control Officer	Included in closure costs.
Issues related to RADIATION																				
Impact on public safety as a result of exposure to radioactivity.	Radioactive elements	10	4	2	5	80	-	H	Develop a Radiation Management Plan.	6	4	1	4	44	-	M	• Implement the Radiation Management Plan throughout the life of mine and monitor exposure of the public to radioactivity in accordance therewith.	Ongoing	Environmental Control Officer/Health & Safety officer	Included in Construction and Operational Costs.

13.8 Assessment of Each Identified Potentially Significant Impact and Risk for the Beatrix 1, 2 and 3 Shafts

13.8.1 Topography

13.8.1.1 Operational Phase

During the operational phase, mining infrastructure such as WRDs, TSFs, evaporation dams, and associated surface infrastructure will cause localised alterations to the natural topography. While the broader undulating plains of the Free State Highveld will remain largely unchanged, permanent landform modifications are expected at engineered waste disposal facilities. These changes may contribute to visual intrusion, erosion risk, and long term alterations of surface drainage patterns.

With the implementation of mitigation measures, including the development of a Stormwater Management Plan, routine inspection and maintenance of trenches, berms, and drains, and progressive shaping and rehabilitation of disturbed land, the significance of the impact is reduced from high to medium. These interventions will minimise erosion, support visual integration into the surrounding landscape, and reduce long term landform instability.

13.8.1.2 Decommissioning Phase

During the decommissioning phase, the cessation of active operations will eliminate the creation of new surface disturbances. However, existing TSFs, WRDs, and evaporation dams will remain as permanent modifications to the topography. Rehabilitation activities, including recontouring of disturbed areas, stabilisation of slopes, and revegetation with indigenous species, will be critical in reducing erosion potential and promoting long term visual and ecological integration with the surrounding environment.

Residual impacts on topography will persist due to the irreversible presence of large, engineered structures. Nonetheless, through effective rehabilitation and closure planning, these impacts are expected to stabilise and remain within acceptable environmental limits. The significance of decommissioning impacts is rated as medium, reflecting their long term but manageable nature.

13.8.2 Soils

13.8.2.1 Operational Phase

During the operational phase, soils are directly impacted by the construction and operation of slimes dams, WRDs, evaporation dams, and disposal sites. Localised sterilisation occurs within mine infrastructure footprints, while seepage from evaporation dams poses risks of long term soil salinisation. Sandy upland soils are highly erodible when disturbed, and valley-bottom alluvial soils are vulnerable to gulley erosion. Without mitigation, impacts are of medium significance. Mitigation during operations includes stripping and stockpiling topsoil, progressive rehabilitation using stored soils, and ongoing monitoring of soil salinity and erosion.

During operations, soils are exposed to potential contamination from hydrocarbon leaks (e.g., fuel storage, haul trucks, workshops), chemical storage and handling, and general/domestic waste disposal. If unmanaged, these sources can lead to hydrocarbon residues, heavy metal accumulation,

or leachate, resulting in soil contamination, reduced fertility, and risks to groundwater. Such impacts are medium to high significance depending on the scale of spillage. Mitigation includes bunding and lining of chemical/hydrocarbon storage areas, strict waste segregation, use of drip trays and spill kits, designated hazardous waste facilities, and continuous soil quality monitoring. With mitigation, residual impacts are reduced to low to medium significance.

13.8.2.2 Decommissioning Phase

In the decommissioning phase, residual risks remain around TSFs, WRDs, and evaporation dams. Poorly drained sodic soils and contaminated footprints may perpetuate salinity and erosion risks if unmanaged. Closure objectives require creating a safe, stable, and non-polluting post-mining landscape. Accordingly, mitigation will focus on re-profiling disturbed areas, applying lime or other ameliorants, reinstating topsoil to a minimum depth of 300–500 mm, and establishing indigenous vegetation to stabilise soils. These measures reduce the impact from medium to low significance and support the partial recovery of soil function, particularly for grazing use.

At closure, residual chemical and hydrocarbon contamination may persist in soils beneath workshops, fuel bays, process plants, and waste handling sites. If unmanaged, these “hotspots” pose a long term risk to rehabilitation success and land capability, with contaminants potentially leaching into soil and groundwater. Closure measures include removal of contaminated soils, disposal at licensed hazardous facilities, bioremediation of hydrocarbon-impacted areas, demolition of contaminated infrastructure to 1 m depth, and capping/amelioration of impacted soils. These measures align with the closure objective of establishing a safe, stable, and non-polluting post-mining environment. With proper implementation, residual impacts can be reduced from medium-high to low–medium significance.

13.8.3 Land Capability

13.8.3.1 Operational Phase

Operational mining sterilises land capability within infrastructure footprints, particularly at TSFs, WRDs, and evaporation dams, while the majority of the surrounding landscape remains suitable for maize production and grazing. Without mitigation, land capability impacts are of high significance. During operations, mitigation includes progressive rehabilitation, erosion and dust control, and reapplication of stored topsoil to maintain potential for post-mining use.

13.8.3.2 Decommissioning Phase

At closure, land capability remains constrained by permanent mine infrastructure. Without intervention, these areas would remain unsuitable for agriculture. Closure measures include recontouring WRDs and TSFs to stable slopes (1:3 for dumps, 1:4 for TSFs), applying a minimum of 500 mm of soil cover, and establishing vegetation. These actions improve stability and restore areas to grazing potential. With mitigation, impacts reduce from high to medium significance, aligned with the closure objective of developing a functional post-mining landscape that supports agricultural practices where feasible.

13.8.4 Land Use

13.8.4.1 Operational Phase

Mining operations permanently transform land use within the project footprint, sterilising agricultural land for crop and livestock production. TSFs, WRDs, and solid waste disposal areas represent a permanent loss of land for agricultural purposes, while evaporation dams may partially recover over time to support grazing. Without mitigation, land use impacts are of high significance. Engagement with the Department of Agriculture and rehabilitation of disturbed areas can reduce residual impacts to medium significance.

13.8.4.2 Decommissioning Phase

During decommissioning, sterilised land uses will persist, but closure planning allows for partial reintegration of land into agriculture and grazing. Rehabilitated footprints, reshaped slopes, and vegetated areas may provide limited grazing capacity, while ecological corridors and riparian zones offer biodiversity opportunities. Long term stakeholder consultation ensures that post-mining land use aligns with community and regional planning objectives. With mitigation, impacts reduce from high to medium significance, ensuring that some beneficial use of the land is retained post closure.

13.8.5 Groundwater

13.8.5.1 Operational Phase

Operational underground mining at Beatrix Shafts 1 to 3 requires ongoing management of fissure and ingress water, resulting in localised groundwater drawdown within the shallow Karoo aquifer and deeper fractured secondary aquifers. Numerical groundwater modelling indicates that drawdown effects are largely confined to the immediate mining footprint and attenuate with distance from the shafts. Regional groundwater flow directions and recharge patterns remain largely unchanged. The impact on groundwater quantity is therefore assessed as moderate in magnitude, localised in extent, and reversible over the long term following mine closure.

Potential groundwater quality impacts during operations are associated with seepage from mining related infrastructure, including tailings storage facilities, return water dams, evaporation dams, and rock dumps. Monitoring data and transport modelling indicate localised increases in salinity and selected metals in groundwater downgradient of Beatrix. While groundwater quality deterioration has occurred in certain areas, impacts remain spatially limited and are actively managed through seepage collection systems and return water management. The significance of the impact is assessed as high at a local scale, medium-term in duration, and partially reversible with continued mitigation and monitoring.

Surface water impacts during the operational phase are indirect and linked to groundwater–surface water interaction within non-perennial drainage features in the Sand River catchment. Given the ephemeral nature of these drainage lines and the limited baseflow contribution from groundwater, potential impacts on surface water quality are considered low to moderate, localised, and episodic, dependent on rainfall events and seepage management effectiveness.

13.8.5.2 Decommissioning Phase

Upon decommissioning and cessation of underground dewatering, groundwater levels within the Beatrix Shafts 1 to 3 area are expected to rebound progressively toward equilibrium conditions. Post closure modelling indicates that groundwater recovery will occur over an extended period, with limited potential for uncontrolled surface decant provided that closure water management measures are implemented. The impact on groundwater levels during decommissioning is assessed as moderate in magnitude, long term in duration, and manageable through appropriate closure planning.

During groundwater rebound, residual contaminants from historical mining activities may continue to influence groundwater quality. Modelling suggests that contaminant plumes may persist post closure but are expected to stabilise and attenuate over time through dilution, dispersion, and geochemical processes. With long term monitoring and maintenance of pollution control infrastructure, the groundwater quality impact is assessed as moderate, long term, and partially reversible.

Post-decommissioning surface water impacts are expected to remain limited and episodic, linked primarily to potential groundwater discharge during periods of elevated groundwater levels and high rainfall. With appropriate closure controls and monitoring, impacts on surface water resources are assessed as low to moderate and controllable over the long term.

13.8.6 Surface Water

13.8.6.1 Operational Phase

During the operational phase, surface water resources associated with Beatrix 1, 2 and 3 Shafts and their related surface infrastructure are influenced primarily by altered hydrological processes, sediment mobilisation, and controlled discharges within an already modified catchment. The ongoing presence of shaft complexes, access roads, railway lines, stormwater diversion structures, culverts, and bridges modifies natural drainage patterns and disrupts surface flow continuity within the Theronspruit catchment. These structures locally impede flow, resulting in upstream ponding during rainfall events and increased flow velocities downstream, which contribute to channel instability and erosion. Evidence of heavily eroded banks and disturbed drainage features downstream of mining infrastructure has been recorded along the Theronspruit and its tributaries, indicating sustained pressure on surface water systems during operations.

Operational activities also contribute to increased sediment loads entering surface watercourses. Disturbed and compacted surfaces associated with shaft precincts, internal roads, and historical mining footprints generate sediment-laden runoff during storm events, leading to infilling of wetlands and reduced hydraulic capacity of drainage lines. These sediment-related impacts adversely affect aquatic habitat quality and wetland functionality, particularly in non-perennial systems that are sensitive to changes in sediment dynamics. The cumulative effect of mining activities, together with extensive agriculture in the catchment, exacerbates erosion and

sedimentation pressures on the surface water environment.

Surface water quality during the operational phase is influenced by both point and diffuse sources. Treated effluent from the WWTW is discharged into the Theronspruit in accordance with authorised standards; however, this discharge represents a continuous anthropogenic input that contributes to cumulative water quality changes, especially during low-flow conditions. In addition, diffuse runoff from paved and compacted areas, workshops, and transport routes may contain hydrocarbons and other contaminants, which pose a risk of localised water quality deterioration if not effectively managed. Specialist assessments have identified evidence of discharge and reduced water quality along sections of the Theronspruit and downstream receiving systems.

13.8.6.2 Decommissioning Phase

During the decommissioning phase, impacts to surface watercourses associated with Beatrix 1, 2 and 3 Shafts are expected to be largely temporary and related to land disturbance during demolition and rehabilitation activities. The removal or abandonment of surface infrastructure, reshaping of landforms, and ripping of compacted areas may temporarily alter runoff patterns and increase surface erosion. Exposed soils are vulnerable to mobilisation during rainfall events, which may result in short-term increases in sediment delivery to drainage lines such as the Theronspruit and its tributaries. If stormwater controls are not adequately maintained during decommissioning, sediment-laden runoff could lead to localised channel instability, reduced conveyance capacity, and increased turbidity downstream. In addition, the progressive reduction or cessation of underground dewatering may alter site water balances, and failure of residual containment or diversion systems could result in contaminated runoff entering surface watercourses. Continued maintenance of stormwater and affected water management infrastructure during closure is essential to prevent uncontrolled discharges and secondary pollution of surface water resources.

13.8.7 Wetlands

13.8.7.1 Operational Phase

Wetland systems associated with Beatrix 1, 2 and 3 Shafts, including channelled valley-bottom wetlands and depression (pan) wetlands, have experienced operational impacts linked to altered hydrology, sediment accumulation, and water quality degradation. Some pans have historically been incorporated into mine dirty water and evaporation systems, resulting in permanent changes from ephemeral to artificial permanent systems, poor water quality, and reduced ecological functioning. Channelled valley-bottom wetlands exhibit signs of erosion, sediment infilling, and invasion by alien plant species, reflecting both mining related influences and broader catchment-level land use pressures. Overall, surface water impacts during the operational phase are assessed as moderate to locally high in the absence of mitigation, but are reduced to low to moderate significance where stormwater controls, effluent management, and monitoring measures are effectively implemented.

13.8.7.2 Decommissioning Phase

Impacts to wetland systems during the decommissioning phase will vary depending on the degree of

prior modification. Channelled valley-bottom wetlands associated with the Theronspruit may experience short-term increases in sediment deposition, turbidity, and localised disturbance during decommissioning earthworks if erosion control measures are inadequate. These impacts are expected to be temporary, and where rehabilitation and runoff stabilisation are effectively implemented, decommissioning may allow for gradual recovery of wetland hydrological functioning and ecological processes.

In contrast, depression (pan) wetlands that were historically used as dirty water or evaporation facilities have undergone permanent hydrological alteration and are characterised by poor water quality and reduced ecological functioning. These systems are unlikely to recover to their natural state following decommissioning, and residual impacts are expected to persist post closure. Overall, wetland-related impacts during decommissioning are assessed as high without mitigation, reducing to low with effective erosion control, rehabilitation, and monitoring, except for permanently modified pan wetlands where impacts remain largely irreversible.

13.8.8 Flora

13.8.8.1 Operational Phase

The Beatrix area falls within the Grassland Biome, dominated by the Endangered Gh10 Vaal-Vet Sandy Grassland, with additional azonal types such as Highveld Alluvial Vegetation, Clay Grassland, and Salt Pans. Operational mining activities, including shaft infrastructure, TSFs, evaporation dams, and WRDs, have already fragmented and transformed large portions of this environment. Remaining climax grasslands and riparian zones continue to function as biodiversity refuges but are under pressure from habitat loss, overgrazing, altered hydrology, and the spread of invasive alien plants such as *Tamarix ramosissima* (Salt Cedar) and *Opuntia ficus-indica* (Prickly Pear).

The persistence of Conservation Important (CI) species including *Boophone disticha* (Bushman's Poison Bulb), *Crinum bulbispermum* (Orange River Lily), *Eucomis autumnalis* (Pineapple Lily), *Hypoxis hemerocallidea* (African Potato), and *Brunsvigia* spp. (Candelabra Flower), indicates the ecological and cultural value of the landscape. However, these slow-growing taxa are highly vulnerable to soil disturbance, unsustainable harvesting, and habitat degradation. Continued operations pose risks of further habitat fragmentation, veld quality reduction through overgrazing, and irreversible biodiversity loss if not carefully managed.

13.8.8.2 Decommissioning Phase

During closure and decommissioning, the removal of infrastructure and rehabilitation of disturbed land presents opportunities to restore floral integrity, but also carries risks of soil erosion, poor revegetation success, and further spread of invasive alien species if rehabilitation is not adequately implemented. Residual contamination from mine-affected soils and hydrological alterations may continue to constrain the regeneration of grassland and wetland flora.

Closure objectives such as re-establishing a stable, non-polluting post-mining landscape—require focused rehabilitation of grasslands, riparian corridors, and pan systems using indigenous vegetation.

Active propagation and reintroduction of CI species, combined with alien invasive clearing and long term monitoring, will be essential to restore ecological function and conserve biodiversity. By integrating these measures into closure planning, Sibanye Gold can contribute to regional conservation goals while ensuring that culturally significant plant species remain available to surrounding communities.

13.8.9 Fauna

13.8.9.1 Operational Phase

Mining operations and associated infrastructure at Beatrix will continue to place pressure on faunal communities through habitat loss, disturbance, and fragmentation. Grassland transformation and wetland modification reduce the availability of intact habitat for ground-nesting birds, amphibians, and small mammals. Threatened species such as the African Marsh-harrier (*Circus ranivorus*), Secretarybird (*Sagittarius serpentarius*), African Grass-owl (*Tyto capensis*), Black-footed Cat (*Felis nigripes*), and Giant Bullfrog (*Pyxicephalus adspersus*) are particularly vulnerable. Noise, artificial lighting, vehicle traffic, and increased human activity may displace sensitive species, while water quality impacts from effluent discharges and dust deposition can alter wetland and pan habitats critical for amphibians and waterbirds. Invertebrates such as butterflies and dragonflies, which serve as ecological indicators, may show reduced diversity under continued disturbance. Although smaller generalist species like the Cape Ground Squirrel (*Xerus inauris*) and Yellow Mongoose (*Cynictis penicillata*) persist, overall ecological function and biodiversity resilience will decline without active management interventions.

13.8.9.2 Decommissioning Phase

Decommissioning activities such as demolition of infrastructure, rehabilitation of tailings and WRDs, and reshaping of disturbed areas—will result in short-term disturbance to faunal communities but also provide opportunities for ecological recovery. Poorly managed closure could leave contaminated soils, fragmented habitats, and residual artificial structures that continue to threaten faunal species through leaching pollutants and creating ecological traps. Wetlands and pans will remain critical habitats, particularly for amphibians such as the Giant Bullfrog (*Pyxicephalus adspersus*) and for migratory waterbirds. Grassland-dependent raptors and ground-nesting birds like the Secretarybird (*Sagittarius serpentarius*) will remain vulnerable to habitat degradation if rehabilitation is not effective. However, if closure objectives are properly implemented—such as restoring grassland mosaics, re-establishing ecological corridors, controlling alien invasive plants, and monitoring key CI species—faunal diversity and ecological functionality could gradually improve. Over the long term, rehabilitated habitats could again support threatened and indicator species, contributing to biodiversity stewardship in the Free State Grassland Biome

13.8.10 Air Quality

13.8.10.1 Operational Phase

During the operational phase, Beatrix contributes to air quality impacts through dust emissions,

smelting and processing emissions, and potential fugitive releases from TSFs and WRDs. Key pollutants include particulate matter (PM_{10} and $PM_{2.5}$), sulphur dioxide (SO_2), oxides of nitrogen (NO_x), volatile organic compounds, and trace heavy metals. Dustfall from TSFs and waste facilities, exacerbated during dry and windy conditions, poses risks to surrounding communities, agricultural land, and natural vegetation.

Although emissions are monitored and generally within national standards, exceedances demonstrate ongoing risks if management lapses occur. Alpha quartz (respirable crystalline silica) in dust also presents occupational and community health risks due to its carcinogenic properties. Without stringent controls, cumulative emissions may degrade air quality, increase respiratory health impacts, and affect sensitive receptors (e.g. communities, wetlands, and biodiversity corridors) downwind of the shaft complex.

13.8.10.2 Decommissioning Phase

During decommissioning, air quality impacts shift from continuous operational emissions to demolition-related dust, contaminated soil disturbance, and residual emissions from dismantling processing facilities and storage tanks. The removal of infrastructure, demolition of concrete and steel structures, and rehabilitation of TSFs and WRDs may release significant dust loads containing silica, sulphates, and trace metals.

Hydrocarbon residues and volatile compounds from decommissioned storage areas, workshops, and refuelling facilities could volatilise or be dispersed during demolition if not properly contained. Inadequate dust suppression during earthmoving and profiling of dumps and TSFs may increase fugitive dust generation, affecting workers and surrounding communities. If rehabilitation measures such as dust suppression, capping, and vegetation establishment are not effectively implemented, long term dust generation and particulate dispersion from rehabilitated landforms may persist.

Proactive mitigation—including dust suppression during demolition, removal of contaminated infrastructure, capping of TSFs and WRDs, and post closure air quality monitoring—is essential to ensure air quality risks are reduced to low significance post closure.

13.8.11 Noise

13.8.11.1 Operational Phase

Noise generated during the operational phase of Beatrix primarily originates from ventilation fans, conveyor systems, machinery, mobile equipment, and vehicle movements. Monitoring conducted in 2023 confirmed that both daytime and night-time levels remained within the permissible thresholds prescribed by SANS 10103:2008 for rural, urban, and industrial districts. Rural monitoring sites demonstrated low background levels of 30–35 dB(A), whereas residential and plant-adjacent areas recorded higher averages, reaching up to 60.97 dB(A) near the Gold Plant and Environmental Offices. Although legally compliant, noise from operational sources has the potential to cause nuisance to nearby communities and ecological disturbance to sensitive fauna such as grassland birds and owls. Prolonged or cumulative exposure may also impact worker wellbeing, necessitating ongoing

monitoring and engineering interventions. Proactive mitigation such as installation of barriers, equipment upgrades, and noise awareness programmes will be required to ensure compliance, minimise disturbance, and maintain stakeholder confidence.

13.8.11.2 Decommissioning Phase

During decommissioning, noise impacts are anticipated to arise from the demolition of infrastructure, dismantling of processing facilities, use of heavy machinery, and increased vehicle activity. These activities are expected to generate short-term but elevated noise levels compared to routine operations. While impacts will be temporary and localised, there is potential for disturbance to nearby residential receptors and for disruption of fauna, particularly nocturnal and wetland-dependent species. With appropriate mitigation, including limiting noisy activities to daytime hours, applying sound-damping measures, maintaining equipment, and providing personal protective equipment (PPE) to workers, noise impacts can be reduced to acceptable levels. Post-decommissioning, the cessation of mining and processing activities will result in a long term reduction of noise across the Beatrix area, restoring the acoustic environment closer to its natural rural baseline.

13.8.12 Heritage

13.8.12.1 Operational Phase

During the operational phase of Beatrix, potential impacts on heritage resources are primarily linked to ground disturbance, infrastructure expansion, and indirect effects such as vibration, dust deposition, and restricted access to heritage sites. Identified heritage resources in proximity to the shaft include historical structures (e.g., irrigation canal, reservoirs, farmsteads), Stone Age sites with surface scatters of lithics, and several cemeteries and burial grounds of high cultural significance. These resources are protected under the NHRA and related legislation.

The main risks include disturbance or accidental destruction of heritage sites through construction or operational activities, contamination of surrounding environments affecting site integrity, and lack of awareness among workers leading to inadvertent damage. Graves and burial grounds are particularly sensitive, as they hold high emotional, religious, and historical importance, while archaeological scatters, although often of lower significance, collectively contribute to regional heritage knowledge.

If unmitigated, the operational phase may result in irreversible loss of heritage resources and contravention of heritage legislation. However, with mitigation measures such as maintaining buffer zones, ongoing monitoring, implementation of chance finds procedures, and staff awareness training, impacts can be reduced to low significance.

13.8.12.2 Decommissioning Phase

During the decommissioning phase, heritage impacts are likely to arise from demolition, site clearing, and rehabilitation activities. Risks include accidental disturbance or destruction of heritage features such as farmstead remains, irrigation infrastructure, or surface scatters of Stone Age

artefacts, as well as exposure of unmarked graves during rehabilitation and earthworks. Vibrations and dust from demolition can further degrade fragile structures, and without appropriate controls, cultural landscapes may lose integrity.

The decommissioning process also provides an opportunity to integrate heritage management into closure, for example by documenting, conserving, or relocating significant artefacts or structures, and by memorialising cemeteries and burial grounds to ensure long term protection. Key mitigation measures include implementing a detailed decommissioning heritage management plan, consultation with heritage authorities, securing permits where required, and engaging affected communities—particularly where graves and burial grounds are concerned. Post closure monitoring and preservation of identified sites will be essential to safeguard the cultural landscape.

If mitigation is properly implemented, decommissioning activities can avoid permanent loss of heritage value and ensure that sites of conservation, historical, or cultural importance are preserved for future generations.

13.8.13 Socio-Economic

13.8.13.1 Operational Phase

During the operational phase, Beatrix will play a central role in sustaining the local economy. The mine will generate direct employment opportunities for skilled, semi-skilled, and unskilled workers, with indirect jobs created through contractors, suppliers, and service providers. This will contribute to household income stability, poverty alleviation, and improved standards of living for many families within the Matjhabeng and Masilonyana municipalities. Local procurement initiatives will further strengthen small and medium enterprises (SMEs), while training and skills development programmes will enhance the employability of the workforce.

At the community level, the mine will contribute to infrastructure development, such as road maintenance and social investment programmes, while supporting the revenue base of local municipalities through rates, taxes, and service fees. These contributions will enable municipalities to improve service delivery and social welfare initiatives.

However, the operational phase will also bring socio-economic risks. The reliance of the local economy on the mining sector will create vulnerability to commodity fluctuations and operational disruptions. The influx of job seekers may increase the demand for housing, education, and healthcare, placing strain on already limited municipal resources. Health risks associated with dust, noise, traffic, and hazardous substances will remain a concern for nearby communities, while social challenges such as crime, substance abuse, and inequality may intensify if not proactively managed.

To maximise socio-economic benefits and minimise risks, the mine will need to continue engaging with communities, local government, and other stakeholders, implement corporate social responsibility initiatives, and support economic diversification efforts beyond mining. If effectively managed, Beatrix will provide a stable socio-economic foundation during its operational life.

13.8.13.2 Decommissioning Phase

The decommissioning of Beatrix will present significant socio-economic challenges for surrounding communities. The closure of operations will lead to large-scale job losses, both directly at the mine and indirectly in sectors that depend on mining activity, such as retail, transport, and services. Household incomes will decline, contributing to rising unemployment, poverty, and social vulnerability. The economic dependency of the Matjhabeng and Masilonyana municipalities on the mine's revenue contributions will also create fiscal strain, reducing the ability of local authorities to provide adequate services such as water, sanitation, healthcare, and housing.

The loss of employment and reduced economic opportunities will likely trigger out-migration, leading to the depopulation of mining towns and a weakening of social networks and cohesion. This could exacerbate crime, informal housing growth, and social instability in affected communities. Culturally, closure will also disrupt the identity and heritage of mining-dependent settlements, as families who have relied on the mine for generations will face uncertainty regarding future livelihoods.

Despite these negative impacts, the decommissioning phase will also create opportunities. Closure planning and rehabilitation will employ workers in short-term jobs focused on demolition, environmental rehabilitation, and infrastructure repurposing. Properly managed closure will rehabilitate land for agricultural use, grazing, renewable energy projects, or other alternative post-mining developments. If supported by government and private sector collaboration, these land use transitions will reduce long term vulnerability and provide sustainable livelihoods.

To reduce negative socio-economic consequences, proactive measures will need to be implemented. These will include:

- Social transition programmes for employees and their families.
- Reskilling and retraining initiatives to enable workers to access employment in other sectors.
- Early stakeholder engagement to align closure plans with municipal development frameworks.
- Partnerships with government and business to promote economic diversification, such as renewable energy, agriculture, or manufacturing.
- Strengthening of social safety nets to cushion vulnerable groups from the immediate impacts of closure.

If closure is aligned with sustainable development goals and integrated into regional economic planning, the long term socio-economic legacy of Beatrix will shift from vulnerability to resilience, providing opportunities for sustainable land use and livelihoods beyond mining.

13.8.14 Impact Table

The table below presents a consolidated assessment of all potentially significant environmental and

socio-economic impacts identified for the Beatrix 1, 2 and 3 Shaft Operations. Each impact has been evaluated using the standard significance rating methodology described in Section 13.1, which considers magnitude, duration, scale, and probability before and after mitigation. The table summarises the main project activities, their associated environmental aspects, the phase of occurrence, the initial (unmitigated) significance, key management and mitigation measures, and the residual significance following implementation of the EMPr.

Table 13-5: Assessment of Each Identified Potentially Significant Impact and Risk for Beatrix 1, 2 and 3 Shafts

Activities	Potential Impact	Aspects Affected	Phase	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation						
				M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP
Deep-level mining below surface	Deep-level mining occurs without causing surface or near-surface geological disturbances, and the undermining at current depths poses no risk of subsidence.	Geology	Operational Phase Decommissioning Phase	No impact.														
Construction and operation of waste rock dumps, tailings storage facilities (TSFs), evaporation dams, and associated infrastructure	Establishment of engineered mining infrastructure causes localised alteration of the natural topography. Permanent landform changes are expected at waste disposal and water management facilities, while the broader Highveld landscape remains largely unchanged. Potential for erosion, altered surface drainage patterns, and visual intrusion if unmanaged.	Topography	Operational Phase	8	5	2	5	75	-	H	• Develop, implement and maintain a comprehensive Stormwater Management Plan to prevent erosion and control runoff across disturbed areas. • Carry out routine inspections of all stormwater trenches, berms and drains, and repair any erosion damage. • Shape and rehabilitate disturbed landforms progressively to blend with the surrounding topography and minimise long term visual intrusion.	6	5	2	4	52	-	M
Closure and rehabilitation of waste rock dumps, TSFs, evaporation dams, and associated infrastructure	During decommissioning, permanent engineered structures remain as altered landforms. Residual disturbance may persist without adequate rehabilitation. Risks include long term erosion, instability of steep slopes, and visual scarring.		Decommissioning Phase	8	5	2	5	75	-	H	• Re-contour and stabilise disturbed landforms, particularly TSFs, WRDs, and evaporation dams, to reduce erosion risk and improve slope stability. • Establish indigenous vegetation cover to stabilise soils and promote ecological reintegration. • Implement closure planning to ensure that rehabilitated landforms blend with surrounding terrain and visual impacts are minimised.	6	5	2	4	52	-	M
Excavation, construction and operation of slimes dams, waste rock dumps (WRDs), evaporation dams, and waste disposal sites	Permanent sterilisation of soils within mine infrastructure footprints; seepage from evaporation dams may cause long term salinisation; sandy upland soils prone to erosion and valley-bottom soils prone to gulley erosion.	Soils	Operational Phase	8	4	2	3	42	-	M	• Strip and stockpile topsoil before disturbance. • Progressive rehabilitation using stored soils. • Monitor soil salinity and erosion and implement corrective action.	6	3	2	2	22	-	L
Closure of TSFs, WRDs and evaporation dams; demolition of infrastructure; reworking of contaminated soils	Residual soil degradation including compaction, salinisation, and erosion around TSFs, WRDs, and evaporation dams. If unmanaged, long term soil productivity is compromised.		Decommissioning Phase	6	3	2	3	33	-	M	• Re-profile disturbed landforms. • Apply lime/soil ameliorants to sodic soils. • Reapply ≥300–500 mm topsoil and establish indigenous vegetation.	4	3	2	3	27	-	L
Fuel storage, chemical handling, vehicle servicing, and waste disposal during operations	Hydrocarbon leaks, chemical spills, and waste mismanagement contaminate soils, reducing fertility and posing leaching risks to groundwater.		Operational Phase	8	4	2	5	70	-	H	• Line and bund all hydrocarbon/chemical storage areas. • Use drip trays, spill kits, and hydrocarbon separators. • Segregate waste and use licensed disposal facilities. • Monitor soil quality near workshops and storage areas.	6	3	2	2	22	-	L
Decommissioning and closure of fuel bays, workshops, storage facilities, and contaminated footprints	Residual hydrocarbon/chemical contamination in soils beneath workshops, fuel bays, and waste sites. If unmanaged, risks persist long term, hindering rehabilitation and land capability.		Decommissioning Phase	6	4	3	5	65	-	H	• Excavate and dispose of contaminated soils at licensed sites. • Bioremediate hydrocarbon-impacted soils. • Demolish contaminated infrastructure to ≥1 m below ground. • Cap or ameliorate soils where excavation is not feasible.	4	3	2	3	27	-	L
Placement and operation of TSFs, WRDs, evaporation dams, and waste disposal areas	Reduction in land capability in affected areas, with permanent loss of arable potential; majority of land outside mine footprints remains viable for grazing and crops.	Land Capability	Operational Phase	6	4	3	5	65	-	H	• Reuse stripped topsoil in rehabilitation. • Progressive rehabilitation with grazing-compatible vegetation. • Implement erosion and dust control.	4	3	3	3	30	-	M
Decommissioning and rehabilitation of TSFs, WRDs and evaporation dams	Permanent loss of arable land in mine footprints if unmanaged; erosion and instability risks. Without intervention, rehabilitated land remains unsuitable for grazing.		Decommissioning Phase	6	3	4	5	65	-	H	• Re-contour WRDs (1:3) and TSFs (1:4). • Apply ≥500 mm soil cover. • Establish vegetation for grazing potential.	4	3	3	3	30	-	M
Conversion of agricultural land to mining land use (TSFs, WRDs, waste disposal areas, evaporation dams)	Land use permanently altered, with agricultural land excluded from production; evaporation dams may partially recover for grazing.	Land Use	Operational Phase	6	4	3	5	65	-	H	• Apply soil amelioration and water management to restore grazing potential.	4	3	2	4	36	-	M
Post closure sterilisation of TSFs and WRDs; rehabilitation of evaporation dams and mine footprints	Land use remains permanently altered post-mining; sterilised zones persist, though rehabilitation can support grazing and ecological corridors.		Decommissioning Phase	8	3	2	5	65	-	H	• Finalise post-mining land use with stakeholders. • Rehabilitate to support grazing and ecological corridors. • Long term monitoring of rehabilitated areas.	4	3	2	4	36	-	M
Gold Processing Plant – storage and use of chemicals (cyanide, caustic, lime, carbon, flocculant)	Spillages/leakages may contaminate soils, groundwater, and surface water, with risks to aquatic ecosystems and nearby communities.	Surface and groundwater	Operational	8	4	2	5	70	-	H	• All chemical storage tanks and containers to be located within bunded areas with impermeable linings, sized to contain at least 110% of the largest container. • Install oil and silt separators on all wash bays, sumps, and drains linked to dirty water systems.	6	3	2	2	22	-	L

Activities	Potential Impact	Aspects Affected	Phase	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation						
				M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP
											• Develop and implement a hazardous substances and chemical handling procedure aligned with the National Water Act (Act 36 of 1998) and the Occupational Health and Safety Act. • Provide annual training to all staff on safe handling, use of personal protective equipment, spill prevention, and emergency procedures. • Conduct quarterly drills simulating chemical and hydrocarbon spill scenarios. • Maintain Material Safety Data Sheets for all chemicals at point of use and storage. • Immediately clean any spillages and transport contaminated materials to licensed hazardous waste disposal facilities. • Undertake monthly surface water and groundwater quality monitoring at upstream and downstream compliance points. • Conduct biennial compliance audits against Government Notice 704 of 1999 requirements to verify clean/dirty water separation.							
Decommissioning of Gold Processing Plant – dismantling, demolition, removal of chemical storage tanks and infrastructure	Residual contamination from decommissioning activities may result in hydrocarbon and chemical releases to soils, groundwater, and surface water.		Decommissioning	6	4	3	5	65	-	H	• All hazardous chemicals, hydrocarbons, and contaminated materials to be removed and transported to licensed hazardous waste facilities. • Establish a salvage yard for decontamination of reusable equipment, ensuring runoff collection and treatment. • Excavate and bioremediate hydrocarbon-contaminated soils using appropriate techniques such as bio piles or in situ treatment. • Maintain stormwater separation during demolition with diversion berms, channels, and lined containment areas. • Conduct groundwater and surface water monitoring for at least five years post closure to confirm rehabilitation success and detect residual contamination. • Maintain a closure register documenting waste volumes, disposal certificates, and decontamination activities for auditing purposes.	4	3	2	3	27	-	L
Underground mining – drilling, blasting, explosives handling, equipment use, hoisting	Hydrocarbon/nitrate contamination of groundwater from explosives and equipment; spillages entering water circuits or shaft complexes.		Operational	8	4	2	3	42	-	M	• Implement water and stormwater management plans to ensure separation of clean and dirty water underground and on surface. • Maintain underground equipment and vehicles on planned maintenance schedules to reduce oil and fuel leaks. • Use drip trays and bunded storage for hydrocarbons and lubricants. • Conduct blasting according to national explosives legislation, with emphasis on minimising nitrate residues. • Store explosives in licensed magazines designed for safe ventilation and contamination prevention. • Monitor groundwater quality monthly for nitrates, hydrocarbons, and other contaminants. • Conduct annual hydrogeological reviews of monitoring data. • Develop, train, and drill emergency spill and explosion response procedures. • Ensure all waste from explosive destruction is disposed of at approved hazardous facilities.	6	3	2	2	22	-	L
Decommissioning of underground workings – plugging shafts, removing equipment, sealing access	Residual nitrates, oils, and contaminants in underground water circuits may leach post closure, affecting groundwater and surface water quality.		Decommissioning	6	4	2	3	36	-	M	• Seal shafts and underground access points with reinforced concrete plugs designed to withstand long term water pressures. • Remove all equipment, pipelines, and hydrocarbon storage facilities underground. • Pump and treat water during closure where necessary to remove contaminants. • Establish a post closure groundwater monitoring programme for at least five years to detect residual nitrate or hydrocarbon leaching. • Install interception trenches or drains if monitoring shows continued contamination migration. • Maintain closure certificates and reports for regulatory compliance.	4	3	2	3	27	-	L
Workshops – vehicle/equipment maintenance, hydrocarbons and chemicals	Spillages/runoff may contaminate soil and water circuits.		Operational	6	3	2	3	33	-	M	• All maintenance to be confined to designated impermeable maintenance bays connected to dirty water systems. • Equip maintenance bays and wash bays with oil and silt separators. • Conduct planned maintenance to prevent leaks. • Implement spill response and waste disposal procedures, including immediate cleanup. • Train all mechanical staff in environmental management and pollution prevention.	4	3	2	3	27	-	L

Activities	Potential Impact	Aspects Affected	Phase	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation						
				M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP
											• Monitor drainage and oil separators monthly and service quarterly. • Transport contaminated waste to licensed disposal sites.							
Decommissioning of workshops – dismantling and rehabilitation of maintenance areas	Hydrocarbon-contaminated soils and residual waste may leach into soils and water resources during closure.		Decommissioning	6	3	2	3	33	-	M	• Remove all tanks, bays, and hydrocarbon-contaminated infrastructure. • Excavate contaminated soils and treat through bioremediation or off-site disposal. • Rip compacted areas, re-profile land, and spread topsoil. • Establish indigenous vegetation on rehabilitated areas. • Conduct post-rehabilitation surface and groundwater monitoring for at least three years.	4	3	2	3	27	-	L
Waste management – salvage yards and office complexes	Incorrect separation may contaminate waste streams and water resources.		Operational	6	4	3	5	65	-	H	• Implement separation of general waste and hazardous waste at the point of generation, with clearly labelled, weatherproof containers on impermeable, bunded surfaces. • Establish covered, bunded temporary storage areas with runoff collection and connection to the dirty water system; prevent water ingress. • Prepare and implement a Waste Management Plan in accordance with the National Environmental Management: Waste Act, including waste minimisation, reuse, and recycling targets. • Maintain an auditable waste register and waste manifest system, including quantities, South African classifications, consignment notes, and safe disposal certificates. • Appoint only licensed waste transporters and use only licensed treatment and disposal facilities; verify licences annually. • Train all staff and contractors on waste segregation, spill response, and housekeeping; conduct quarterly toolbox talks. • Conduct monthly inspections of storage areas; immediately rectify non-conformances. • Install litter screens and conduct routine clean-ups to prevent windblown waste reaching stormwater systems.	4	3	2	3	27	-	L
Decommissioning of salvage yards/offices – removal of waste facilities, demolition of buildings, cleanup	Residual hazardous waste or poor cleanup could leach contaminants into soils and water.		Decommissioning	6	3	2	3	33	-	M	• Undertake a pre-demolition hazardous materials survey (including asbestos, oil-containing equipment, lead-based paints, fluorescent tubes, and electronic waste) and prepare method statements for removal. • Remove all wastes and contaminated materials to licensed facilities prior to demolition; obtain and file safe disposal certificates. • Decontaminate salvage areas (pressure wash on lined bays with runoff capture and treatment) and verify through confirmatory sampling. • Excavate visibly contaminated soils; treat by bioremediation or dispose at licensed facilities based on laboratory classification. • Re-profile, rip, replace topsoil, and revegetate footprints; install erosion and sediment controls. • Conduct a final waste audit and a closure verification sampling programme for soils and runoff; include at least one wet season check.	4	3	2	3	27	-	L
Tailings disposal – Beatrix No.2 TSF	Overflow, pipe bursts, or slope failures may release contaminated runoff to surface and groundwater.		Operational	8	4	2	5	70	-	H	• Maintain minimum freeboard in ponds and dams that complies with Government Notice 704 of 1999 (operate at less than 0.8 metres from crest); record levels weekly and after storms. • Implement a Code of Practice for Mine Residue Deposits and audit compliance annually; close out findings within defined timeframes. • Maintain the Stormwater Management Plan for paddocks, penstocks, decant trenches, and return water systems; keep channels free of sediment and vegetation. • Conduct routine integrity inspections of tailings pipelines; install pressure monitors and automatic shut-off valves at high risk sections; keep spill kits along routes. • Undertake periodic geotechnical inspections of embankments (crest, slopes, toe drains); repair erosion promptly and maintain slope protection. • Perform leachate characterisation of tailings to identify parameters of concern and adjust monitoring suites accordingly. • Maintain an emergency preparedness and response plan for pipeline failures and potential tailings storage facility instability; conduct drills at least annually.	6	3	2	2	22	-	L

Activities	Potential Impact	Aspects Affected	Phase	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation						
				M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP
Decommissioning of TSFs – capping, reshaping, revegetation	Long term seepage of sulphates, chlorides, and uranium may contaminate groundwater and surface water.		Decommissioning	6	4	3	5	65	-	H	• Construct an engineered cover system: shape outer slopes to one vertical to four horizontal or flatter; install at least five hundred millimetres of growth medium, with lime and fertiliser as required by soil testing; place a low permeability layer where risk assessments justify. • Install surface water diversion berms, contour drains, and energy dissipation structures to prevent erosion; line high-velocity sections. • Establish indigenous, deep-rooted vegetation for erosion control and evapotranspiration; implement a three-year maintenance and reseeding programme. • Monitor groundwater and surface water for at least five years post closure; expand monitoring if upward trends are detected. • Where required by risk assessment, install toe drains, passive treatment wetlands, or seepage collection trenches. • Maintain access control and signage to prevent unauthorised disturbance of the rehabilitated facility.	4	3	2	4	36	-	M
Water management facilities – TSFs, RWDs, evaporation dams, reticulation systems	Overflows/discharges during flood events may contaminate surface waters.		Operational	6	4	3	5	65	-	H	• Demonstrate storage capacity for at least a one in fifty year storm event through a site water balance; update monthly and after material changes. • Operate all dams below the freeboard required by Government Notice 704 of 1999; install level alarms and backup pumping capacity. • Inspect embankments, spillways, valves, and penstocks weekly; repair defects immediately. • Maintain separation of clean water and affected water; keep clean water diversions unobstructed; route affected runoff to the dirty water system. • Prohibit any deliberate discharge of process water to the environment without an authorisation in terms of the National Water Act, 1998 (Act 36 of 1998). • Implement an incident reporting procedure for any unplanned releases, including internal and external notification to the Department of Water and Sanitation (DWS) in terms of section 20 of the National Water Act, where applicable. • Monitor upstream and downstream surface water quality and dam inlets and outlets; investigate and correct any exceedances promptly.	4	3	2	4	36	-	M
Decommissioning of dams/ponds – sediment removal, wall breaching, re-profiling	Residual sediments and contaminated water may leach into soils and surface waters post closure.		Decommissioning	8	3	2	5	65	-	H	• Dewater ponds, remove contaminated sediments to the tailings storage facility or licensed disposal sites based on classification, and keep records. • Remove or shred synthetic liners and dispose at licensed facilities; verify liner removal by inspection. • Breach embankments to prevent future impoundment; shape basins to free-draining contours; stabilise outlets with rock armour or concrete as needed. • Rip compacted surfaces, place topsoil, apply ameliorants (for example lime at agronomic rates), and establish vegetation. • Conduct post closure water quality monitoring in adjacent surface water bodies and downstream points for a minimum of three years.	4	3	2	3	27	-	L
Dormant WRDs	Runoff/seepage may contaminate groundwater and surface water.		Operational	6	4	3	5	62	-	H	• Maintain clean water diversions around dump footprints; route dirty runoff to the dirty water system or containment. • Stabilise slopes with benching, contouring, and vegetation to reduce erosion; install energy dissipation at outlets. • Characterise waste rock for acid generation and leachable metals; update risk assessments and monitoring suites accordingly. • Inspect monthly for erosion, rilling, or ponding; repair immediately. • Implement a Code of Practice for waste rock dumps, including access control and traffic management to minimise track-induced erosion.	4	3	2	3	27	-	L
Decommissioning of WRDs – reshaping, capping, vegetation	Residual seepage and erosion from rehabilitated WRDs may still affect water resources.		Decommissioning	8	3	2	5	65	-	H	• Reshape dumps to stable angles with berms and benches; construct perimeter drains and toe protection. • Place a soil cover of suitable thickness (typically three hundred to five hundred millimetres) based on erosion risk; include an optional low permeability layer if justified.	4	3	2	4	36	-	M

Activities	Potential Impact	Aspects Affected	Phase	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation						
				M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP
											• Establish indigenous vegetation; apply mulch, fertiliser, and soil conditioners to achieve rapid cover; maintain for at least three growing seasons. • Monitor runoff quality, erosion features, and vegetation success; repair gullies with rock check dams or gabions. • Maintain long term access control and signage.							
Waste water treatment works discharges	Poorly treated effluent may deteriorate surface/groundwater quality.		Operational	6	4	2	3	36	-	M	• Operate treatment works to achieve DWS licence limits; calibrate instruments and verify through accredited laboratory analysis. • Implement process controls (for example nutrient removal and disinfection) to maintain consistent compliance. • Conduct biomonitoring of receiving streams at agreed frequencies; trigger investigations if biological indices decline. • Maintain emergency storage and bypass prevention measures; prohibit uncontrolled discharges. • Report any significant non-compliance to the DWS and implement corrective actions.	4	3	2	3	27	-	L
Decommissioning of WWTWs - closure of treatment works	Abandonment may leave contaminated liners/soils, leaching into water.		Decommissioning	6	3	2	3	33	-	M	• Drain and clean tanks and basins; remove sludge and dispose at licensed facilities; obtain safe disposal certificates. • Remove liners, contaminated soils, and process residues; verify by confirmatory laboratory sampling. • Backfill excavations with suitable material, re-profile, replace topsoil, and revegetate. • Monitor adjacent surface water and groundwater for at least two wet seasons to confirm no residual impact.	4	3	2	3	27	-	L
Use and maintenance of vehicles	Hydrocarbon leaks may contaminate soils and stormwater.		Operational	6	4	2	2	24	-	L	• Conduct all servicing on impermeable, bunded surfaces connected to the dirty water system with oil and silt separators. • Implement preventative maintenance to minimise leaks; keep spill kits in all parking and loading areas. • Train operators in refuelling and spill response; clean spills immediately and dispose contaminated materials at licensed facilities. • Inspect separators monthly and service quarterly.	4	3	2	3	27	-	L
Decommissioning of vehicle yards/parking areas	Hydrocarbon-contaminated soils may remain and leach post closure.		Decommissioning	6	3	2	3	33	-	M	• Survey yards for staining; excavate and treat contaminated soils by bioremediation or off-site disposal. • Remove hardstands where not required for future land use; rip compacted subgrades; replace topsoil and revegetate. • Verify by confirmatory sampling that hydrocarbon concentrations meet closure criteria.	4	3	2	3	27	-	L
Diesel and oil storage/refuelling	Spillages contaminating soils, groundwater, and stormwater.		Operational	8	4	2	3	42	-	M	• Provide bunded, roofed storage with impermeable linings; bund capacity at least one hundred and ten percent of the largest tank. • Protect tanks with overfill prevention, automatic shut-off, and leak detection; inspect daily for leaks and monthly for integrity. • Conduct refuelling on lined, bunded pads with drip trays; collect and manage all runoff as dirty water. • Maintain spill response equipment at refuelling points; train staff quarterly. • Implement a hazardous substances procedure compliant with the National Water Act and the National Environmental Management Act.	6	3	2	2	22	-	L
Decommissioning of diesel/oil facilities – tank removal and rehabilitation	Residual contamination from dismantled tanks, pipelines, and bunds may leach post closure.		Decommissioning	6	4	2	3	36	-	M	• Drain and gas-free tanks; remove tanks, pipelines, and bund liners; manage residues as hazardous waste. • Undertake soil screening and confirmatory laboratory analysis; excavate contaminated soils and treat or dispose accordingly. • Backfill and compact excavations; re-profile, place topsoil, and establish vegetation; monitor for settlement and erosion.	4	3	2	3	27	-	L
Erosion control and stormwater management	Disturbed soils may erode, destabilising slopes and increasing sediment load in surface water.		Operational	8	3	2	5	65	-	H	• Implement and maintain the Stormwater Management Plan, including clean water diversions and dirty water containment. • Install erosion controls (for example grassed swales, rock rip-rap, gabions, check dams) at concentration points and outfalls. • Minimise unvegetated areas; undertake progressive rehabilitation; mulch and hydroseed steep or erodible areas. • Inspect after rainfall events exceeding twenty millimetres in twenty-four hours; repair erosion immediately.	4	2	2	3	24	-	L
Decommissioning of disturbed areas – general rehabilitation	Poorly rehabilitated areas may erode, affecting water quality and stability.		Decommissioning	6	3	2	3	33	-	M	• Rip compacted areas to at least three hundred millimetres; re-grade to blend with natural topography and achieve free drainage.	4	2	2	3	24	-	L

Activities	Potential Impact	Aspects Affected	Phase	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation						
				M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP
											• Replace stockpiled topsoil of adequate thickness; apply ameliorants based on soil tests; seed with indigenous species and apply mulch. • Install temporary erosion and sediment controls until vegetation is established; inspect after storm events. • Monitor vegetation cover and stability for three growing seasons; undertake infill seeding and repairs where needed.							
Operation of shaft infrastructure, TSFs, evaporation dams, and associated stormwater systems	Altered hydrology, seepage of sulphates/salts, bank erosion, alien vegetation invasion, reduced habitat quality in wetlands; salinisation and biodiversity loss in depressional wetlands.	Wetlands	Operational	8	4	3	5	75	-	H	• Maintain and implement comprehensive Stormwater Management Plan to separate clean and dirty water. • Line or upgrade TSFs/evaporation dams to minimise seepage. • Implement seepage interception drains and monitoring boreholes near wetlands. • Regularly monitor wetland water quality, vegetation condition, and erosion features. • Alien invasive species control programme (*Tamarix, Opuntia*). • Progressive rehabilitation of disturbed areas with indigenous wetland species.	6	3	3	2	24	-	L
Decommissioning of TSFs, WRDs, evaporation dams, and supporting shaft infrastructure	Residual contamination and seepage (sulphates, chlorides, metals) may degrade wetlands; sedimentation, reduced groundwater discharge in seep wetlands; depressional wetlands risk ongoing degradation if evaporation dams are not rehabilitated.		Decommissioning	6	4	3	5	65	-	H	• Cap and reshape TSFs with ≥500 mm soil and vegetate with indigenous wetland-compatible species. • Re-profile WRDs and stabilise slopes; apply stormwater diversions to reduce erosion and sediment loads. • Excavate and neutralise contaminated sediments from evaporation dams, breach walls to restore free-draining conditions, and rehabilitate as wetlands where possible. • Long term groundwater and surface water monitoring for ≥5 years post closure. • Active alien invasive species control and biodiversity rehabilitation programmes in wetlands. • Integration of wetlands into ecological corridors as part of closure land use planning.	4	3	3	2	20	-	L
Mining operations, construction and maintenance of shaft infrastructure, TSFs, WRDs, evaporation dams, and haul roads	Loss and fragmentation of natural vegetation including Endangered Vaal-Vet Sandy Grassland; alteration of riparian zones and wetland margins; decline in veld quality due to overgrazing; displacement of climax grass species such as *Themeda triandra* (Red Grass) by disturbance-tolerant taxa; spread of invasive alien plants (e.g. *Tamarix ramosissima* – Salt Cedar; *Opuntia ficus-indica* – Prickly Pear).	Flora (grassland, riparian, wetland vegetation)	Operational Phase	8	5	3	4	64	-	H	• Map and designate intact climax grasslands, riparian zones, and wetland buffers as high sensitivity areas protected from further disturbance. • Implement alien invasive clearing programme targeting *Tamarix ramosissima* and *Opuntia ficus-indica*. • Introduce grazing management plans to prevent overgrazing and veld degradation. • Rehabilitate disturbed areas progressively with indigenous grassland species. • Protect Conservation Important (CI) species (e.g. *Boophone disticha, Crinum bulbispermum, Eucomis autumnalis, Hypoxis hemerocallidea, Brunsvigia spp.*) through propagation, relocation if needed, and education to prevent unsustainable harvesting. • Monitor vegetation trends and rehabilitation success through long term biodiversity monitoring programmes.	6	4	3	2	26	-	L
Decommissioning of mining infrastructure (shafts, plants, TSFs, WRDs, roads, evaporation dams, salvage yards)	Residual soil contamination, poor revegetation success, and spread of invasive alien species may limit recovery of floral communities. Inadequate rehabilitation could result in long term biodiversity loss, erosion, and failure to re-establish CI species.		Decommissioning Phase	6	4	3	5	65	-	H	• Implement closure objectives focusing on restoring grasslands, riparian corridors, and wetland buffers with indigenous species. • Apply soil amelioration, re-topsoiling, and erosion control to promote revegetation success. • Actively propagate and reintroduce CI species into suitable rehabilitated habitats. • Integrate ecological corridors into the closure land use plan to restore connectivity across the landscape. • Maintain long term monitoring (≥5 years) of rehabilitation success, alien invasive spread, and biodiversity persistence. • Engage local communities in the stewardship of culturally significant species used in traditional medicine, ensuring sustainable use post-mining.	4	3	3	2	20	-	L
Mining operations, shaft and plant activities (noise, lights, traffic, habitat disturbance)	Disturbance and displacement of fauna due to continuous noise, vibration, dust, and light. Loss of habitat connectivity for grassland and wetland-dependent species.	Fauna (mammals, birds, amphibians, reptiles, invertebrates)	Operational	6	4	3	5	65	-	H	• Restrict noisy operations to daytime where feasible. • Implement biodiversity monitoring programme with focus on CI species (e.g., African Grass-owl, Black-footed Cat, Giant Bullfrog). • Maintain ecological corridors between grasslands, wetlands, and riparian zones. • Apply speed limits and install fauna crossing signage to reduce vehicle collisions. • Control lighting to reduce nocturnal faunal disturbance.	4	3	3	2	20	-	L

Activities	Potential Impact	Aspects Affected	Phase	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation						
				M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP
Wetland and pan interactions with mine infrastructure (effluent, seepage, altered flow)	Degradation of wetland and pan habitats supporting amphibians, waterbirds, and invertebrates. Reduced breeding success of Giant Bullfrog and migratory flamingos.	Fauna (wetland and aquatic species)	Operational	6	4	3	5	65	-	H	• Maintain clean/dirty water separation (GN 704 compliance). • Regular biomonitoring of amphibians and aquatic invertebrates in pans/wetlands. • Implement alien vegetation control (e.g., Tamarix ramosissima, Opuntia ficus-indica). • Enhance buffers around wetlands to protect habitats.	4	3	3	2	20	-	L
Decommissioning of shaft, plant, TSFs and WRDs (demolition, reshaping, rehabilitation)	Short-term disturbance and displacement of fauna from closure activities (noise, dust, demolition). Risk of residual contamination and habitat fragmentation if rehabilitation is not effective.	Fauna (general assemblage and CI species)	Decommissioning	6	3	3	3	36	-	M	• Implement phased rehabilitation of disturbed areas with indigenous species (grasslands, riparian vegetation). • Remove contaminated materials and decontaminate soils. • Shape, rip and revegetate footprints of infrastructure. • Control alien invasive species during rehabilitation. • Maintain post closure biodiversity monitoring for ≥5 years.	4	3	3	2	20	-	L
Post closure wetlands, pans, and rehabilitated grasslands	Long term residual impacts if seepage or poor rehabilitation results in ongoing wetland degradation and habitat loss. Risk to sensitive species such as Giant Bullfrog and African Grass-owl.	Fauna (wetland, grassland and migratory species)	Decommissioning	6	3	4	5	65	-	H	• Prioritise rehabilitation of wetlands and riparian corridors. • Establish long term monitoring of faunal communities in rehabilitated habitats. • Engage local stakeholders to support conservation of CI species and restrict unsustainable harvesting of medicinal plants. • Integrate mine rehabilitation into broader ecological corridor initiatives.	4	3	3	2	20	-	L
Demolition and dismantling of smelting and processing facilities	Demolition dust, disturbed contaminated soils, release of volatile compounds and trace metals. Dust dispersion into surrounding environment, affecting health and ecosystems.	Air quality; soils; communities	Decommissioning Phase	6	4	3	5	65	-	H	• Apply strict dust suppression (water spraying, dust screens, wind breaks). • Decontaminate salvageable equipment prior to removal. • Remove hazardous waste and contaminated materials to licensed facilities. • Excavate and bioremediate hydrocarbon-contaminated soils. • Maintain clean/dirty water separation during demolition. • Establish vegetation on exposed soils post closure. • Post closure air quality monitoring ≥5 years.	4	3	2	3	27	-	L
TSFs and waste rock dumps (WRDs)	Fugitive dust emissions containing silica, sulphates, and trace metals. Long term dispersion may affect communities, agriculture, and ecosystems.	Air quality; soils; vegetation; communities	Operational Phase	6	4	3	5	65	-	H	• Maintain TSF freeboard below 0.8 m. • Progressive rehabilitation of TSFs and WRDs (capping, vegetation). • Routine inspections and maintenance of dust suppression. • Regular leachate testing of tailings material. • Codes of Practice audits for mine residue facilities.	4	3	2	3	27	-	L
Decommissioning of TSFs and WRDs – reshaping, capping, and rehabilitation	Dust generation during earthmoving, profiling, and capping. Long term risk of residual dust dispersion if rehabilitation fails.	Air quality; soils; vegetation	Decommissioning Phase	8	3	2	5	65	-	H	• Cap TSFs with ≥500 mm soil cover. • Shape and stabilise slopes ≤1:4. • Apply lime or soil amendments where required. • Establish indigenous vegetation. • Implement stormwater diversion. • Long term monitoring and maintenance of rehabilitated surfaces.	4	2	2	4	32	-	L
General mining and vehicle activities (haul roads, equipment, blasting)	Dustfall from haul roads, vehicles, and blasting. Localised air quality deterioration; occupational and community health risks.	Air quality; human health; vegetation	Operational Phase	6	3	2	3	33	-	M	• Water spraying of haul roads and exposed areas. • Enforce speed restrictions. • Maintain vehicle fleets. • Cover loads during transport. • Provide personal protective equipment (PPE). • Routine air quality monitoring.	4	2	2	3	24	-	L
Decommissioning of vehicle yards and roadways	Dust emissions during road ripping, rehabilitation, and demolition. Hydrocarbon-contaminated soils may release vapours.	Air quality; soils	Decommissioning Phase	6	3	2	3	33	-	M	• Excavate and remediate contaminated soils. • Dust suppression during rehabilitation. • Reapply topsoil and vegetate. • Monitor air quality during demolition.	4	2	2	3	24	-	L
Operation of ventilation fans, conveyor systems, Gold Plant machinery, and mobile equipment	Continuous operational noise may increase ambient noise levels at nearby rural and residential receptors, disturbing community wellbeing and sensitive fauna (e.g., African Grass-owl, raptors).	Noise environment (communities and fauna)	Operational	6	4	3	5	65	-	H	• Conduct regular noise monitoring as per SANS 10103 and SANS 10328. • Install noise barriers/enclosures around major sources. • Replace or upgrade older machinery with quieter alternatives. • Use vibration isolation and damping materials. • Limit noisy activities during sensitive night-time hours. • Maintain equipment to reduce mechanical noise. • Implement employee and community awareness programmes on noise impacts.	4	3	2	3	27	-	L
Decommissioning of processing plant, shafts, and infrastructure (demolition, dismantling, heavy vehicle use)	Short-term elevated noise levels from demolition equipment and vehicles may disturb communities and fauna.		Decommissioning	8	3	2	5	65	-	H	• Restrict demolition to daytime hours. • Fit machinery with silencers and sound-dampening materials. • Provide personal protective equipment to workers. • Create exclusion zones around noisy demolition activities. • Inform communities of demolition schedules to reduce disturbance.	4	2	2	3	24	-	L

Activities	Potential Impact	Aspects Affected	Phase	Environmental Significance Before Mitigation							Recommended Mitigation Measures	Environmental Significance After Mitigation						
				M	D	S	P	Total	Status	SP		M	D	S	P	Total	Status	SP
											• Conduct post-decommissioning monitoring to confirm noise returns to baseline levels.							
Disturbance of identified heritage resources during mining operations (canal, reservoirs, Stone Age scatters, farmsteads, cemeteries)	Damage or destruction of archaeological sites, historical structures, and burial grounds; loss of cultural, historical, and scientific value.	Heritage (archaeological, historical, and cultural sites, including graves)	Operational	6	4	3	5	65	-	H	• Maintain legally required buffer zones around identified heritage sites. • Implement a Heritage Management Plan aligned with the National Heritage Resources Act, 1999 (Act 25 of 1999). • Train staff on heritage awareness and chance finds procedures. • Immediate reporting of heritage finds to heritage authorities. • Protect and fence sensitive areas such as cemeteries. • Apply dust and vibration control near heritage sites. • Conduct monitoring by heritage specialists during earthworks or expansion.	4	3	2	3	27	-	L
Decommissioning activities including demolition of infrastructure, rehabilitation of disturbed areas, and earthmoving near heritage sites	Accidental disturbance, removal, or destruction of heritage features; exposure of unmarked graves; degradation of cultural landscapes.		Decommissioning	8	3	2	5	65	-	H	• Implement a Heritage Decommissioning Management Plan prior to closure. • Obtain required permits for alteration or removal of heritage resources from SAHRA. • Document, conserve, or relocate significant structures and artefacts where feasible. • Engage with affected communities regarding treatment of graves and culturally important sites. • Memorialisation of burial grounds to ensure long term cultural respect. • Monitoring by heritage specialists during demolition and rehabilitation. • Integrate heritage sites into post-mining land use planning.	4	2	2	3	24	-	L
Operation of Beatrix1, 2 and 3 Shaft (employment, procurement, municipal contributions, community services)	Job creation and income stability for local households. Strengthening of SMEs through procurement. Support for municipal revenue and service delivery. Risks include economic dependency on mining, strain on housing/healthcare/education services, and social challenges such as crime and inequality.	Socio-economic conditions, livelihoods, municipal services, social cohesion	Operational Phase	6	5	3	5	72	+	H	• Implement local employment and procurement policies prioritising nearby communities. • Invest in training and skills development to improve employability and resilience. • Continue corporate social responsibility programmes focusing on education, healthcare, and infrastructure. • Regular engagement with communities and municipalities to manage expectations and align with development priorities. • Develop partnerships to diversify the local economy beyond mining.	5	4	3	5	60	+	H
Closure and decommissioning of Beatrix 1, 2 and 3 Shaft (loss of operations, dismantling, rehabilitation)	Large-scale job losses and reduced household income. Loss of municipal revenue. Economic downturn for service sectors. Risks of out-migration, crime, social instability, and erosion of social cohesion. Opportunity for alternative land uses and sustainable livelihoods if closure is managed proactively.	Socio-economic conditions, livelihoods, municipal services, community stability	Decommissioning Phase	8	5	3	5	80	-	H	• Implement social transition programmes for workers and families. • Provide retraining and reskilling opportunities aligned with alternative sectors (e.g. renewable energy, agriculture, services). • Develop closure plans in alignment with municipal integrated development plans and regional economic frameworks. • Foster partnerships with government and private sector to support diversification projects. • Establish social safety nets and targeted support for vulnerable groups. • Use rehabilitation to restore land for agricultural or alternative productive use.	6	4	3	5	65	-	H

14 SUMMARY OF SPECIALIST REPORTS

The findings of each specialist study are summarised in Table 14-1 below. The table outlines the list of additional specialist investigations undertaken[46], the recommendations provided by the respective specialists, whether these recommendations have been incorporated into the BAR, and the section of the report where their inclusion is reflected. This summary provides a clear link between specialist input and the impact assessment, ensuring transparency and traceability in how recommendations have been addressed.

Table 14-1: Summary of the Specialist Studies

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the BAR (Mark with an X Where Applicable)	Reference to Applicable Section of Report Where Specialist Recommendations have been Included
Hydrogeological Study for Beatrix Mine, compiled by SRK Consulting (SRK , 2019) attached in Appendix B.	The hydrogeological specialist recommends that the effectiveness of existing seepage interception and control infrastructure associated with Beatrix 1, 2 and Shafts be verified and improved where necessary. This includes confirming the performance of the Titanic cut-off trench, sump, and pump station by installing additional monitoring points within and adjacent to the trench system, as well as between the trench and the Theronspruit, to determine whether saline or high electrical conductivity (EC) water is migrating towards surface water receptors. Further investigation is recommended to assess the role of a dolerite dyke intersecting the Theronspruit, which may act as a preferential pathway for contaminated groundwater moving from the mining area towards the river. Geophysical surveys and targeted monitoring boreholes are advised to establish whether this geological feature facilitates the transport of high EC water from the shaft complexes to surface water systems. The specialist emphasises the need for a source–pathway–receptor focused approach, with particular attention to identifying and managing preferential flow paths from pollution sources associated with Beatrix 1, 2 and 3 Shafts. These pathways include stormwater channels, geological structures, underground services, and surface drainage features that may connect contaminated areas to the Theronspruit and adjacent wetlands. From a risk perspective, surface watercourses and groundwater currently in use are identified as the most critical receptors requiring protection. To reduce long term risks to groundwater and connected surface water systems, the specialist recommends reducing the volume of contaminated water circulating within the mine water	X	Section 12.5.12.5.2

[46] The table outlines the list of additional specialist investigations undertaken since the approval of the EA.

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the BAR (Mark with an X Where Applicable)	Reference to Applicable Section of Report Where Specialist Recommendations have been Included
	management system, particularly water conveyed via drainage channels that may contribute to recharge of shallow and deeper aquifers. This reduction is intended to limit plume development and the potential for migration towards surface water receptors. An expanded groundwater monitoring network is recommended for the Beatrix 1, 2 and 3 Shaft area. This includes maintaining up-gradient background monitoring boreholes to track baseline water quality, incorporating additional down-gradient boreholes to monitor plume migration, and installing monitoring points between the Titanic Trench, Titanic Pump Station, and the Theronspruit to confirm whether seepage control measures are functioning as intended. Monitoring of boreholes near workshops for potential hydrocarbon contamination is also recommended. Using a Risk-Based Corrective Action approach, the specialist concludes that impacts to the Theronspruit appear to be localised near the Beatrix shaft complex, with no clear evidence of downstream impacts at the confluence with the Doring River. On this basis, active remediation of the Theronspruit is not recommended at present, unless future monitoring indicates localised ecological impacts on aquatic fauna or flora. Continued monitoring and verification are therefore considered the most appropriate management response for Beatrix 1, 2 and 3 Shafts.		
Biodiversity Baseline Assessment Report, Section D: Wetland Assessment, compiled by NSS (NSS, 2016b) attached in Appendix C.	• Habitat Protection and Buffers ○ Grassland and wetland habitats should be considered of high conservation importance as they support the majority of detected and potentially occurring Conservation Important (CI) species. ○ Buffers should be implemented around sensitive habitats, particularly wetland systems and grassland patches where species such as the African Grass-owl, Giant Bullfrog, and Giant Dragon Lizard were recorded or are highly likely to occur. • Targeted Species Surveys ○ A dedicated survey is recommended to determine the extent and population size of the Vulnerable Giant Dragon Lizard (*Smaug giganteus*) population in the Wolvepan/Rietpan evaporation complex. ○ Additional long term monitoring should be undertaken for threatened mammals (e.g., Black-footed Cat, Brown Hyaena, Southern African Hedgehog), birds (African Marsh-harrier, Secretarybird, Lanner Falcon, Blue Crane, Greater and Lesser Flamingos), and amphibians (Giant Bullfrog). • Management of Threatened Species	X	Section 12.7

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the BAR (Mark with an X Where Applicable)	Reference to Applicable Section of Report Where Specialist Recommendations have been Included
	○ Specific management measures must be put in place to protect detected and potential CI species, including the Aardvark, Natal Long-fingered Bat, African Grass-owl, and Maccoa Duck. ○ Seasonal monitoring of migratory or nomadic species, such as Lesser Kestrels and flamingos, should be conducted. • Mitigation of Potential Threats ○ Activities that could disturb or destroy CI species' habitats (e.g., further development near evaporation pans or grassland patches) should be carefully managed or avoided. ○ Measures to reduce secondary poisoning of birds of prey and waterbirds should be implemented, particularly in response to reports of agrochemical poisoning of "pest" species in the region. • Monitoring and Adaptive Management ○ Monitoring programmes should be established for faunal populations, particularly in grassland and wetland habitats. ○ Adaptive management should be applied, whereby findings from ongoing monitoring inform adjustments in mine planning, operational controls, and rehabilitation programmes. • Collaboration and Stewardship ○ Partnerships with organisations such as the Endangered Wildlife Trust should continue, particularly for species like the Giant Dragon Lizard. ○ Biodiversity stewardship programmes could be used to formalise conservation commitments for sensitive habitats on and around the mine lease area.		
Biodiversity Baseline Assessment Report, Section C: Faunal Assessment, compiled by NSS (NSS, 2016c) attached in Appendix D.	• Biodiversity and Species Conservation ○ Commit to conserving biodiversity features of highest provincial priority, including wetlands, pans, and habitats supporting threatened species such as the Giant Bullfrog (*Pyxicephalus adspersus*), African Grass-owl (*Tyto capensis*), and Giant Dragon Lizard (*Smaug giganteus*). ○ Encourage custodianship of local Conservation Important biodiversity by lessees and landholders, with recognition and incentives, in line with Endangered Wildlife Trust custodianship guidelines. • Fire and Veld Management ○ Prevent and extinguish fires in all sensitive habitats including wetlands, riparian zones, grasslands, and alien bush clumps until a specialist veld condition assessment is completed.	X	Section 12.9

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the BAR (Mark with an X Where Applicable)	Reference to Applicable Section of Report Where Specialist Recommendations have been Included
	○ Reconfigure and maintain fire breaks by using natural drainage channels, roads, and controlled cool burns instead of mowing or herbicides. ○ Engage with the national "Working on Fire" and "FireWise Communities" programmes to integrate community fire management, awareness, and risk reduction. • Waste and Energy Management ○ Collaborate with the DWS "Working on Waste" programme to establish a community-based waste management system, including domestic waste collection, recycling centres, composting facilities, and Integrated Waste Management Plans. ○ Explore opportunities with the "Working for Energy" programme to generate renewable energy from biomass, invasive alien plants, biofuels, mini-grids, solar power, and micro-hydro systems. • Stakeholder Engagement and Awareness ○ Orchestrate biodiversity awareness programmes, including open days, workshops, school outreach (e.g., mini-SASS aquatic biomonitoring events), and voluntary surveys such as Big Birding Days and Frogging Nights. ○ Develop effective communication networks with land occupants and stakeholders through WhatsApp, SMS, email groups, pamphlets, and conspicuous signage. ○ Provide regular updates to stakeholders on biodiversity issues and collaborate on adaptive veld and rangeland management. • Monitoring and Adaptive Management ○ Monitor veld condition regularly to evaluate the impacts of grazing and fire, with annual internal evaluations, external auditing, and a comprehensive review every five years. ○ Incorporate all Biodiversity Management and Action Plan recommendations into the mine's Environmental Management Programme to ensure legal compliance and accountability.		
Air Quality Management Plan (Sibanye, 2016)	• A comprehensive ambient air quality monitoring programme must be established and maintained. This programme should include the monitoring of particulate matter (both PM_{10} and $PM_{2.5}$), dust fall, alpha quartz, heavy metals, and volatile organic compounds. • All operations must ensure full compliance with the requirements of the National Environmental Management: Air Quality Act as well as the conditions of the Atmospheric Emission Licences. • Abatement equipment such as bag filters and scrubbers must be installed and properly maintained at furnaces, kilns and acid tanks in order to control emissions effectively. • Vegetation establishment and surface crusting programmes must be implemented on slimes dams to reduce the potential for dust generation. • Boiler emissions and emissions from the transport of materials must be regularly maintained, managed, and monitored to prevent air quality deterioration.	X	Section 12.10Air Quality

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the BAR (Mark with an X Where Applicable)	Reference to Applicable Section of Report Where Specialist Recommendations have been Included
	• Climate change response measures must be incorporated into operations, including the implementation of energy recovery initiatives and efficiency projects aimed at reducing carbon intensity. • Stakeholder engagement must take place on a regular basis, and there must be transparent disclosure of any exceedances. This includes the submission of accurate reports to the National Atmospheric Emissions Inventory System and the communication of results to regulatory authorities and affected parties.		
Heritage Audit undertaken by PGS Heritage (Pty) Ltd. (PSG, 2017), attached in Appendix E.	• Heritage Management Policy o A Heritage Management Policy must be implemented to provide guidance on the protection, conservation, and mitigation of heritage resources identified within the Beatrix mining area. o This policy should outline actions required when construction, mining, or related activities could affect heritage resources. • Mitigation Measures for Heritage Resources o Any heritage site older than 60 years, including historical farmsteads and outbuildings, may not be altered, demolished, or destroyed without a permit from the South African Heritage Resources Agency (SAHRA) or the Provincial Heritage Resources Authority. o o Archaeological sites, structures, or objects older than 100 years are defined as archaeological resources and require permits prior to any disturbance. • Graves and Burial Grounds o Graves and burial grounds identified (including unmarked graves likely associated with historic homesteads and worker compounds) must be treated as highly significant and managed according to the National Heritage Resources Act, 1999 (Act No. 25 of 1999) and relevant provincial legislation. o Any relocation of graves must follow formal procedures, including public participation and approval by the relevant heritage authority. • Conservation of High Significance Sites o Sites of high or medium significance, such as the Wolwepan farmstead and its associated cemetery, must be conserved in situ where possible. o No-go or buffer zones should be created around sensitive heritage sites. • Recording and Documentation o Sites of medium or lower significance that cannot be conserved should be mapped, recorded, and documented prior to any disturbance or destruction.	X	Section 12.13

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations that have been Included in the BAR (Mark with an X Where Applicable)	Reference to Applicable Section of Report Where Specialist Recommendations have been Included
	○ This includes photographic records, GPS logging, and controlled sampling where appropriate. • Further Specialist Studies ○ Additional fieldwork and heritage assessments must be undertaken if new areas are added to the mining property beyond those covered in the 2017 survey. ○ Continuous monitoring is recommended in undisturbed sections where there is a likelihood of uncovering archaeological remains (such as Stone Age sites). • Legislative Compliance ○ All activities impacting heritage resources must comply with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) and its relevant sections on archaeological sites, palaeontological sites, historical structures, and burial grounds. ○ Developers must obtain permits prior to any intervention.		

15 ENVIRONMENTAL IMPACT STATEMENT

15.1 Summary of the Key Findings of the Environmental Impact Assessment Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

The EIA for the SOFS Operations assessed the environmental and socio-economic implications of establishing and operating a new underground mining front with associated surface infrastructure south of Virginia. The assessment integrated specialist inputs, baseline surveys, and the approved layout to determine potential impacts, the efficacy of mitigation, and residual/cumulative risks for the construction, operational, and decommissioning phases.

15.1.1 Physical and Biophysical Environment

15.1.1.1 Topography and Landform

Construction and operation of shafts, access roads, WRDs, TSFs, evaporation dams, and platforms will introduce engineered landforms into the gently undulating Free State Highveld. Local alteration of micro-relief and drainage pathways is expected within the authorised footprint, while the broader landform character remains intact.

Significance: High (pre-mitigation) due to permanent landform creation; reduced to medium (post-mitigation) with stormwater controls (clean/dirty separation), stable slope geometry (≤1:4), toe drains/energy dissipation, and progressive shaping/revegetation to soften visual and hydrological contrasts.

15.1.1.2 Soils and Land Capability

Site preparation will disturb and compact top-soils; footprints under WRDs, TSFs and evaporation dams will be sterilised for the LoM. Risks include erosion on sandy uplands, gullying in valley bottoms, and local contamination from hydrocarbons/chemicals if unmanaged. Land capability within the footprint will shift from mixed agriculture/grazing to industrial use.

Significance: Medium–high (pre-mitigation) for soil loss/erosion and sterilisation; reduced to low–medium (post-mitigation) through topsoil stripping and conservation, traffic control, erosion controls, spill prevention/response, and progressive rehabilitation. Post closure grazing potential is achievable on rehabilitated areas with ≥300–500 mm soil cover and indigenous revegetation.

15.1.1.3 Groundwater and Surface Water

Dewatering to maintain underground access will induce localised drawdown; seepage risk from residue facilities and evaporation dams could elevate sulphate/chloride in downgradient aquifers if not contained. Surface waters may be affected by altered runoff, sediment transport during earthworks, and accidental releases.

Significance: Medium–high (pre-mitigation) owing to plume formation and erosion/runoff risks; reduced to medium (post-mitigation) via lined/bunded storage, interceptor drains, seepage collection/recovery boreholes, no discharge stormwater design with adequate freeboard (≥1:50 AEP), and routine upstream/downstream monitoring per WUL conditions.

15.1.1.4 Wetlands and Hydrological Systems

Drainage line wetlands and pans within the Merriespruit and Sand River catchments are sensitive to sediment loads, hydroperiod changes, and salinity increases. The approved layout avoids delineated wetlands and applies buffers; residual risk persists from diffuse seepage and altered flow paths if controls lapse.

Significance: Medium (pre-mitigation); medium (post-mitigation) with enforced buffers, sediment traps, clean/dirty water separation, wetland-edge rehabilitation, and invasive species control. No permanent wetland loss is anticipated under the authorised footprint.

15.1.1.5 Biodiversity and Ecological Function

The footprint lies in Grassland Biome units that include Endangered Vaal-Vet Sandy Grassland. Habitat loss and fragmentation will occur where infrastructure is sited in previously cultivated or disturbed land, with remaining natural fragments along drainage lines hosting SCC (e.g., *Boophone disticha* (Bushman's Poison Bulb), *Crinum bulbispermum* (Orange River Lily), *Hypoxis hemerocallidea* (African Potato), and *Eucomis autumnalis* (Pineapple Lily)).

Significance: High (pre-mitigation) for direct habitat loss and SCC disturbance; reduced to medium (post-mitigation) through avoidance of high sensitivity areas, SCC search-and-rescue, progressive rehabilitation with local seed mixes, and alien invasive control along servitudes and wetland margins.

15.1.2 Air Quality, Noise, and Heritage

15.1.2.1 Air Quality

Construction earthworks, unpaved traffic, and exposed WRD and TSF surfaces will generate fugitive dust (TSP, PM_{10} and $PM_{2.5}$); there are no smelter-type point sources in SOFS Phase 1.

Significance: Medium (pre-mitigation); medium–low (post-mitigation) with water-carting/crusting, speed control, rapid stabilisation of surfaces, wind-trigger work stoppages, and boundary monitoring with corrective action.

15.1.2.2 Noise

Plant, fans, vehicles, and construction/demolition equipment will elevate ambient levels episodically; separation distances to receptors limit nuisance potential.

Significance: Medium (pre-mitigation) during peak works; low (post-mitigation) via daytime scheduling, silencers, maintenance, and SANS 10103:2008 compliance monitoring.

15.1.2.3 Heritage

Phase 1 HIA indicates scattered historical/agricultural features and potential archaeological material; chance finds may occur during ground-breaking.

Significance: Medium (pre-mitigation); low (post-mitigation) with mapped exclusion buffers, contractor induction, and a SAHRA-aligned Chance Find Procedure (stop work, record, permit where

required).

15.1.3 Socio-Economic Environment

SOFS will provide construction and long term operational employment, sustain regional procurement chains, and support municipal revenues while offering transition opportunities for the Beatrix workforce as mature shafts wind down. Pressures may arise from in-migration, housing demand, and service load.

Significance: High (Positive) during operations, with risks moderated through local hiring and supplier development, LED, SLP investments, transparent engagement, health and safety programmes, and coordinated planning with municipalities. Decommissioning will be managed via retraining and diversification measures to limit negative shocks.

15.1.4 Cumulative and Residual Impacts

Cumulative effects with the broader goldfields include incremental loss of intact grassland, regional groundwater salinity trends, and reliance on mining for livelihoods. SOFS is designed as a low-impact brownfield expansion that leverages existing servitudes and avoids high sensitivity areas, thereby limiting additive effects.

Residual impacts post closure include engineered landforms (re-profiled TSFs and WRDs), reduced arable potential within permanent footprints, and long term water quality vigilance needs. With progressive rehabilitation, stable slopes, ≥300–500 mm soil cover, and long term hydrometric and quality monitoring, residual impacts are expected to stabilise within acceptable thresholds and support post-mining grazing and open-space land uses aligned with regional planning.

15.2 Summary of the Key Findings of the Environmental Impact Assessment for Beatrix 1, 2 and 3 Shafts

The EIA for the Beatrix 1, 2 and 3 Shafts evaluated the environmental and socio-economic implications of ongoing mining, processing, and associated surface infrastructure. The assessment incorporated specialist studies, site monitoring data, and existing authorisations to determine current environmental performance, residual impacts, and cumulative risks.

15.2.1 Physical and Biophysical Environment

15.2.1.1 Topography and Landform

Mining activities, including the establishment of TSFs, WRDs, evaporation dams, and associated infrastructure, have resulted in localised alteration of the natural topography. Permanent engineered landforms have replaced sections of the gently undulating plains typical of the Free State Highveld. While regional landform character remains intact, local visual and hydrological modifications are evident.

The overall significance of these impacts is rated as high (pre-mitigation) and reduced to medium (post-mitigation) through implementation of stormwater controls, slope stabilisation, and progressive rehabilitation.

15.2.1.2 Soils and Land Capability

Topsoil within operational areas has been disturbed, compacted, or sterilised. Seepage from evaporation dams and residue facilities has contributed to elevated soil salinity and sodicity in some areas. Soil erosion and contamination from hydrocarbons and chemicals remain localised but significant if unmanaged.

Progressive rehabilitation, re-topsoiling, and chemical containment have reduced residual impacts to low–medium significance, ensuring partial recovery of soil function and grazing potential post closure.

15.2.1.3 Groundwater and Surface Water

Groundwater impacts associated with Beatrix 1, 2 and 3 Shafts are primarily linked to underground dewatering, seepage from mining infrastructure, and historical residue management practices. Operational groundwater drawdown is largely confined to the immediate mining area and is assessed as moderate and reversible over the long term. Groundwater quality impacts, including localised increases in salinity and selected metals downgradient of mining infrastructure, are assessed as high at a local scale but are actively managed through seepage interception systems and ongoing monitoring.

Surface water impacts are indirect and episodic, arising from altered drainage patterns, sediment mobilisation, and groundwater–surface water interaction within non-perennial systems of the Sand River catchment, particularly the Theronspruit. Operational infrastructure disrupts natural flow continuity, contributing to erosion, sedimentation, and localised water quality deterioration. Treated effluent discharges from the wastewater treatment works represent a continuous anthropogenic input but are managed in accordance with regulatory requirements. With mitigation, surface water impacts are assessed as low to moderate, localised, and manageable.

During decommissioning, groundwater rebound is expected to occur gradually, with limited risk of uncontrolled decant provided that closure water management measures are maintained. Residual groundwater quality impacts may persist but are expected to attenuate over time. Surface water impacts during decommissioning are anticipated to be temporary, associated mainly with earthworks and rehabilitation activities, and are assessed as low to moderate with effective controls.

15.2.1.4 Wetlands and Hydrological Systems

Wetland systems associated with Beatrix 1, 2 and 3 Shafts include channelled valley-bottom wetlands and depression (pan) wetlands. Operational impacts include altered hydrology, sediment accumulation, water quality degradation, and invasion by alien plant species. Several pan wetlands have been permanently modified through historical incorporation into dirty water and evaporation systems, resulting in irreversible changes to their natural ecological functioning. Channelled valley-bottom wetlands exhibit erosion and sediment infilling, reducing habitat quality.

Without mitigation, wetland impacts are assessed as high; however, implementation of clean and dirty water separation, seepage interception, alien invasive control, and rehabilitation reduces

operational impacts to low significance. During decommissioning, channelled valley-bottom wetlands may experience short-term disturbance but also present opportunities for gradual recovery. In contrast, permanently modified pan wetlands are expected to retain residual impacts post closure. Overall wetland impacts during decommissioning reduce from high to low with mitigation, except where irreversible modification has occurred.

15.2.2 Biodiversity and Ecological Function

The Beatrix mining area is located within the Endangered Gh10 Vaal-Vet Sandy Grassland of the Grassland Biome. Most natural habitat has been transformed through historical mining, agriculture, and infrastructure development. Remaining fragments provide limited biodiversity value but retain ecological and cultural significance.

Several SCC were recorded, including *Boophone disticha* (Bushman's Poison Bulb), *Crinum bulbispermum* (Orange River Lily), *Hypoxis hemerocallidea* (African Potato), and *Eucomis autumnalis* (Pineapple Lily). These occur mainly along riparian corridors and undisturbed buffer zones.

The significance of direct biodiversity loss is high (pre-mitigation) and reduced to medium with implementation of conservation buffers, relocation of SCCs, progressive rehabilitation, and alien invasive species control.

15.2.3 Air Quality, Noise, and Heritage

15.2.3.1 Air Quality

Dust and gaseous emissions originate from TSFs, WRDs, haul roads, and processing plants. Key pollutants include PM_{10}, $PM_{2.5}$, SO_2, and NO_x. Monitoring data indicates general compliance with National Ambient Air Quality Standards, with periodic exceedances during dry or windy conditions.

Implementation of dust suppression, capping of residue facilities, and adherence to the site's AEL have reduced residual impacts to medium significance.

15.2.3.2 Noise

Noise emissions arise from ventilation fans, conveyors, and vehicle movement. Measured levels (average 60 dB(A) near industrial areas) remain within SANS 10103:2008 permissible limits. Noise nuisance potential is low, with overall impact significance rated low post-mitigation.

15.2.3.3 Heritage

Heritage resources identified include historic farm structures, irrigation infrastructure, archaeological scatters, and several cemeteries of cultural importance. All identified sites are protected under the NHRA

No direct disturbance has occurred to date. Mitigation through heritage buffers, monitoring, and chance find procedures ensures compliance and preservation. Residual impacts remain low.

15.2.4 Socio-Economic Environment

Beatrix continues to be a critical socio-economic anchor within the Virginia-Welkom region. As of 2023, the operation employed approximately 6 268 workers (including contractors) and supports a substantial secondary economy through procurement, services, and local supply chains.

Positive impacts include sustained employment, poverty alleviation, municipal revenue, and skills development under the approved SLP. The operation's local expenditure contributes significantly to the revenue of Matjhabeng and Masilonyana Local Municipalities.

Negative social pressures relate to population influx, pressure on services, and health concerns associated with air quality and noise. The overall socio-economic significance is rated high (Positive) during operations, with risks mitigated through continuous community engagement, LED projects, and transparent reporting.

15.2.5 Cumulative and Residual Impacts

Cumulative impacts reflect the combined effects of decades of mining across the Free State Goldfields. These include regional groundwater contamination, loss of natural vegetation, and socio-economic dependency on mining. Beatrix contributes to these cumulative trends but demonstrates effective mitigation through its comprehensive EMS, regular audits, and adaptive management aligned with ISO 14001 principles.

Residual impacts post closure include irreversible landform change, reduced soil productivity, and limited post-mining land capability. Through implementation of progressive rehabilitation and final closure planning, these impacts are expected to stabilise within acceptable environmental thresholds.

15.3 Final Site Map

Refer to the following figures:

- Figure 5-1: Layout map of Beatrix Mine (1, 2, 3 Shaft and Associated Infrastructure)
- Figure 5-2: Layout map of the Wolvepan / Rietpan Evaporation Dam
- Figure 5-3: Locality Map with the proposed surface infrastructure for the DBM Project
- Figure 5-4: Proposed Surface Infrastructure Layout for the DBM Project Gold Plant

15.4 Summary of the Positive and Negative Impacts and Risks of the Proposed Activity and Identified Alternatives

15.4.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

The EIA for the proposed SOFS Operations identified a range of both negative and positive impacts associated with the construction, operational, and decommissioning phases of the project. These impacts vary in magnitude, duration, and spatial extent depending on the environmental parameter affected and the effectiveness of proposed mitigation and management measures. The summary below consolidates the key findings, highlighting the principal areas of environmental concern and

benefit.

15.4.1.1 Summary of Negative Impacts

Physical Environment:

The most notable adverse effects are associated with the disturbance of land and natural drainage systems. During construction, extensive earthworks will alter surface topography, compact soils, and temporarily increase erosion potential. The establishment of engineered landforms such as TSFs and WRDs will permanently modify the landscape and reduce local land capability. Hydrological and hydrogeological systems may experience short-term changes in water levels and flow regimes due to dewatering, excavation, and stormwater management interventions. Accidental spills or seepage from process areas pose potential contamination risks to both surface and groundwater resources.

Biological Environment:

Vegetation clearance will result in the loss of grassland habitat and isolated individuals of SCCs, while noise, dust, and vehicle movement may displace fauna and increase the risk of roadkill. Wetlands and drainage line habitats are particularly sensitive to sedimentation and flow modification during the early construction period. Although these impacts are localised, they require strict implementation of mitigation measures to prevent long term degradation of ecosystem function.

Atmospheric and Acoustic Environment:

Temporary declines in air quality and increases in noise will occur during construction due to vehicle movement, blasting, and material handling. Dust deposition could affect adjacent farmland and homesteads, while construction equipment may raise ambient noise levels above rural background conditions. These impacts are short-lived and reversible through ongoing suppression, maintenance, and timing controls.

Visual and Land Use Aspects:

The introduction of industrial infrastructure into an otherwise open agricultural landscape will alter the visual character of the area. WRDs, TSFs, and shaft complexes will remain prominent features until full rehabilitation and vegetation cover are established. Land within the mining footprint will be permanently converted from agricultural to industrial use for the life of the mine, reducing the area available for crop production or grazing.

Heritage and Socio-Economic Risks:

While the likelihood of direct heritage disturbance is low, inadvertent damage to subsurface artefacts or graves remains possible without adherence to the Chance Find Procedure. Socio-economic risks include population influx, increased pressure on local services, and potential inequality in employment opportunities if recruitment is not transparently managed. At closure, job losses and reduced local business activity could negatively affect household income levels.

Overall, the potential negative impacts are predominantly localised, short- to medium-term, and of low to moderate significance after mitigation. None are considered fatal flaws to project implementation.

15.4.1.2 Summary of Positive Impacts

Economic Growth and Employment:

The project will generate significant economic benefits at local and regional scales. Construction activities will create short-term employment opportunities for skilled and semi-skilled workers, stimulate demand for local goods and services, and provide training that enhances the long term employability of the workforce. During operations, the mine will sustain direct and indirect employment, support supplier networks, and contribute to municipal revenue through taxes and service payments. These positive impacts are rated as moderate to high significance.

Infrastructure Development and Skills Transfer:

The establishment of new access roads, power and water connections, and communication systems will improve local infrastructure and accessibility. Partnerships with local municipalities and contractors will enable capacity building, technology transfer, and improved technical skills among community members.

Social Investment and Community Development:

Implementation of the company's SLP will support local enterprise development, education, and health initiatives. These programmes will have lasting social benefits beyond the life of the project, strengthening community resilience and diversification of the local economy.

Environmental Enhancement and Rehabilitation:

Through effective environmental management, the project will result in improved stormwater and erosion control systems, formalised waste handling procedures, and long term rehabilitation that enhances land stability and vegetation cover. Post closure, rehabilitated areas will provide new grazing and ecological habitats, representing a net environmental improvement compared with the pre-development disturbed agricultural landscape.

Regional and Strategic Contributions:

The project will reinforce the Free State Goldfields' role in sustaining South Africa's mining economy while adhering to responsible E&S governance standards. The alignment with national policy objectives — including job creation, economic transformation, and sustainable resource management — represents a broad positive contribution of high long term significance.

15.4.2 Beatrix 1, 2 and 3 Shafts

The EIA for Beatrix 1, 2 and 3 Shafts evaluated the potential biophysical and socio-economic effects arising from continued mining operations and decommissioning. The findings demonstrate that while the project contributes to unavoidable long term alterations of the physical and ecological

environment, most adverse effects can be effectively mitigated through existing management systems, progressive rehabilitation, and responsible closure planning. At the same time, the Beatrix Operations deliver significant and sustained positive socio-economic benefits to the Matjhabeng and Masilonyana municipalities, underpinning regional livelihoods and infrastructure.

15.4.2.1 Summary of Negative Impacts

Physical and Geochemical Environment:

During operations, the establishment and operation of engineered landforms, including TSFs, WRDs, evaporation dams, and associated infrastructure, have permanently altered local topography and sterilised underlying soils within the mine footprint. These facilities have modified natural drainage patterns, increased erosion risk, and contributed to localised landform instability. Seepage from residue facilities and historical mining infrastructure has resulted in groundwater quality degradation, characterised by elevated sulphate, chloride, and electrical conductivity levels, with localised plumes extending toward the Theronspruit catchment. During decommissioning and closure, groundwater rebound and residual seepage may continue to pose risks of secondary contamination if not adequately managed. In the absence of mitigation, these impacts are assessed as medium to high significance at a local scale and long term in duration; however, with existing seepage interception systems, monitoring, and closure controls, residual impacts are reduced to medium significance.

Soils, Land Capability, and Land Use:

Soil sterilisation within the mine footprint, salinisation from seepage, and hydrocarbon contamination around workshops and storage areas reduce fertility and hinder post-mining rehabilitation. Permanent loss of arable land within operational areas remains unavoidable, constraining land capability to limited grazing potential post closure. Residual soil contamination and compaction could persist for decades if not actively remediated. These impacts are assessed as medium significance after mitigation and high if unmanaged.

Surface Water and Wetland Systems:

Surface water impacts are primarily indirect and episodic, arising from altered drainage patterns, sediment mobilisation, seepage from mining infrastructure, and groundwater–surface water interaction within non-perennial systems, particularly the Theronspruit and associated wetlands. Operational discharges and seepage have contributed to localised deterioration in surface water quality, with elevated salinity and sulphate concentrations affecting aquatic habitat integrity and promoting alien invasive vegetation in wetlands. Several depression (pan) wetlands have been permanently modified through historical incorporation into mine water management systems, resulting in irreversible loss of natural ecological function. During decommissioning, residual seepage and altered hydrology remain risks that require long term monitoring and adaptive management. Without mitigation, impacts to surface water and wetlands are assessed as medium to high significance; with effective stormwater management, seepage interception, and

rehabilitation, residual impacts are reduced to low to medium significance, except where irreversible wetland modification has occurred.

Ecology (Flora and Fauna):

Habitat fragmentation, vegetation loss, and disturbance of grassland and wetland ecosystems have resulted in declining biodiversity. The Endangered Gh10 Vaal-Vet Sandy Grassland and numerous SCCs remain under pressure. Sensitive fauna, including the *Tyto capensis* (African Grass-owl) and *Pyxicephalus adspersus* (Giant Bullfrog), face continued habitat degradation and disturbance. These ecological impacts are medium to high significance during operations but reduce to low to medium with effective rehabilitation, alien plant control, and CI species conservation.

Air Quality and Noise:

Dust and gaseous emissions from residue facilities, vehicle movement, and smelting operations contribute to local air quality degradation. Fine particulate and silica exposure represent potential occupational and community health risks. Although monitoring confirms general compliance with national standards, cumulative emissions remain an ongoing concern. Demolition-phase dust and noise will cause short-term nuisance impacts. With mitigation (dust suppression, equipment maintenance, timing controls), residual effects are low significance.

Heritage and Visual Resources:

Heritage features, including farmstead remains, irrigation infrastructure, archaeological scatters, and burial grounds, are susceptible to disturbance through ground-altering activities and vibration. Visual intrusion from engineered structures alters the rural landscape character. However, these impacts are localised and manageable through heritage management procedures, buffer zones, and progressive rehabilitation. Residual significance is low to medium.

Socio-Economic and Closure Risks:

While operational employment provides significant benefits, dependence on mining creates vulnerability. Mine closure will result in substantial job losses, reduced municipal revenue, and potential social instability. Without proactive transition planning, socio-economic decline could have high short-term significance. Early implementation of retraining, enterprise development, and community-support programmes can reduce this to medium.

15.4.2.2 Summary of Positive Impacts

Economic and Employment Benefits:

Beatrix 1, 2 and 3 Shafts remain a cornerstone of the regional economy, sustaining thousands of direct and indirect jobs. The operations contribute substantially to household income, poverty reduction, and municipal revenue through taxes, rates, and service payments. Local procurement and supplier development further stimulate small business growth. These impacts are rated as high positive significance during operations.

Skills Development and Social Investment:

Ongoing training, bursary, and learnership programmes enhance employee capacity and build transferable skills. Implementation of the SLP and Corporate Social Investment projects supports education, healthcare, and infrastructure in host communities. These initiatives have long term, transformative value and are considered moderate- to high positive.

Environmental Rehabilitation and Legacy:

Progressive rehabilitation of WRDs and TSFs, coupled with erosion control and vegetation establishment, improves long term land stability and restores ecological function. Closure provides opportunities to repurpose rehabilitated land for grazing, renewable energy projects, or conservation use, creating enduring environmental and socio-economic value.

Regional and Strategic Alignment:

The Beatrix Operations align with national and provincial development priorities by promoting economic participation, employment, and responsible resource use. The mine's commitment to environmental compliance and sustainable closure planning strengthens regional resilience and demonstrates best practice in long term environmental stewardship.

16 PROPOSED IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR

The EMPr outlines the framework through which environmental risks associated with the SOFS and Beatrix Operations will be mitigated, monitored, and managed in compliance with relevant legislation, despite the administrative nature of the proposed amendment. While no new development or physical activity is proposed, the EMPr remains critical to maintaining the environmental integrity of the site and ensuring that the consolidation of rights does not compromise ongoing environmental stewardship.

16.1 Key Objectives of the EMPr

The EMPr is guided by the following environmental management objectives:

- To prevent and minimise environmental degradation throughout the LoM.
- To ensure that existing environmental sensitivities and risks—particularly those flagged in specialist assessments—are appropriately managed.
- To facilitate the implementation of best practice mitigation measures based on historical and existing environmental baselines.
- To promote ongoing rehabilitation and restoration of disturbed areas.
- To preserve ecosystem services, biodiversity, and cultural heritage assets.
- To ensure that monitoring, reporting, and corrective action systems are in place for adaptive environmental management.

16.2 Impact Management Outcomes

The impact management outcomes are designed to ensure that both the SOFS (Phase 1 – De Bron Merriespruit Project) and Beatrix 1, 2 and 3 Shafts remain environmentally compliant and operate within approved limits for the duration of the LoM and closure period. These outcomes confirm that environmental performance will be maintained at a level that safeguards ecological integrity, protects human health, and ensures sustainable post-mining land use.

The key outcomes include:

Land and Soil Stability: All disturbed areas must remain structurally stable and free of erosion or subsidence. Landforms created through mining must blend with the surrounding topography, supporting long term stability and post closure land use objectives.

- Water Resource Protection: Surface- and groundwater quality must be maintained within the relevant RQOs and applicable licence conditions under the NWA. Clean and dirty water systems must remain separated, and no uncontrolled discharge of polluted water may occur.
- Air Quality and Noise Management: Air emission and noise levels must remain within applicable national and local standards, ensuring that no nuisance or health impacts occur at surrounding receptors. Continuous dust suppression, equipment maintenance, and operational scheduling must maintain air- and noise-related impacts at low significance levels.
- Waste and Hazardous Material Management: Waste generation must be minimised, and all general and hazardous waste must be handled, stored, and disposed of in accordance with the National Environmental Management: Waste Act (59 of 2008) and relevant municipal bylaws. Evidence of lawful transport and disposal must be retained for auditing.
- Biodiversity and Habitat Integrity: No net loss of biodiversity is permitted in areas of ES. Rehabilitation must progressively restore vegetation cover and ecosystem functionality using indigenous species appropriate to the local biome, with alien and invasive species actively controlled.
- Cultural Heritage Conservation: Heritage resources identified in previous and ongoing surveys must be protected and managed in line with the NHRA. Any chance finds must be reported immediately, and mitigation undertaken with SAHRA approval before work resumes.
- Socio-Economic Sustainability: Employment, procurement, and community development commitments in the SLP must be upheld, ensuring continued socio-economic benefit to the Matjhabeng and Masilonyana Local Municipalities and surrounding communities during operation and closure.
- Progressive Rehabilitation and Closure: Rehabilitation must proceed concurrently with operations, with success measured against criteria for slope stability, vegetation establishment (≥ 70–80 % cover within five years), and non-polluting drainage. Post closure monitoring must verify the attainment of safe, stable, and sustainable conditions before relinquishment.

- Monitoring, Auditing, and Adaptive Management: Environmental monitoring programmes must remain operational for water, air, biodiversity, waste, and rehabilitation performance. Findings must inform adaptive management actions, and independent environmental audits must be submitted to the Competent Authority (CA) in accordance with Regulation 34 of the EIA Regulations.

17 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORISATION

To ensure that the proposed activities are undertaken in an environmentally responsible and legally compliant manner, the following conditions are recommended for inclusion in the EA:

- Implementation of the EMPr: The holder of the EA must implement all mitigation, monitoring, and management measures as detailed in the approved EMPr, including any subsequent amendments approved by the DMPR.
- Progressive Rehabilitation and Closure Planning: Rehabilitation must be undertaken progressively throughout all phases of the project. All disturbed areas must be restored to a safe, stable, non-polluting, and sustainable condition consistent with the final land use objectives. The final Closure Plan must be updated every five years or as required by the DMPR.
- Maintenance of Financial Provision: The holder must provide and maintain adequate financial provision for rehabilitation, decommissioning, and post closure monitoring in accordance with the Financial Provision Regulations, 2015. Proof of annual review and adjustment of the financial provision must be submitted to the DMPR.
- Water Use Compliance: All water uses must be authorised in terms of Section 21 of the NWA. A valid WUL must be obtained and complied with before commencement of any listed water use.
- Environmental Monitoring and Reporting: The holder must implement the environmental monitoring programme described in the EMPr, including surface water, groundwater, dustfall, noise, and biodiversity monitoring. Monitoring results must be submitted to the DMPR and relevant regulatory departments at intervals specified in the EMPr or licence conditions.
- Independent Environmental Audits: External environmental performance audits must be undertaken by an independent auditor at least once every two years (or as otherwise specified) in terms of Regulation 34 of the EIA Regulations, 2014. Audit reports must be submitted to the DMPR within 30 days of completion.
- Incident Management and Reporting: Any environmental incident that may cause significant pollution or degradation must be reported to the DMPR and relevant authorities within 24 hours, in accordance with Section 30 of the NEMA.
- Protection of Heritage Resources: The holder must comply with the provisions of the NHRA. Should any heritage artefacts or graves be discovered during construction or operation, all work must cease in the affected area, and the SAHRA must be notified immediately.

- Post Closure Monitoring: The holder must conduct post closure environmental monitoring for a minimum period of five years following the cessation of mining or related activities to confirm that all rehabilitated areas are stable, non-polluting, and meet the closure objectives.
- Amendments and Adaptive Management: Any changes to the scope of work, technology, or mitigation measures that may alter the nature or extent of environmental impacts must be submitted to the DMPR for approval prior to implementation, in accordance with Regulation 31 of the EIA Regulations, 2014.

18 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

In compiling this report, GCS has relied exclusively on information provided by the client. No independent site inspections were undertaken as part of this assessment. The following assumptions, uncertainties, and knowledge gaps are noted:

- Reliance on client data: Information on mining methods and operational schedules was supplied by the client and is assumed to be accurate and up to date.
- Baseline information: Baseline environmental conditions are based on existing reports and available data. It is assumed that this information remains valid and representative of current site conditions.
- Specialist modelling results: Specialist studies and modelling outputs have been relied upon without independent verification. It is assumed that these remain valid and representative of current site conditions.
- Impact assessments: E&S impacts have been assessed using previously approved studies, with the assumption that no significant changes to operational design or environmental context have occurred since those assessments.
- Socio-economic conditions: Assumptions have been made that current employment levels, regional economic reliance on mining, and community dynamics will remain broadly consistent over the operational life of the mine.
- Monitoring data: Where monitoring data has been used, it is assumed that this data is accurate and collected according to appropriate standards.

Overall, while assumptions and uncertainties exist due to the reliance on secondary information, they are consistent with the level of detail and do not affect the overall confidence in the findings and recommendations presented.

19 REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

19.1 Reasons why the activity should be Authorised or Not

The proposed activity should be authorised as it constitutes an amendment to already authorised

SOFS and Beatrix Operations, and the findings of this BAR confirm that the scope of the proposed changes will not result in any new, significant, or previously unidentified environmental impacts. The original authorisation remains valid, and all potential environmental aspects have been reassessed in accordance with the EIA Regulations, 2014, promulgated under the NEMA. The assessment confirms that the nature, intensity, extent, and duration of impacts remain consistent with those evaluated in the approved EMPr, and that the mitigation and management measures previously committed to remain appropriate and sufficient to ensure compliance with relevant environmental legislation and standards.

From an environmental perspective, the amendment does not introduce new activities or expand the approved footprint. All project components remain confined to areas already authorised for mining and associated infrastructure, and the proposed modifications relate primarily to operational, administrative, or technical refinements. These changes have been reviewed against baseline environmental conditions and specialist findings, which confirm that no additional biophysical, social, or heritage sensitivities will be affected. The mitigation hierarchy established in the EMPr (including avoidance, minimisation, control, and rehabilitation) continues to be effectively implemented through existing site management systems, monitoring programmes, and internal audit procedures.

The continuation of the authorised SOFS and Beatrix Operations will maintain significant socio-economic benefits within the Matjhabeng and Masilonyana Local Municipalities and the broader Free State region. The projects sustain direct and indirect employment, supports SMEs through local procurement, and contributes to municipal revenue and community development commitments outlined in the SLP. Maintaining operational continuity the operations is therefore critical to ensuring socio-economic stability and regional resilience in an area historically dependent on mining.

Technically, the project remains feasible and compliant with approved design parameters. Operational processes, environmental infrastructure, and monitoring networks already established for the existing operations are adequate to manage environmental risks effectively. The project's progressive rehabilitation and closure strategies remain in force, ensuring that all disturbed areas will be returned to a safe, stable, and non-polluting condition aligned with the approved post-mining land use objectives. Financial provision has been confirmed in accordance with the Financial Provision Regulations, 2015, guaranteeing that sufficient funds are available for rehabilitation, decommissioning, and post closure care.

In conclusion, the proposed amendment does not alter the environmental significance ratings previously approved, nor does it introduce new risks or cumulative impacts. All activities remain within the scope of the existing EA, and the mitigation, monitoring, and management measures outlined in the current EMPr remain valid and effective. It is therefore the reasoned opinion of the EAP that the activity should remain authorised, subject to the existing conditions of approval and continued implementation of the EMPr and monitoring programmes to ensure long term

environmental compliance and sustainability.

19.2 Conditions that must be Included in the Authorisation

To ensure that the proposed activities are undertaken in an environmentally responsible and legally compliant manner, the following conditions are recommended for inclusion in the EA:

- Implementation of the EMPr: The holder of the EA must implement all mitigation, monitoring, and management measures as detailed in the approved EMPr, including any subsequent amendments approved by the DMPR.
- Progressive Rehabilitation and Closure Planning: Rehabilitation must be undertaken progressively throughout all phases of the project. All disturbed areas must be restored to a safe, stable, non-polluting, and sustainable condition consistent with the final land use objectives. The final Closure Plan must be updated every five years or as required by the DMPR.
- Maintenance of Financial Provision: The holder must provide and maintain adequate financial provision for rehabilitation, decommissioning, and post closure monitoring in accordance with the Financial Provision Regulations, 2015. Proof of annual review and adjustment of the financial provision must be submitted to the DMPR.
- Water Use Compliance: All water uses must be authorised in terms of Section 21 of the NWA. A valid WUL must be obtained and complied with before commencement of any listed water use.
- Environmental Monitoring and Reporting: The holder must implement the environmental monitoring programme described in the EMPr, including surface water, groundwater, dustfall, noise, and biodiversity monitoring. Monitoring results must be submitted to the DMPR and relevant regulatory departments at intervals specified in the EMPr or licence conditions.
- Independent Environmental Audits: External environmental performance audits must be undertaken by an independent auditor at least once every two years (or as otherwise specified) in terms of Regulation 34 of the EIA Regulations, 2014. Audit reports must be submitted to the DMPR within 30 days of completion.
- Incident Management and Reporting: Any environmental incident that may cause significant pollution or degradation must be reported to the DMPR and relevant authorities within 24 hours, in accordance with Section 30 of the NEMA.
- Protection of Heritage Resources: The holder must comply with the provisions of the NHRA. Should any heritage artefacts or graves be discovered during construction or operation, all work must cease in the affected area, and the SAHRA must be notified immediately.
- Post Closure Monitoring: The holder must conduct post closure environmental monitoring for a minimum period of five years following the cessation of mining or related activities to confirm that all rehabilitated areas are stable, non-polluting, and meet the closure objectives.
- Amendments and Adaptive Management: Any changes to the scope of work, technology, or

mitigation measures that may alter the nature or extent of environmental impacts must be submitted to the DMPR for approval prior to implementation, in accordance with Regulation 31 of the EIA Regulations, 2014.

20 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The EA is required for the full LoM, including the closure and post closure aftercare phases, until such time as a closure certificate is issued by the DMPR in terms of the MPRDA.

Given that the SOFS Operations are projected to have a LoM of approximately 20 years, the EA must therefore remain valid for at least 20 years from the commencement of operations, with provisions for ongoing environmental management, financial provision, and post closure monitoring until the site achieves a stable, non-polluting, and sustainable end-land use consistent with the approved EMPr and closure objectives.

21 UNDERTAKING

Sibanye Gold, confirm that:

- The information provided in this Basic Assessment Report (BAR) and EMPr is to the best of their knowledge true and correct.
- All mitigation measures, monitoring requirements, and rehabilitation commitments contained in the EMPr will be implemented and maintained for the duration of the project.
- They will ensure that adequate financial, human, and technical resources are available to meet these obligations.
- This Undertaking applies equally to both the BAR and the EMPr and remains valid until a closure certificate is issued in terms of Section 43 of the MPRDA.

21.1 Undertaking Under Oath/Affirmation

I, Kahmani Gounden wear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature:

Sibanye Gold Proprietary Limited:

Date: 15/01/2026

Signature of the Commissioner of Oaths:

Date: 15/01/2026

COMMISSIONER OF OATHS (RSA)
Wendy Sherriff CA(SA)
63 Wessel Road, Woodmead
Johannesburg

I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, that he/she does not have any objection to taking the oath, and that he/she considers it to be binding on his/her conscience, and which was sworn to and signed before me

at Rivonia on this the 15 day of January 20 26 and that the administering oath complied with the regulations contained in Goverment Gazette No. R1258 of 21 July 1972, as amended.

22 FINANCIAL PROVISION

In accordance with the Financial Provisioning Regulations, 2015) and GN R1147 (Appendix 4), the consolidated closure liability for the Beatrix (1, 2 and 3 Shafts with associated infrastructure) and SOFS (Phase 1 De Bron Merriespruit Project) has been determined as follows (exclusive of VAT):

- Unscheduled (immediate/premature) closure: R 864 870 755.90
- Scheduled (planned end-of-life) closure: R 744 223 291.86

These figures provide for rehabilitation, decommissioning and post closure aftercare to achieve safe, stable and non-polluting conditions and to meet relinquishment criteria.

22.1 Explain how the Aforesaid Amount was Derived

The amounts were derived from the rehabilitation and closure planning contained in:

- Southern Free State Mining Operation EIA and EMPr (GCS, 2023).
- Final Rehabilitation, Decommissioning and Mine Closure Plan – Beatrix Gold Mine (WSP, 2023), with an integrated update and cost review by WSP reflecting the mine plan horizon to 2042.

Method summary (aligned to GN R1147, Appendix 4):

- Scope definition: All disturbed and to-be-disturbed footprints at final closure, including shafts and collars; metallurgical/processing areas; TSFs (reshaping, cover, drainage and revegetation); WRDs; return/evaporation dams; PCDs; roads/servitudes and power reticulation; offices/workshops; water management systems; monitoring boreholes; fencing and signage.
- Closure strategy basis: Three-phase plan (Decommissioning and removal; Landform and ecological recovery; Maintenance/monitoring and aftercare) with objectives tied to baseline land capability, hydrological integrity and Grassland Biome restoration.
- Quantification: Measured quantities from layout and GIS layers; unit rates from recent contractor schedules and benchmarks; productivity and access factors; allowances for hazardous material handling and licensed disposal where required.
- Engineering and professional fees: Design, supervision, quality control and independent audits.
- Monitoring and aftercare: Minimum 3 years post closure groundwater and surface water monitoring, slope/erosion inspections, vegetation performance, alien invasive control and reporting to DMPR.
- Risk and contingency: Contingency applied per facility class and risk (e.g., TSF cover, seepage control, subsidence management).

- Regulatory compliance: Cost model structured per GN R1147 line items; VAT excluded from the stated totals; annual CPI-linked escalation and three-year formal review cycles to reflect footprint changes, inflation and new information.

22.2 Confirm that this Amount can be Provided for from Operating Expenditure

The DMPR currently holds a valid and enforceable financial guarantee (Reference No. CQ/G/30309/1024/018) issued in favour of the Minister Responsible for Mineral Resources and Energy. This financial guarantee, issued by Centriq Insurance Company Limited (FSP 3417) on 3 October 2024, provides assurance of the mine's compliance with the statutory obligation to determine and maintain financial provision for prospecting, exploration, mining, and production operations in accordance with Regulation 8 of the Financial Provisioning Regulations, 2015 (GN R1147).

In line with Regulation 11 of GN R1147, the financial provision will continue to be:

- Reviewed annually and updated in accordance with changes to the mine plan, operational footprint, and closure cost model.
- Audited and verified by an independent specialist to confirm accuracy and adequacy.
- Maintained through an approved financial instrument (bank or insurer guarantee) lodged with the DMPR to ensure immediate accessibility by the Minister, should rehabilitation or closure obligations not be met.

This mechanism ensures that sufficient, ring-fenced financial resources are always available to achieve the long term objectives of safe, stable, and non-polluting post-mining conditions, in accordance with the Financial Provisioning Regulations, 2015, NEMA and the MPRDA.

23 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

The sections below provide additional information in support of the application and should be considered by the CA.

23.1 Impact on the Socio-Economic Conditions of any Directly Affected Person

The mining operations within the SOFS and Beatrix will have both positive and negative implications for directly affected individuals, surrounding landowners, and communities.

The most significant positive impact will be the maintenance of existing employment and income security. Sibanye Gold remains one of the largest employers in the Free State Goldfields, providing direct and indirect employment to thousands of individuals, many of whom support extended families in nearby towns and rural settlements. Continued mining will preserve these livelihoods, maintain household income levels, and reduce the socio-economic strain associated with potential mine closure or downsizing. Local procurement and contracting will also stimulate secondary economic activity in the transport, engineering, retail, and service sectors, while the company's SLP commitments will continue to support education, skills development, small business incubation,

and community infrastructure projects.

However, several short-term negative effects may occur during construction and early operational phases of the SOFS Operations. Landowners in proximity to the proposed infrastructure may experience temporary disruption to agricultural activities, limited access to certain land portions, and increased movement of construction vehicles. These impacts will be mitigated through negotiated access agreements, compensation where applicable, and strict adherence to environmental management procedures. The potential influx of work seekers during the construction phase could place additional pressure on local services and housing, but Sibanye Gold's Local Employment Policy and engagement with municipal authorities will minimise unplanned in-migration and ensure recruitment transparency. Health, safety, and nuisance impacts such as dust, noise, and traffic will be managed through the approved EMPr mitigation measures.

From a long term perspective, the operation will continue to support municipal financial stability by contributing to local rates, taxes, and service payments, which in turn fund public infrastructure and social service delivery. The socio-economic benefits are therefore expected to outweigh potential short-term disturbances. Should operations not proceed, the "no-go" scenario would result in significant economic decline, job losses, and increased poverty within the region. Overall, the project will contribute positively to socio-economic conditions, provided that mitigation measures, stakeholder engagement, and SLP commitments are consistently implemented throughout the project life cycle.

23.2 Impact on any National Estate Referred to in Section 3(2) of the National Heritage Resources Act

The PGS Heritage Audit (2017) and Archaetnos Cultural Heritage Assessment (2011) identified several heritage features within the broader Beatrix and SOFS areas that fall under the National Estate as defined in Section 3(2) of the NHRA. These include historical structures, burial grounds, and isolated archaeological artefacts of local significance.

No sites of high national importance occur within the immediate development footprint, and the majority of recorded heritage resources can be preserved in situ through avoidance and site demarcation. Any required disturbance or relocation of graves or heritage features will be undertaken under permit from the Provincial Heritage Resources Authority – Free State and in accordance with Section 35 and 36 of the NHRA.

Sibanye Gold has adopted a Heritage Management Position Statement and Plan that outlines procedures for avoidance, mitigation, and monitoring during project implementation. With adherence to these requirements and continued liaison with Provincial Heritage Resources Authority – Free State, the potential heritage impacts are considered low to moderate and fully manageable.

24 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

No additional matters are required in terms of Section 24(4)(A) and (B) of the Act.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

25 DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

25.1 Details of the Environmental Assessment Practitioner

The details of the EAP have been provided in Part A, Section 2.2 of this report.

25.2 Description of the Aspects of the Activity

The activities are described in Section 5 of Part A of this report.

25.3 Composite Map

Figure 25-1 illustrates the spatial extent of the Sibanye Gold Proprietary Limited Beatrix and SOFS operational areas (shown with a bold yellow boundary) in relation to key regional ecological and hydrological sensitivities. The underlying base layers include the Terrestrial CBAs and ESAs as identified in the Free State Biodiversity Plan. Areas classified as CBA 1 and CBA 2 represent land of high conservation priority required to meet biodiversity targets, while ESA 1 and ESA 2 areas provide ecological processes and landscape connectivity.

Wetland features are displayed according to the National Wetland Map 5, identifying wetland types such as channelled and unchannelled valley-bottom wetlands, floodplain systems, seep wetlands, and depression wetlands. Several perennial and non-perennial watercourses traverse the operational boundary, including tributaries associated with the Sand River system.

Figure 25-1 demonstrates that portions of the SOFS footprint intersect with ecologically sensitive and wetland-supporting landscapes, highlighting the need for carefully planned development, avoidance of high sensitivity zones where feasible, and the application of buffers and mitigation measures to maintain ecological integrity and hydrological function. The inset locality map provides the regional context of the operations relative to the towns of Welkom and Virginia in the Free State Province.

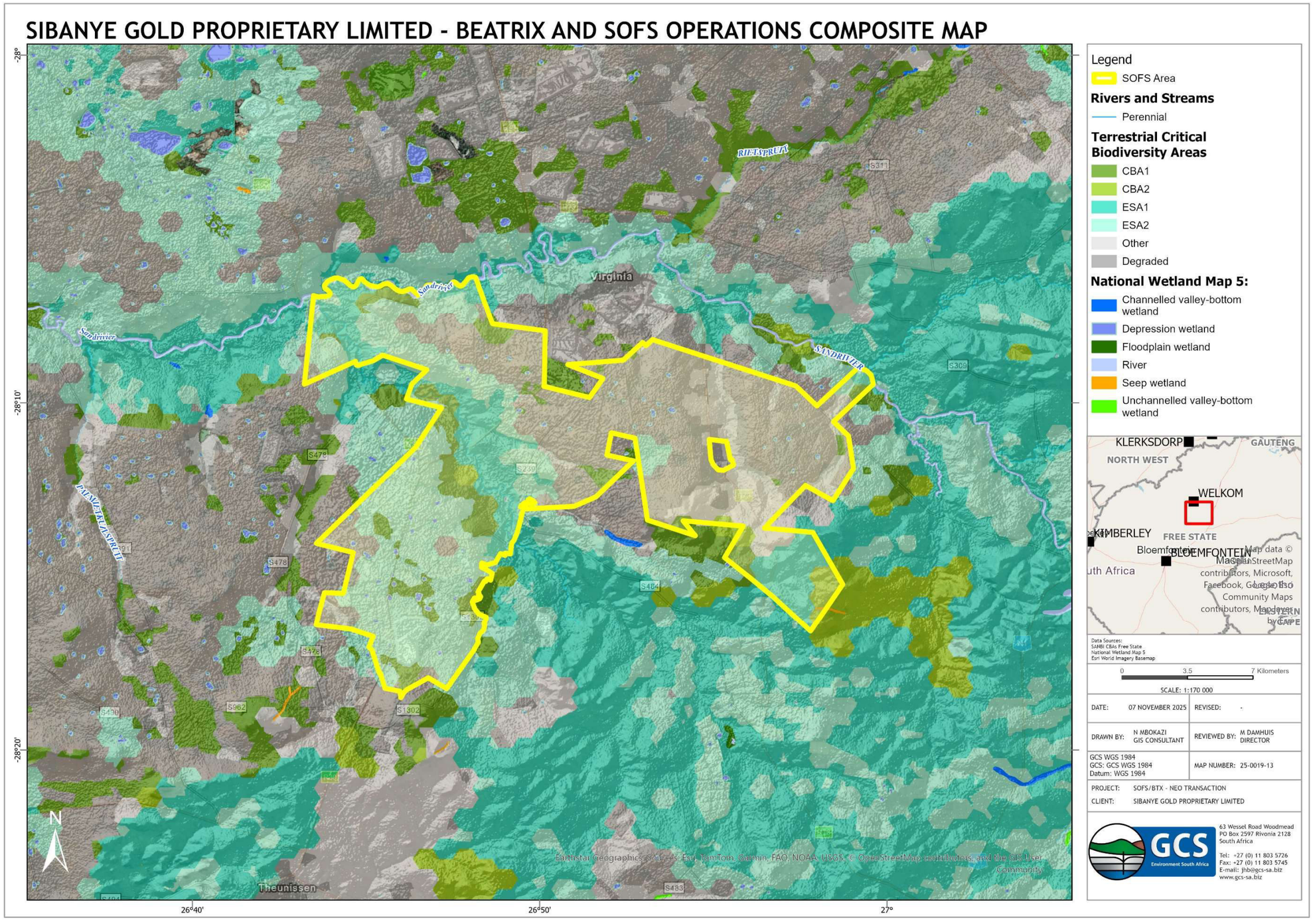


Figure 25-1: Composite Map

25.4 Description of Impact management objectives including management statements

25.4.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

The primary objective of impact management for the SOFS Operations is to ensure that all construction, operational, and closure activities are conducted in a manner that prevents or minimises negative E&S effects, while enhancing socio-economic benefits. Impact management is guided by the approved EMPr and associated specialist studies.

Management objectives focus on:

- Landform stability and erosion control: Maintain stable, erosion-free slopes across all disturbed areas by implementing stormwater and rehabilitation measures.
- Water resource protection: Prevent pollution of surface and groundwater by ensuring effective separation of clean and dirty water systems in compliance with GN 704 under the NWA.
- Soil and vegetation management: Preserve and reuse topsoil for rehabilitation and re-establish indigenous vegetation communities to restore ecological function.
- Air and noise management: Maintain dustfall below 600 mg/m^2/day and operational noise within SANS 10103 limits.
- Waste and hazardous-substance control: Implement integrated waste management procedures in accordance with the National Environmental Management: Waste Act (59 of 2008).
- Biodiversity conservation: Protect remaining natural habitats and SCCs, applying buffers and rehabilitation plans for wetlands and grasslands.
- Socio-economic upliftment: Promote local procurement, employment, and enterprise development through the SLP.
- Heritage protection: Avoid or mitigate any disturbance to archaeological and historical resources under the NHRA.

25.4.2 Beatrix 1, 2 and 3 Shafts

Impact management for the Beatrix Operations aims to maintain safe, compliant, and sustainable mining and closure conditions while preventing long term degradation of land, water, and ecological systems.

Key objectives include:

- Landform and soil rehabilitation: Progressively shape and stabilise tailings and waste rock facilities to minimise erosion and promote vegetation recovery.
- Groundwater and surface water protection: Prevent further plume migration by managing

seepage through interception, pumping, and water treatment measures.

- Air quality management: Control dust from haul roads, TSFs, and waste facilities via suppression and progressive capping.
- Waste and chemical management: Maintain bunded areas, spill response systems, and licensed waste disposal to eliminate secondary pollution.
- Biodiversity restoration: Re-establish grazing and habitat functionality consistent with post-mining land use objectives.
- Socio-economic sustainability: Continue employment and procurement initiatives through SLP commitments and manage closure transitions with local authorities.
- Heritage and safety compliance: Ensure protection of heritage resources and maintain public safety measures around shafts and open workings.

25.5 Determination of Closure Objectives

The overarching closure vision is to ensure that, once operations cease, all disturbed areas are safe, stable, and non-polluting, allowing the land to be reintegrated into surrounding agricultural and eco-tourism land uses.

Key objectives include:

- Returning all disturbed land to an acceptable post-mining condition that approximates its pre-development state.
- Achieving stable, free-draining landforms to prevent erosion or ponding.
- Ensuring all tailings and waste storage facilities are capped, vegetated, and engineered to prevent dust generation and water contamination.
- Re-establishing natural drainage patterns and connectivity of streams and wetlands.
- Promoting the self-sustaining recovery of indigenous vegetation, while implementing long term alien plant control.
- Removing or repurposing redundant infrastructure and safely sealing shafts and other hazardous openings.

These closure measures are to be implemented progressively and maintained until the site demonstrates long term ecological and structural stability.

25.5.1 Volumes and Rate of Water Use Required for the Operation

25.5.1.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

Refer to Section 5.2.11 for the detailed SOFS Operations water balance.

25.5.1.2 Beatrix 1, 2 and 3 Shafts

Detailed volumetric data are contained within the approved Water Use Licence (WUL 08/C42K/AEFJG/8739) and associated IWWMP.

25.5.2 Has a Water Use Licence been Applied for?

Beatrix operates under an existing WUL 08/C42K/AEFJG/8739, dated 31 October 2018 and the subsequent amendment of 21 April 2021.For a copy of the WUL refer to Appendix F.

25.6 Impacts to be mitigated in their respective phases

25.6.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

The table below is intended to guide implementation and compliance monitoring during all stages of the project life cycle from planning and design, pre-construction, and construction, through to operation, rehabilitation, closure, and post closure. It should be read together with the detailed impact assessment tables (Table 13-1 to Table 13-4) and the environmental monitoring programme (Section 26), which further elaborate on monitoring indicators, frequencies, and responsibilities.

Table 25-1: Summary of Environmental Impacts and Mitigation Measures for the Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
Rezoning and Environmental Authorisation	Planning / Pre-construction	Administrative – no ground disturbance	Prepare and submit applications for rezoning and environmental approvals including Environmental Impact Assessments and Management Programmes, Social and Labour Plans, and Water Use Licences. Engage with the Department of Mineral and Petroleum Resources (DMPR), Department of Forestry, Fisheries and the Environment (DFFE), and Department of Water and Sanitation (DWS) to ensure full compliance. No construction or site clearance may begin until all approvals are granted. Retain all records of decisions for audit purposes.	National Environmental Management Act (Act 107 of 1998) (NEMA); Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA); National Water Act, 1998 (Act 36 of 1998) (NWA)	Prior to construction
Vegetation Clearance and Site Preparation	Construction	Moderate – localised to footprint area	Clearly demarcate construction boundaries using stakes or fencing to prevent accidental disturbance outside approved zones. Phase vegetation clearance to minimise exposed soil surfaces. Stockpile topsoil separately at a maximum height of 1.5 metres for later rehabilitation. Implement erosion control measures such as silt traps, berms, and contour drains. Inspect and maintain erosion prevention structures weekly and after heavy rainfall. Prohibit the use of heavy vehicles outside demarcated areas. Ensure all vehicles are fitted with drip trays to prevent hydrocarbon leaks.	NEMA; NWA Government Notice (GN) 704; South African National Standard (SANS) 1929 (dustfall monitoring standard); SANS 10103 (noise)	During construction
Topographical Alteration and Earthworks	Construction / Operation	Significant – long term alteration from waste dumps and infrastructure	Design waste rock dumps and stockpiles to align with the surrounding landform and natural slope to ensure long term stability. Shape waste facilities progressively, applying rock cladding or grassing to stabilise slopes and reduce erosion. Drainage systems must divert clean water away from disturbed areas and capture dirty water in containment facilities. Regular inspections should confirm structural integrity of embankments and identify erosion channels for repair.	NEMA; NWA GN 704	During and after construction
Hydrology and Surface Water Management	Construction / Operation	Moderate – altered drainage and potential sedimentation	Develop a comprehensive Stormwater Management Plan separating clean and dirty water systems. Construct cut-off drains, diversion berms, and sediment control ponds around active work areas. Monitor turbidity and suspended solids in discharge points. Maintain natural drainage where possible, avoiding unnecessary channelisation. Rehabilitate temporary drainage lines after construction to restore flow connectivity.	NWA; GN 704	Before and during construction; ongoing during operation
Geology and Mining Operations	Operation	Large – permanent alteration of geological strata	Restrict mining to approved boundaries defined in the Mining Right. Conduct pre-mining geological mapping to avoid undermining or instability. Prevent infrastructure development over potentially mineralised areas. Maintain updated mine plans and submit revisions to DMPR when new resource zones are identified. Conduct stability and geotechnical monitoring of underground workings to detect early signs of ground movement.	MPRDA; Mine Works Programme Requirements	During operation
Groundwater Protection and Pollution Control	Operation / Closure	Moderate to high – contamination risk from dirty water systems	Line all pollution control dams, fuel storage areas, and process ponds with impermeable geomembranes to prevent seepage. Install groundwater monitoring boreholes upstream and downstream of mining facilities and test for pH, electrical conductivity, sulphates, nitrates, and metals monthly. Maintain clean and dirty water separation, ensuring spillages are immediately contained and contaminated soil removed. At closure, conduct a final groundwater quality audit and remediate any contamination through soil removal or in situ treatment.	NWA; GN 704; SANS 10299-4 (design, construction and testing of boreholes)	Continuous during operation and closure
Waste Management	Construction / Operation / Closure	Moderate – general and hazardous waste generation	Implement a Waste Management Plan covering classification, segregation, storage, and disposal. Store all hazardous substances such as oils, hydrocarbons, and solvents in bunded areas with concrete flooring and spill containment capacity of at least 110% of the largest container. Recycle non-hazardous waste where feasible and dispose of remaining waste at licensed landfills. Maintain a waste inventory register, inspect storage areas weekly, and train workers on spill response and waste segregation.	National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA); NEMA	Throughout project life
Radiation and Public Safety	Operation	Localised – exposure to	Develop a Radiation Management Plan specifying roles, responsibilities, and	National Nuclear Regulator Act (Act 47 of 1999)	Prior to and during

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures	Compliance with Standards	Time Period for Implementation
		naturally occurring radioactive materials	monitoring procedures. Obtain a Certificate of Registration from the National Nuclear Regulator before operation. Conduct baseline radiation monitoring at the site boundary and update quarterly. Restrict access to areas with elevated radioactivity. Provide radiation awareness training to all staff. Display signage in accordance with regulatory requirements.		operation
Heritage and Archaeological Site Protection	Pre-construction / Construction	Localised – within areas of known heritage value	Identify and map heritage resources before earthworks. Fence off known archaeological and cultural sites with visible signage. Conduct toolbox talks to train construction teams on heritage protection. Establish a Chance Find Procedure to stop work immediately and notify the South African Heritage Resources Agency if artefacts, fossils, or graves are discovered. Prohibit unauthorised access to protected areas.	National Heritage Resources Act, 1999 (Act 25 of 1999)	Prior to and during construction
Flora, Fauna, and Wetlands	Construction / Operation	Moderate – loss of vegetation and habitat disturbance	Limit clearing to essential areas. Relocate protected species under permits. Maintain a minimum 32-metre buffer from wetlands and 100 metres from rivers. Implement a Wetland Management and Rehabilitation Plan to restore degraded systems, control erosion, and remove alien vegetation such as *Phragmites australis* and *Arundo donax*. Rehabilitate disturbed areas with indigenous plants suited to local conditions and monitor success through seasonal ecological surveys.	National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004); DWS Wetland and Riparian Buffer Determination Method (Macfarlane & Bredin, 2017)	During and post-construction
Air Quality and Dust Control	Construction / Operation	Moderate – dust generation from haulage and excavation	Develop and implement a Dust Control Plan. Water unpaved roads and exposed areas regularly, especially during dry and windy conditions. Fit vehicles with tarpaulins when transporting loose materials. Install windbreaks and vegetative screens near sensitive receptors. Conduct monthly dustfall monitoring at site boundaries and maintain levels below SANS 1929 limits. Suspend dust-generating activities during extreme wind conditions.	National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) (NEMAQA); SANS 1929 (dustfall monitoring standard)	During construction and operation
Noise and Vibration Management	Construction / Operation	Moderate – machinery and blasting impacts	Restrict noisy operations to daylight hours (07:00–18:00). Notify nearby communities before blasting events. Use silencers on equipment and acoustic barriers where sensitive receptors are within 500 metres. Maintain all mechanical equipment to avoid unnecessary noise. Conduct quarterly noise level measurements to ensure compliance.	SANS 10103 (noise measurement); Provincial Noise Control Regulations under NEMAQA	During construction and operation
Socio-economic Impacts and Property Values	Pre-construction / Construction / Operation	Regional – community and landowner effects	Conduct a baseline property valuation of all affected properties within the project area. Engage affected landowners in consultation to address concerns related to land access, compensation, and noise or dust impacts. Develop a Local Economic Development Plan focusing on local employment, training, and small business procurement. Establish a grievance mechanism for community members. Maintain transparent communication through regular stakeholder meetings.	MPRDA; Social and Labour Plan Requirements	Prior to and throughout operation
Rehabilitation and Post closure Monitoring	Closure / Post closure	Site-wide – all disturbed areas	Implement the approved Mine Closure and Rehabilitation Plan, replacing topsoil, stabilising slopes, and re-vegetating with native species. Inspect rehabilitated areas monthly for erosion, vegetation cover, and invasive species. Maintain fencing to restrict access until the site is safe. Monitor water and soil quality for at least five years post closure and submit annual reports to the authorities.	NEMA, Financial Provision Regulations (Government Notice Regulation (GN R) 1147); DMPR Mine Closure Guidelines	During closure and post closure

25.6.2 Beatrix 1, 2 and 3 Shafts

This table outlines the environmental impacts requiring mitigation during all project phases of the Beatrix 1, 2, and 3 Shaft operations. It presents each activity's scale, associated risks, and the detailed mitigation measures necessary to prevent, minimise, or rehabilitate adverse impacts.

Table 25-2: Impacts to Be Mitigated in Their Respective Phases for Beatrix Operations (1, 2, and 3 Shafts)

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures (Expanded)	Compliance with Standards / Practices	Time Period for Implementation
Deep-level mining below surface	Operational	Large-scale, underground only; minimal surface disturbance	Implement routine geotechnical monitoring to identify early signs of rock instability or subsidence; restrict underground blasting to controlled sequences; ensure backfilling of mined-out areas where feasible; maintain updated mine plans and report subsidence risks to the Department of Mineral and Petroleum Resources (DMPR).	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA); Mine Health and Safety Act, 1996 (Act 29 of 1996); Mandatory Code of Practice for Rockfall and Rockburst Control	Continuous during operation
Establishment of waste rock dumps (WRDs), tailings storage facilities	Construction / Operational	Moderate to extensive surface disturbance;	Engineer facilities with appropriate liners and drainage; establish clean and dirty water separation; install perimeter berms, silt traps, and stormwater	National Water Act, 1998 (Act 36 of 1998) (NWA), Government Notice (GN) 704 704	During construction and continuously during

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures (Expanded)	Compliance with Standards / Practices	Time Period for Implementation
(TSFs), evaporation dams, and associated infrastructure		permanent alteration of terrain	cut-off drains; conduct weekly inspections for erosion, seepage, and slope instability; progressively rehabilitate inactive areas by contouring and establishing vegetative cover.		operation
Decommissioning and rehabilitation of WRDs, TSFs, and evaporation dams	Decommissioning / Closure	Extensive alteration of landform and soil cover	Remove and relocate contaminated soils; shape and compact landforms to ensure long term stability; spread topsoil evenly over reshaped areas at a minimum depth of 150 mm; seed with a mix of indigenous grass species; establish surface drainage to prevent ponding; inspect bi-annually for erosion and vegetation success until stability achieved.	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)	At cessation of activity and during closure
Excavation and operation of slimes dams and WRDs	Operational	Significant; potential alteration of soil structure and drainage patterns	Strip and separately stockpile topsoil before deposition; monitor pH, electrical conductivity, and salinity of soils; install perimeter containment drains and return water systems; vegetate outer slopes to control erosion; conduct quarterly inspections and report on structural integrity.	NWA, GN 704; South African National Standard (SANS) 1929 (dustfall monitoring standard)	During operation
Fuel storage, chemical handling, vehicle servicing, and waste disposal	Operational	Localised, potential for hydrocarbon contamination	Store fuel and lubricants in bunded areas with impermeable concrete floors; bund capacity ≥ 110% of largest container; provide spill kits and train staff in spill response; inspect storage areas weekly; remove and bioremediate contaminated soil immediately; keep detailed incident and waste registers.	NWA; NEMA; SANS 10089	Ongoing during operation
Decommissioning of workshops and storage areas	Decommissioning / Closure	Moderate	Empty and decontaminate all tanks and drums before dismantling; excavate and treat hydrocarbon-impacted soils using bioremediation or removal to licensed disposal site; backfill excavations with clean fill; verify through confirmatory testing that residual hydrocarbons are below acceptable limits.	National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEMWA)	During closure activities
Gold processing plant operation	Operational	Large-scale, continuous; risk of chemical spills and emissions	Maintain chemical storage and mixing areas under roof and bunded; perform quarterly leak detection; ensure all process water is recycled through return systems; conduct annual groundwater monitoring; install emergency shut-off valves; keep updated inventory of reagents and Material Safety Data Sheets.	NWA; Occupational Health and Safety Act, 1993 (Act 85 of 1993)	Throughout operation
Decommissioning of processing facilities	Decommissioning	Moderate to high	Drain and clean all tanks; remove hazardous substances; dismantle structures under controlled conditions; salvage recyclable components; treat contaminated soil and dispose of hazardous waste at licensed facilities; monitor groundwater for a minimum of 5 years post closure.	NWA; GN 704; NEMWA	During closure and post closure
Workshops and maintenance facilities	Operational	Localised	Maintain concrete floors with oil-water separators; inspect drains weekly; provide secondary containment for oil storage; ensure waste oil collected by licensed contractors; keep spill kits accessible and functional; log all maintenance activities and incidents.	NWA; NEMWA	Throughout operation
Waste management and salvage yards	Operational	Site-wide potential for waste generation	Segregate waste at source (hazardous, non-hazardous, recyclable); maintain labelled containers; store hazardous waste under cover; dispose through licensed service providers; conduct monthly audits; maintain waste inventory register.	NEMWA	Continuous during operation
Tailings disposal (Beatrix No. 2 TSF)	Operational	Large and long term	Maintain freeboard of ≥ 0.8 m; inspect pipelines daily for leaks; monitor phreatic levels and seepage zones monthly; install groundwater boreholes upstream and downstream; rehabilitate outer walls progressively with indigenous vegetation; update Emergency Preparedness Plan annually.	NWA; GN 704; Code of Practice for Mine Residue Deposits	Continuous during operation
Water management facilities (dams, sumps, canals)	Operational	Extensive site coverage; potential contamination of surface water	Design facilities to contain 1-in-50-year storm events; install diversion berms; sample surface water monthly at all discharge points; inspect for leakage or overflow; repair immediately if non-compliance detected.	NWA	Continuous during operation
Wetlands and surface water systems	Operational / Closure	Moderate	Maintain buffer zones of at least 32 m; prevent encroachment or alteration of hydrology; rehabilitate with indigenous species post-disturbance; monitor wetland condition index annually; control invasive alien species.	National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004); DWS Wetland and Riparian Buffer Determination Method (Macfarlane & Bredin, 2017)	Throughout operation and closure
Vegetation clearing and road construction	Construction / Operational	Large, impacting vegetation and soil	Clearly demarcate construction footprint; restrict clearing to approved areas; stockpile topsoil ≤ 1.5 m high; establish erosion control berms; revegetate road verges with indigenous grasses post-construction.	NEMA, NEMBA	During and after construction
Faunal disturbance (noise, lights, traffic)	Operational	Site-wide	Avoid night-time blasting; reduce light pollution using downward-facing lights; install fauna crossings near natural corridors; train staff on wildlife protection protocols.	SANS 10103 (noise measurement); Provincial Noise Control Regulations under NEMAQA	Continuous during operation
Heritage resources (archaeological sites, graves)	Construction / Operational	Localised	Conduct pre-construction surveys; fence and signpost heritage sites; train workers on chance find procedures; notify South African Heritage Resources Agency (SAHRA) within 24 hours of discoveries; stop work pending assessment.	National Heritage Resources Act, 1999 (Act 25 of 1999)	Prior to and during ground disturbance
Air quality (dust, emissions, vehicle movement)	Construction / Operational / Decommissioning	Widespread, site-wide	Apply water to haul roads daily during dry conditions; cover trucks; limit vehicle speed to 40 km/h; rehabilitate exposed surfaces promptly; monitor dust fallout monthly; report exceedances to authorities.	National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004); SANS 1929 (dustfall monitoring standard)	Throughout operation and decommissioning
Noise and vibration (mining, processing, demolition)	Operational / Decommissioning	Localised	Fit equipment with silencers; maintain machinery; erect noise barriers around high-noise sources; restrict noisy activities to 07:00–18:00; monitor noise	SANS 10103 (noise measurement); Provincial Noise Control Regulations under NEMAQA; SANS	During all noisy activities

Activities	Phase	Size and Scale of Disturbance	Mitigation Measures (Expanded)	Compliance with Standards / Practices	Time Period for Implementation
			quarterly.	10328 (vibration measurement)	
Socio-economic impacts (employment, procurement)	Operational / Closure	Regional	Prioritise local employment and skills transfer; support small and medium enterprises; communicate closure timelines early; provide retraining and alternative livelihood programmes.	MPRDA; Social and Labour Plan Requirements	Continuous during operation and closure
Rehabilitation and closure	Closure / Post Closure	Large-scale; permanent	Implement Closure Plan progressively; replace topsoil; seed with indigenous species; install erosion controls; monitor vegetation success bi-annually; maintain post closure water and soil monitoring for ≥ 5 years.	NEMA, Financial Provision Regulations (Government Notice Regulation (GN R) 1147); DMPR Mine Closure Guidelines	At cessation of activities and during post closure period

25.7 Impact Management Outcomes

25.7.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

This table summarises the impact management outcomes identified for each listed and non-listed activity associated with the SOFS Operations. It outlines the potential environmental impacts, the aspects affected, the phase during which the impact may occur, and the type of mitigation required to prevent, minimise, or remedy adverse effects. The table further specifies the performance standards and measurable outcomes that must be achieved to ensure compliance with the approved EMPr and relevant national legislation.

Table 25-3: Impact Management Outcomes and Performance Standards for the SOFS Operations (Phase 1 – De Bron Merriespruit Project)

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved / Management Outcome
Rezoning and Environmental Authorisation	Project delay or unlawful commencement without approvals	Legal compliance and administrative processes	Planning / Pre-construction	*Modify* through administrative authorisation and legal compliance	All statutory authorisations obtained before any ground disturbance; compliance with the National Environmental Management Act, 1998 (Act No. 107 of 1998), the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), and the National Water Act, 1998 (Act No. 36 of 1998).
Blasting and Shaft Development	Ground vibration, fly-rock, noise, and air overpressure affecting nearby receptors	Topography, Soil Stability, Infrastructure, Noise Environment	Construction / Operation	*Control* through blasting design, vibration monitoring, and community notification	Peak particle velocity ≤ 12 mm/s at nearest dwelling; no fly-rock or damage beyond property boundary; noise ≤ 85 decibels (A) at source and ≤ 55 decibels (A) at receptors in accordance with South African National Standard (SANS)10103.
Vegetation Clearing and Site Preparation	Soil erosion, dust generation, and habitat loss	Soils, Flora and Fauna, Air Quality	Construction	*Control* through phased clearing, erosion control, and dust suppression	Topsoil stockpiled ≤ 1.5 metres high and vegetated; no visible erosion gullies; dust fallout below 600 milligrams per square metre per day (SANS 1929).
Earthworks, Roads and Topographical Alteration	Disturbance of landform and natural drainage	Landform, Surface Water	Construction / Operation	*Modify* through design and *Remedy* through recontouring	Stormwater channels and cut-off drains constructed before bulk earthworks; post-rehabilitation slopes ≤ 18°; no evidence of ponding or sediment-laden runoff leaving site.
Surface Drainage and Stormwater Systems	Contaminated runoff and sedimentation of watercourses	Hydrology, Surface Water Quality	Construction / Operation	*Control* through stormwater management and maintenance	100 % separation of clean and dirty water achieved; sediment traps functioning effectively; discharge water meeting site-specific Resource Quality Objectives (RQO).
Waste Rock Dumps and Tailings Storage Facilities	Landform change, erosion, and potential leachate generation	Land Capability, Surface Water, Groundwater	Operation / Closure	*Control* through engineered design and monitoring	Facilities built to geotechnical design standards; slopes stabilised and vegetated; no seepage or overtopping; groundwater chemistry within baseline variation (±10 %).
Water Supply Dams and Pollution Control Dams	Seepage and contamination of surface or groundwater	Hydrology and Groundwater Quality	Construction / Operation	*Control* through lining, water quality monitoring, and maintenance	Dams lined with impermeable geomembrane (< 1×10^{-9} m/s permeability); spillways sized for 1-in-50-year storm; no uncontrolled discharge; monthly sampling meeting RQO.
Workshops and Fuel Storage Areas	Hydrocarbon spills and soil contamination	Soil, Groundwater	Operation	*Control* through containment and emergency preparedness	Bunded containment ≥ 110 % capacity of largest container; hydrocarbon absorbents on site; zero untreated hydrocarbon spill reaching soil or stormwater.
Stockpiling and Material Handling Areas	Dust, compaction, and contamination of soil	Soil and Air Quality	Construction / Operation	*Control* through dust suppression and housekeeping	Stockpiles vegetated if inactive > 30 days; compacted areas rehabilitated at closure; dust levels within SANS 1929 limits.
Processing Plant and Material Transfer Points	Air pollution and noise	Air Quality, Noise, Health and Safety	Operation	*Control* through engineering containment and monitoring	Stack emissions compliant with National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) requirements; occupational noise < 85 decibels (A); ambient noise ≤ 55 decibels (A) at boundary.
Road Haulage and Transport Routes	Dust, noise, and traffic safety risks	Air Quality, Noise, Safety and Health	Construction / Operation	*Control* through watering, signage, and speed enforcement	Watered at least twice daily in dry periods; vehicle speeds ≤ 40 km/h; zero serious traffic incidents attributable to project traffic.
Pipelines and Water Conveyance Systems	Erosion and leakage	Surface Water, Soil Stability	Construction / Operation	*Modify* through design and *Control* through inspection	Pipelines pressure-tested before commissioning; no visible leaks; erosion protection in place at stream crossings.
Power Lines and Electrical Infrastructure	Visual intrusion and electrocution of avifauna	Visual Quality, Avifauna and Safety	Construction / Operation	*Modify* through alternative routing and bird-friendly design	Power lines routed outside sensitive receptors; bird diverters installed; visual blending achieved through colour matching with landscape.
Workforce Accommodation and Ablutions	Wastewater contamination and odour nuisance	Soil, Groundwater, Social Health	Construction	*Control* through sanitation management and waste control	All ablutions chemical or linked to sealed septic tanks; no discharge to surface water; sanitation inspections weekly.
Offices, Stores and Workshops	General waste generation and safety hazards	Waste Management, Health and Safety	Operation	*Control* through waste segregation and housekeeping	Waste segregated at source; storage areas clean and secure; no windblown litter; audits conducted monthly.
Air Quality and Dust Emissions	Air pollution from haulage and excavation	Air Quality	Construction / Operation	*Control* through watering, vehicle covers, and monitoring	Dustfall < 600 mg/m²/day at boundary; activities suspended during high-wind events; dust complaints logged = 0.

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved / Management Outcome
Noise and Vibration	Nuisance to communities and workers	Noise Environment, Health and Safety	Construction / Operation	*Control* through equipment maintenance, barriers, and scheduling	Daytime ≤ 55 dB(A), night-time ≤ 45 dB(A) at property boundary; worker exposure < 85 dB(A).
Fauna and Flora Interaction	Habitat loss and species disturbance	Terrestrial Ecology	Construction / Operation	*Control* through avoidance, relocation, and rehabilitation	All protected species relocated under permit; vegetation cover ≥ 80 % of baseline within 2 years after rehabilitation; no wildlife mortality from operations.
Wetlands and Riparian Areas	Disturbance to wetland function and hydrology	Wetlands and Biodiversity	Construction / Operation	*Modify* through avoidance and buffer zones	32-metre buffer maintained from outer edge of wetland; post-construction wetland condition rating ≥ baseline ecological category.
Heritage and Archaeological Sites	Loss or damage to heritage resources	Cultural Heritage	Pre-construction / Construction	*Stop* through avoidance and *Control* through Chance Find Procedure	No disturbance to recorded sites; any chance finds managed per South African Heritage Resources Agency requirements; full documentation maintained.
Groundwater Use and Monitoring	Drawdown and pollution of aquifers	Groundwater Quantity and Quality	Operation / Closure	*Control* through monitoring and adaptive management	Quarterly groundwater levels and quality within RQO; immediate corrective action on exceedances; full records submitted to Department of Water and Sanitation.
Socio-Economic and Employment Activities	Community conflict and inequitable benefit distribution	Socio-Economic Conditions	Pre-construction / Construction / Operation	*Control* through labour management and stakeholder engagement	Minimum 60 % local labour employment; implementation of Social and Labour Plan projects; active grievance register maintained.
Public Safety and Security	Unauthorised access and accidents	Safety and Security	All Phases	*Control* through fencing and security management	Perimeter fencing intact 100 %; 24-hour security presence; zero public injuries recorded.
Rehabilitation and Mine Closure	Unstable landforms, erosion, residual pollution	Land Capability, Surface and Groundwater	Closure / Post closure	*Remedy* through recontouring, topsoiling, and revegetation	Slopes stable (< 5 % erosion); vegetation cover ≥ 80 % of reference condition within 5 years; water quality within RQO.
Post Closure Monitoring	Long term pollution or rehabilitation failure	Soil, Water, Flora and Fauna	Post closure	*Control* through environmental monitoring and maintenance	Monitoring continued for minimum five years; results confirm compliance with closure objectives and post-mining land use criteria.

25.7.2 Beatrix 1, 2 and 3 Shafts

This table presents the impact management outcomes and performance standards for the Beatrix Operations (1, 2, and 3 Shafts). It identifies the potential environmental impacts associated with key project activities, specifies the mitigation approach to be implemented, and defines the measurable environmental standards or performance outcomes required to ensure compliance with the approved EMPr.

Table 25-4: Impact Management Outcomes and Performance Standards for Beatrix Operations (1, 2, and 3 Shafts)

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved / Management Outcome
Underground mining operations	Potential ground instability, subsidence, and safety risks	Geology and Topography	Operational	*Control* through geotechnical design, backfilling, and monitoring	Zero surface subsidence; continuous geotechnical stability confirmed through monitoring reports to Department of Mineral and Petroleum Resources (DMPR); compliance with Mine Health and Safety Act, 1996 (Act No. 29 of 1996).
Waste rock dumps (WRDs), tailings storage facilities (TSFs), evaporation dams	Landform alteration, erosion, and potential contamination of soil and water	Land Capability, Soils, Surface Water, and Groundwater	Construction / Operational	*Control* through stormwater control, progressive rehabilitation, and monitoring	Stormwater separation maintained 100%; slope erosion < 5%; no uncontrolled discharge; dust levels within South African National Standard (SANS) 1929 limits; groundwater quality remains within Department of Water and Sanitation (DWS) Resource Quality Objectives (RQO).
Construction and rehabilitation of TSFs and WRDs	Erosion, sedimentation, and soil compaction	Landform and Surface Hydrology	Decommissioning / Closure	*Remedy* through recontouring, topsoiling, and vegetation establishment	Post closure slopes stable (≤18°); ≥80% indigenous vegetation cover achieved within 3 years; no visible erosion gullies.
Fuel storage, hydrocarbon handling, and vehicle maintenance	Soil and groundwater contamination	Groundwater and Soil Quality	Operational	*Control* through containment and spill prevention	Bunded containment ≥110% capacity; no hydrocarbon spills reaching soil or water; quarterly groundwater monitoring results within baseline ranges.
Workshops and maintenance facilities	Hydrocarbon leakage and waste oil spills	Soil and Groundwater	Operational	*Control* through bunding, waste collection, and staff training	All oil separators functional; no visible oil residue in drains; all waste oil removed by licensed service providers; no contamination of monitoring boreholes.
Processing plant operation	Chemical contamination, dust and air emissions, and noise	Air Quality, Water Quality, Health and Safety	Operational	*Control* through engineering design, containment, and monitoring	Stack emissions below National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) limits; occupational noise ≤85 dB(A); dust levels ≤600 mg/m²/day (SANS 1929); no chemical leaks recorded.
Decommissioning of processing plant	Residual contamination and structural instability	Soils, Groundwater, Air Quality	Decommissioning / Closure	*Remedy* through decontamination and demolition control	All hazardous materials removed; confirmatory soil and groundwater samples within baseline; no structures remaining that pose safety or contamination risk.
Water management infrastructure (canals, dams, pipelines)	Contaminated runoff and leakage	Surface Water and Groundwater	Operational	*Control* through maintenance, lining, and inspection	No untreated water released to the environment; lined dams impermeability ≤1×10^{-9} m/s; monitoring results within RQOs.
Surface drainage and stormwater management	Flooding, sedimentation, and contamination	Surface Water, Soils	Construction / Operational	*Modify* through drainage design and *Control* through monitoring	Clean and dirty water systems separated 100%; no contaminated discharge; drainage structures inspected monthly and maintained.
Road construction and vehicle movement	Dust emissions, noise, and soil compaction	Air Quality, Noise, Soil Structure	Construction / Operational	*Control* through dust suppression, traffic control, and erosion management	Vehicle speed ≤40 km/h; dust levels remain within SANS 1929 limits; no off-site sedimentation; noise ≤55 dB(A) at sensitive receptors.
Power lines and electrical infrastructure	Visual intrusion and avifaunal electrocution	Visual and Ecological Aspects	Construction / Operational	*Modify* through route design and installation of bird	Power lines located outside high sensitivity zones; bird diverters installed on spans near wetlands; visual intrusion minimised by appropriate colour and placement.

Activity	Potential Impact	Aspects Affected	Phase	Mitigation Type	Standard to be Achieved / Management Outcome
				diverters	
Accommodation and ablution facilities	Wastewater leakage and odour nuisance	Soil, Groundwater, and Health	Construction	*Control* through sanitation and waste management	Sanitation facilities sealed and serviced weekly; no visible leakage; no wastewater discharge to the environment.
Air emissions (dust, blasting fumes, vehicle exhaust)	Air pollution and visibility reduction	Air Quality	Construction / Operational / Decommissioning	*Control* through dust suppression and monitoring	Dust fallout ≤600 mg/m²/day in accordance with SANS 1929; blasting impacts comply with SANS 10328: Methods and Criteria for the Prediction of Vibration and Airblast Overpressure from Surface Blasting; noise levels comply with SANS 10103: Measurement and Rating of Environmental Noise; complaints register maintained with zero unresolved cases.
Noise and vibration (mining, blasting, plant operation)	Community nuisance and worker hearing loss	Noise Environment, Health, and Safety	Construction / Operational	*Control* through acoustic barriers, scheduling, and equipment maintenance	Noise ≤55 dB(A) at boundary and ≤85 dB(A) within plant; blasting vibration ≤12 mm/s at nearest receptor; complaints resolved within 48 hours.
Wetlands	Loss of wetland function, erosion, and contamination	Wetlands, Surface Hydrology, Biodiversity	Operational / Closure	*Modify* through avoidance and *Control* through rehabilitation	32 m buffer maintained; wetland condition ≥ baseline Present Ecological State category; alien vegetation eradicated; no discharge of dirty water into wetlands.
Vegetation clearing and habitat disturbance	Loss of biodiversity and increased erosion	Flora, Soils, Biodiversity	Construction / Operational	*Control* through phased clearing and revegetation	Clearing confined to approved footprint; alien invasive species controlled; 80% vegetation recovery within 3 years post-disturbance.
Faunal disturbance (noise, lights, traffic)	Wildlife displacement or mortality	Fauna and Habitat Connectivity	Operational	*Control* through reduced lighting, wildlife crossings, and awareness training	Zero recorded wildlife fatalities due to site operations; faunal corridors remain functional; lighting directed downward and shielded.
Heritage and archaeological resources	Damage or destruction of historical or cultural artefacts	Heritage Resources	Construction / Operational	*Stop* through avoidance and *Control* through Chance Find Procedure	No disturbance of identified heritage sites; all chance finds reported to SAHRA within 24 hours; heritage registers maintained.
Socio-economic and community relations	Labour disputes, inequitable employment, loss of livelihood	Socio-economic Environment	Operational / Closure	*Control* through local employment, consultation, and retraining	≥60% local labour force; active Social and Labour Plan projects implemented; retrenchment plan developed and approved before closure.
Rehabilitation and mine closure	Residual pollution, erosion, and unsafe landforms	Land Capability, Soils, Water Resources	Closure / Post closure	*Remedy* through topsoiling, seeding, and erosion control	Rehabilitated areas stable with ≤5% erosion; vegetation cover ≥80% of reference condition within 5 years; water quality within RQOs; annual closure audit compliant with National Environmental Management Act, 1998 (Act No. 107 of 1998) and the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).
Post closure monitoring and maintenance	Long term instability or pollution	Soil, Water, Flora, and Fauna	Post closure	*Control* through monitoring and adaptive management	Monitoring continues for ≥5 years post closure; groundwater and surface water within baseline; site meets final land use and sustainability objectives.

25.8 Impact Management Action

25.8.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

This table describes the specific impact management actions that will be implemented to achieve the environmental objectives and outcomes identified in the preceding sections. It defines how each activity will be managed in practice, specifying the timing of implementation and the standards that must be met to ensure full compliance with the approved EMPr and relevant legislation.

Table 25-5: Impact Management Actions for the SOFS Operations (Phase 1 – De Bron Merriespruit Project)

Activity	Potential Impact	Mitigation Type	Time Period for Implementation	Compliance with Standards / Practices
Excavations and Foundation Works	Alteration of landform, drainage disturbance, erosion	*Modify* through engineering design and stormwater control measures	During construction and ongoing maintenance	National Water Act, 1998 (Act 36 of 1998) (NWA) — Regulation GN 704 (activities in or near watercourses); Department of Water and Sanitation (DWS) Best Practice Guidelines (BPGs) for stormwater and mine residue management.
Blasting and Shaft Development	Fly-rock, vibration, and noise	*Control* through blasting controls, monitoring, and scheduling	During construction and operation phases when blasting occurs	Mine Health and Safety Act, 1996 (Act 29 of 1996) (MHSA) and DMPR Blasting Code of Practice (COP)/Guidelines; South African National Standard (SANS) 10103 (The measurement and rating of environmental noise); community notifications ≥ 24 h in advance; vibration limits per site-specific standard/permit.
Stockpiling of Topsoil and Overburden	Soil compaction, dust, and erosion	*Remedy* through stockpile vegetation and dust control	During construction and rehabilitation	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA) principles; stockpiles ≤ 1.5 m and stabilised; dust fallout per SANS 1929 (Settling dust) — typically ≤ 600 mg/m²/day at residential receptors.
Waste Rock Dumps and Tailings Storage Facilities	Seepage, sedimentation, and slope failure	*Control* through engineered design and ongoing inspections	During operation and closure	NWA — GN 704 (clean/dirty water separation); DWS Best Practice Guidelines for Tailings and Mine Residue Deposits; DMPR Guideline for the Compilation of a Mandatory Code of Practice for Mine Residue Deposits (MHSA).
Surface Water Dams and Pollution Control Dams	Contaminated runoff and seepage	*Control* through lining and stormwater management	During construction and operation	NWA (Dam Safety Regulations, where applicable); DWS design criteria (e.g., containment and freeboard); permeability and monthly water quality monitoring to site-specific limits.
Workshops and Fuel Storage Areas	Hydrocarbon spills and groundwater contamination	*Control* through bunded containment, spill kits, and staff training	Throughout operation	NEMA s28 (Duty of Care) and NWA s19 (Prevention and remedy of pollution); bunding ≥ 110% of largest vessel; relevant SANS 10089 series (petroleum storage and handling) and SANS 10228/10229 (classification/packaging of dangerous goods), as applicable.
Processing Plant and Material	Air pollution, noise, and fugitive dust	*Control* through enclosure, dust	During operation	National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) (NEMAQA) —

Activity	Potential Impact	Mitigation Type	Time Period for Implementation	Compliance with Standards / Practices
Handling		suppression, and acoustic barriers		applicable Listed Activity/Atmospheric Emission Licence (AEL) limits; SANS 10103 for environmental noise at boundary.
Road Haulage and Transport Routes	Dust emissions and traffic safety	*Control* through dust suppression, speed enforcement, and driver training	During construction and operation	Water/dust suppressants in dry conditions; enforce 40 km/h on site roads; dust fallout per SANS 1929; vehicle roadworthiness per Road Traffic legislation.
Pipelines and Conveyance Systems	Leakage, erosion, and contamination	*Modify* through design and *Control* through inspection and maintenance	During construction, commissioning, and operation	NWA — GN 704 (containment and separation); pressure testing before commissioning; applicable SANS 2001 construction series (replaces SANS 1200) for civil works.
Power Lines and Electrical Infrastructure	Electrocution of birds and visual intrusion	*Modify* through design and *Control* through monitoring	During construction and operation	Eskom Bird & Power Line Interaction Guidelines (2018) and BirdLife SA guidance; maintain 32 m exclusion/buffer from wetlands per general DWS practice where relevant; authorisations under NEMA/Listed Activities where applicable.
Accommodation, Ablutions, and Camps	Wastewater and sanitation pollution	*Control* through waste management and sanitation maintenance	During construction and decommissioning of camps	National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEMWA) and municipal bylaws; sealed toilets/septic tanks serviced regularly; no discharge to land/surface water (compliance with NWA).
Offices, Stores, and Workshops	General waste generation and poor housekeeping	*Control* through segregation, recycling, and inspections	During operation	NEMWA (waste classification, storage, transport, disposal) and NEMA s28; labelled containers; weekly housekeeping inspections.
Air Quality (Dust and Emissions)	Dustfall, reduced visibility, and community nuisance	*Control* through dust suppression, monitoring, and reporting	Continuous during construction and operation	NEMAQA; ambient monitoring and dust fallout per SANS 1929; complaints register and response within 24 h.
Noise and Vibration	Disturbance to receptors and health impacts	*Control* through equipment maintenance, barriers, and scheduling	Throughout construction and operation	SANS 10103 (environmental noise) for rating/limits; time-of-day restrictions (07:00–18:00); blasting vibration per site-specific standard and MHSA COP.
Flora and Fauna Disturbance	Loss of vegetation and displacement of fauna	*Control* through avoidance and rehabilitation	During site clearance and rehabilitation	National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA); species permits where required; retain buffers; rehabilitate with indigenous species; Alien & Invasive Species Regs under NEMBA.
Wetlands and Riparian Zones	Disturbance to wetland function and hydrology	*Modify* through avoidance and buffer maintenance	During construction and operation	NWA — GN 704 (activities near watercourses); DWS Buffer Determination Method (Macfarlane & Bredin, 2017); maintain ≥ 32 m buffer unless authority-approved alternative with mitigation.
Heritage and Archaeology	Damage or loss of heritage resources	*Stop* through avoidance and *Control* through Chance Find Procedure	Pre-construction and during excavation	National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA); notify SAHRA immediately; work stoppage until clearance.
Groundwater Use and Monitoring	Aquifer drawdown and pollution	*Control* through monitoring and adaptive management	Continuous during operation and closure	NWA authorisation (GA/WUL) conditions; quarterly monitoring vs. site Resource Quality Objectives (RQOs); SANS 10299-4 (test-pumping and borehole management) where applicable; remediation on exceedance.
Socio-Economic and Labour Practices	Community dissatisfaction or inequality	*Control* through stakeholder engagement and local employment	Pre-construction, construction, and operation	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA) Social and Labour Plan (SLP) requirements; ongoing stakeholder engagement per NEMA PPP requirements for relevant processes.
Public Safety and Security	Unauthorised access, accidents, and theft	*Control* through access management and security patrols	Throughout all phases	MHSA (risk management, Health & Safety COPs); perimeter fencing and access control; zero harm objective reporting to DMPR.
Rehabilitation and Closure	Land instability, erosion, and pollution	*Remedy* through recontouring, topsoiling, and revegetation	Upon cessation of individual activities and upon mine closure	NEMA Financial Provision Regulations (GN R1147 of 2015, as amended) for closure liability and plans; DMPR Mine Closure Guidelines (2021); performance criteria (e.g., ≥ 80% vegetation cover, stable slopes).
Post Closure Monitoring	Residual pollution or rehabilitation failure	*Control* through long term monitoring and maintenance	For a minimum of 5 years post closure	Annual reporting to DMPR and DWS against closure objectives, WUL/EA conditions, and NEMA s28 ongoing duty of care.

25.8.2 Beatrix 1, 2 and 3 Shafts

This table presents the impact management actions identified for the Beatrix Operations (1, 2, and 3 Shafts) in accordance with the approved EIA and EMPr. It outlines the specific activities that may give rise to environmental impacts, the associated mitigation or management actions to be implemented, the timeframe for their application, and the relevant environmental standards or legislative requirements governing compliance.

Table 25-6: Impact Management Actions for Beatrix Operations (1, 2, and 3 Shafts)

Activity	Potential Impact	Mitigation Type / Management Action	Time Period for Implementation	Compliance with Standards / Practices
Deep-level mining below surface	Potential subsidence or geological instability	Implement geotechnical monitoring; control underground blasting sequences; maintain up to date mine plans; conduct routine inspections and report findings to Department of Mineral and Petroleum Resources (DMPR).	Throughout operational phase	Mineral and Petroleum Resources Development Act, 2002 (Act 28 of 2002) (MPRDA); Mine Health and Safety Act, 1996 (Act 29 of 1996) (MHSA); Mandatory Code of Practice for Rockfall and Rockburst Control (issued under MHSA)
Construction and operation of waste rock dumps (WRDs), tailings storage	Alteration of topography, erosion, and surface water runoff	Develop and maintain a Stormwater Management Plan; install berms,	Construction and operational phases	National Water Act, 1998 (Act 36 of 1998) (NWA); Government Notice (GN) 704 of 1999 – Regulations on Use of Water for Mining and Related Activities; Best Practice Guidelines for

Activity	Potential Impact	Mitigation Type / Management Action	Time Period for Implementation	Compliance with Standards / Practices
facilities (TSFs), and evaporation dams		drains, and cut-offs; conduct erosion monitoring; progressively rehabilitate slopes.		Mine Residue Deposits (DWS, 2007–2008)
Decommissioning and rehabilitation of WRDs, TSFs, and evaporation dams	Instability and erosion of rehabilitated landforms	Re-contour and stabilise slopes; establish indigenous vegetation cover; inspect for erosion; maintain stability until vegetation establishment.	During decommissioning and closure phases	National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA); Mine Closure Guidelines (DMPR, 2021); Financial Provisioning Regulations, 2015 (GN R1147), as amended 2021
Excavation and operation of slimes dams and waste disposal sites	Soil salinisation and erosion	Strip and stockpile topsoil; monitor salinity and erosion; rehabilitate progressively with indigenous vegetation.	Throughout operational phase	NWA; GN 704 of 1999; South African National Standard (SANS) 10286:2008 – The South African Code of Practice for Mine Residue Deposits; SANS 1929:2019 – Dustfall Monitoring Standard
Fuel storage and handling of hydrocarbons and chemicals	Soil and groundwater contamination	Store fuel in bunded areas; provide spill kits; train staff; inspect weekly; remove contaminated soil for remediation.	Continuous during operation	National Environmental Management Act (NEMA) – Section 28 Duty of Care; SANS 10089-1:2013 – Petroleum Storage and Handling; National Water Act (NWA) requirements for pollution prevention
Workshops and maintenance facilities	Hydrocarbon leaks, waste oil contamination	Maintain oil-water separators; inspect drainage; ensure licensed disposal of waste oil; record maintenance actions.	Continuous during operation	National Environmental Management: Waste Act, 2008 (Act 59 of 2008) (NEMWA); SANS 10299-11 – Construction and Performance Requirements for Water Boreholes; SANS 5667-11 – Groundwater Sampling
Gold processing plant operation	Spills, water contamination, and chemical exposure	Bund all chemical storage areas; recycle process water; implement leak detection; conduct annual groundwater monitoring.	Throughout operational phase	NWA; Occupational Health and Safety Act, 1993 (Act 85 of 1993) (OHSA); IFC Environmental, Health and Safety Guidelines for Mining (as supplementary good practice)
Decommissioning of process facilities	Residual contamination, waste generation	Drain and clean all tanks; dismantle and salvage equipment; treat contaminated soils; monitor groundwater for 5 years post closure.	Decommissioning and closure phases	NEMWA; NWA; GN 704 of 1999
Vegetation clearing and road construction	Erosion, habitat disturbance, and topsoil loss	Demarcate footprint areas; limit clearance; stockpile topsoil ≤1.5 m high; install erosion control measures; revegetate roadsides.	Construction phase	National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) (NEMBA); Alien and Invasive Species Regulations (GN R102 of 2014, as amended); NEMA EIA Regulations (2014, as amended)
Wetland and surface water crossings	Sedimentation, hydrological alteration	Maintain 32 m buffer; avoid instream construction; implement sediment control; rehabilitate crossings post-use.	Construction and operational phases	NWA; GN 704 of 1999; DWS Wetland and Riparian Buffer Determination Method (Macfarlane & Bredin, 2017) (guideline)
Air emissions and dust from roads and TSFs	Dust fallout and air quality degradation	Apply water for dust suppression; cover trucks; limit vehicle speed to 40 km/h; monitor dust fallout monthly.	Construction and operational phases	National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004) (NEMAQA); National Dust Control Regulations, 2013 (GN R827); SANS 1929:2019 Dustfall Standard
Noise and vibration from blasting and machinery	Noise pollution affecting fauna and nearby residents	Schedule blasting during daylight hours; maintain silencers; monitor noise quarterly; erect noise barriers where required.	Operational and decommissioning phases	SANS 10103:2008 – Environmental Noise Assessment; SANS 10328 – Noise Impact Assessment Methods; SANS 10137 – Vibration Exposure in Buildings
Heritage sites and cultural resources	Damage or disturbance to archaeological sites	Conduct pre-construction heritage surveys; implement chance find procedures; notify SAHRA if heritage resources are discovered.	Pre-construction and construction phases	National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA)
Socio-economic impacts (employment, procurement)	Local economic displacement or inequality	Prioritise local hiring; support small enterprises; provide retraining during closure; maintain stakeholder engagement.	Operational and closure phases	MPRDA Regulations (GN R527 of 23 April 2004), Regulations 42–46 – Social and Labour Plans
Rehabilitation and closure	Incomplete rehabilitation and post closure instability	Implement progressive rehabilitation; restore drainage patterns; seed with indigenous species; monitor for erosion and vegetation cover.	Closure and post closure phases	NEMA; Financial Provision Regulations (GN R1147 of 2015, as amended 2021); DMPR Mine Closure Guidelines (2021)

26 MONITORING

26.1 Proposed SOFS Operations (Phase 1 De Bron Merriespruit Project)

26.1.1 Geohydrological and Hydrological Monitoring Programme

The objective of the geohydrological and hydrological monitoring programme will be to ensure that the site's water management systems perform effectively, act as an early warning system for potential impacts, verify compliance with licence conditions, and provide reliable data for reporting and decision-making. These objectives will be achieved if monitoring confirms that mine-related activities do not negatively affect the instream or downstream fitness-for-use criteria of surface or groundwater resources.

The programme will form a key component of overall water management and will aim to:

- Prevent contamination and protect downstream water resources;
- Establish and maintain an understanding of baseline and ongoing water quality conditions;
- Detect changes or trends in water quality and quantity over time; and
- Evaluate the performance of pollution prevention measures and compliance with licence and catchment objectives.

26.1.1.1 Reporting

Monitoring results for surface and groundwater quality and quantity will be summarised in quarterly reports for the SOFS Operation, with a comprehensive annual report submitted to the relevant regulatory authorities.

Quarterly reports will include:

- Updates to the site's hydrological database.
- Time-series graphs showing long term trends.
- Statistical analyses (average, minimum, maximum, and 5th 50th, and 95th percentile values).
- Assessment of performance indicators.

All laboratory results will be compared to the South African Water Quality Guidelines for domestic use, livestock watering, and irrigation. The most stringent criteria between these guidelines and any site-specific water quality objectives will be applied.

Flow measurements will be conducted continuously to quantify all water uses and discharges, including:

- Make-up and process water volumes.
- Groundwater abstraction for dewatering.
- Volumes of slimes and return water pumped from the plant.

- Recovered or reused contaminated water (for example, for dust suppression).
- Internal water transfers and recirculation.

An annual water quality audit will be prepared to provide a detailed analysis of surface and groundwater trends, assess compliance with water use licences, and identify non-compliances. If data indicate deterioration in groundwater quality, additional investigations will be undertaken to determine the source and extent of the impact, and corrective actions will be implemented as required.

26.1.1.2 Data Management

All monitoring results will be captured in an electronic database as soon as laboratory results are available (no less than monthly). The database will allow for:

- Tabular data presentation.
- Time-series and trend graphs.
- Statistical and performance analyses.
- Linear trend determination.
- Spatial data presentation through diagrams and maps.
- Comparison against applicable guideline values and objectives.

To ensure continuity and enable long term trend analysis, the same monitoring points will be retained throughout the construction, operational, decommissioning, and post closure phases wherever possible.

26.1.1.3 Hydrological Monitoring

It is recommended that monthly surface water samples be collected and analysed at monitoring locations upstream and downstream of the mine along the Merriespruit, provided that sufficient surface water is available for sampling. The mine will also sample any authorised discharges and effluents from water treatment facilities as part of its compliance monitoring programme.

Analyses will include all parameters tested during baseline sampling, with specific emphasis on lead and arsenic, which previously recorded elevated concentrations. Monitoring these elements will confirm that mining activities do not contribute to any deterioration in surface water quality.

The mine will adopt a no discharge policy, ensuring that all contaminated or “dirty” water remains contained within the mining area. Collected water will be reused internally for operational purposes, such as dust suppression or processing, to prevent pollution of surrounding water resources.

To implement the monitoring programme effectively, accurate and consistent data collection is essential. Sampling must be performed at the correct times, locations, and frequencies as specified in the monitoring plan, and any deviations must be documented and reported.

The surface water monitoring plan and associated parameters are presented in Table 26-1 and Table 26-2, while Table 26-3 lists the proposed monitoring points and their geographic coordinates.

Table 26-1: Surface Water Monitoring Plan

Water Type	Details	Monitoring Frequency
Process Water	Dirty water dams and other storage facilities	Monthly
Surface Water	Upstream and downstream samples from rivers, pans, and natural dams near mining areas	Monthly
Drinking Water	Any domestic water supply; must include all parameters from the South African National Standards (SANS) 241, particularly total and faecal coliform bacteria	Monthly

Table 26-2: Surface Water Monitoring Parameters

Constituent	Class 0 (Ideal)	Class I (Acceptable)	Class II (Max. Allowable)	Class III (Exceeding)
pH (at 20°C)	6.0-9.0	5-6 or 9.0-9.5	4-5 or 9.5-10	<4 or >10
Conductivity (mS/m at 25°C)	<70	70-150	>150-370	>370
Total Dissolved Solids (mg/L)	<450	450-1000	1000-2400	>2400
Calcium (mg/L)	<80	80-150	>150-300	>300
Magnesium (mg/L)	<30	30-70	>70-100	>100
Total Hardness as $CaCO_3$	-	100-200 (Fairly Hard)	200-300 (Hard)	>300 (Very Hard)
Sodium (mg/L)	<100	100-200	200-400	>400
Potassium (mg/L)	<25	25-50	50-100	>100
Chloride (mg/L)	<100	100-200	>200-600	>600
Sulphate (mg/L)	<200	200-400	>400-600	>600
Nitrate as Nitrogen (mg/L)	<6.0	6.0-10	>10-20	>20
Fluoride (mg/L)	<0.5	0.5-1	1-1.5	>1.5
Aluminium (mg/L)	<0.15	0.15-0.3	>0.3-0.58	>0.58
Manganese (mg/L)	<0.05	0.05-0.1	>0.1-1	>1
Iron (mg/L)	<0.01	0.01-0.2	>0.2-2	>2
Chromium (mg/L)	<0.01	0.01-0.1	0.1-0.5	>0.5

Table 26-3: Proposed surface water monitoring points

Surface Water Point	Coordinates	
	Latitude (S)	Longitude (E)
Q2	-28.1723	26.79552
P1	-28.1651	26.82967
P2	-28.1511	26.85106
M1	-28.1697	26.87721
W3	-28.1969	26.8556
Q1	-28.1969	26.8556
M2	-28.187	26.85884
W2	-28.1729	26.88824
W1	-28.1703	26.8971
P4	-28.136	26.86036
Q4	-28.146	26.91936
P3	-28.1763	26.92281
Q3	-28.1846	26.923

26.1.1.4 Geohydrological Monitoring (Groundwater)

The objective of the groundwater monitoring programme will be to detect and evaluate any changes

in groundwater quality or levels that may result from mining activities. Monitoring will provide early warning of contamination, assess compliance with licence conditions, and inform the effectiveness of water management measures at the SOFS Mining Operation.

The proposed monitoring boreholes are listed in Table 26-4. The monitoring network has been designed to represent potential contaminant sources, receptors, and migration pathways, while also incorporating background (upgradient) boreholes to define natural groundwater quality and baseline levels.

Table 26-4: Proposed Groundwater Monitoring Points

Groundwater Monitoring Point	Latitude (South)	Longitude (East)
Am 10	-28.2117	26.86983
Am 4	-28.2013	26.87915
BH25H	-28.1112	26.90568
BH31H	-28.1206	26.83948
BH37H	-28.1726	26.90449
BH79H	-28.1165	26.91032
BH80H	-28.1302	26.92351
BH81H	-28.1470	26.91465
BH82H	-28.1580	26.90731
BH83H	-28.1181	26.90221
BH84H	-28.1877	26.84053
BH85H	-28.1158	26.83162
BH86H	-28.1166	26.83409
BH87H	-28.1077	26.81801
BH88H	-28.1647	26.85905
BH89H	-28.1647	26.85989
BH90H	-28.1666	26.85859
BH91H	-28.1586	26.86688
BH92H	-28.1713	26.86754
BH93H	-28.1824	26.85987
Bl 3	-28.1995	26.82352
Fl 1	-28.1880	26.88103
Fl 2	-28.1920	26.89983
GCS 1	-28.1610	26.84149
GCS 2	-28.1633	26.85054
GCS 3	-28.1563	26.86300
GCS 4	-28.1680	26.86301
GCS 5	-28.1804	26.85857
GCS 6	-28.1465	26.83769
GCS 7	-28.1353	26.85949
Ha 1	-28.1511	26.82760
Ni 10	-28.1757	26.92478
Ply 3	-28.2161	26.84058
Ply 6	-28.2201	26.85267
We	-28.2139	26.82750
Wel 2	-28.1922	26.81370
Wel 4	-28.1875	26.80397

26.1.1.5 Monitoring Network and Frequency

In addition to the existing network, it is recommended that a minimum of two additional monitoring boreholes be installed to monitor potential plume migration pathways.

All monitoring boreholes will be sampled quarterly, with the schedule reviewed after two years to determine whether bi-annual sampling (to represent wet and dry seasons) would be sufficient.

The quarterly chemical analysis will include arsenic, cyanide, electrical conductivity, Ph, sulphate, calcium, magnesium, sodium, chloride, nitrate, potassium, fluoride, total alkalinity, iron, aluminium, and additional metals of concern.

Cyanide monitoring will be undertaken in accordance with the International Cyanide Management Code for the Gold Mining Industry, including the analysis of free cyanide, total cyanide, and weak acid dissociable cyanide. Cyanide monitoring will be focused on boreholes located near the TSF and processing plant where cyanide is used or stored.

All data will be stored in a dedicated electronic database, with quarterly and annual summary reports generated for mine management and submission to relevant authorities.

Table 26-5: Groundwater Monitoring Schedule

Monitoring Position	Sampling Interval	Analysis	Water Quality Standards
All monitoring boreholes	Monthly: depth to water measurement	N/A	N/A
All monitoring boreholes	Quarterly: sampling for full water quality analysis (April, July, October, and January)	Physical and chemical parameters; groundwater levels	South African Water Quality Guidelines (Domestic Use, Livestock Watering)
Rainfall	Daily measurement on site	N/A	N/A

26.1.1.6 Parameters and Analysis

The selection of groundwater parameters will be based on the geochemistry of potential pollution sources, with parameters grouped as follows:

- Physical Parameters
    - Groundwater levels and depth to water table.
- Chemical Parameters
    - Field measurements: pH and Electrical Conductivity.
    - Laboratory analyses: Major anions and cations (calcium, magnesium, sodium, potassium, nitrate, chloride, sulphate, fluoride, iron, manganese, aluminium, and total alkalinity), as well as TDS.
    - Hydrocarbon contaminants: To be monitored near workshops and fuel-handling areas.
    - Sewage-related contaminants: *Escherichia coli* and faecal coliform bacteria to be analysed in boreholes located near septic tanks or sewage treatment facilities.

Laboratory analyses will be conducted in accordance with the South African Bureau of Standards requirements to ensure quality assurance and comparability of results. The groundwater monitoring database will be updated monthly as results become available, and the information will be used to identify trends, anomalies, or potential contamination events.

26.1.1.7 Reporting and Management

An annual groundwater compliance report will be prepared and submitted to the competent authorities for review and comment. This report will be produced annually during the construction, operational, and decommissioning phases, and will continue for at least two years post closure.

A groundwater monitoring response protocol will be developed following completion of the construction phase. This protocol will outline the actions to be taken if monitoring results indicate deterioration in groundwater quality, including additional sampling, confirmatory analyses, and the implementation of remedial measures such as containment or source control.

26.1.2 Biomonitoring

The bi-annual biomonitoring programme is undertaken to assess the ecological health and integrity of surface water systems potentially influenced by mining activities. It provides a scientifically defensible means of tracking changes in aquatic ecosystem condition over time and evaluating the effectiveness of implemented management measures.

The monitoring will include the following components:

- Baseline information: Collection and consolidation of existing and newly obtained biological, chemical, and physical data to characterise reference conditions.
- Fieldwork data collection, analysis, and interpretation: Sampling of aquatic macroinvertebrates, habitat integrity, and selected physicochemical parameters at established monitoring points to determine ecosystem status.
- Comparative analysis of historical data: Where previous biomonitoring results exist, these will be compared to current data to identify temporal trends, potential deterioration, or improvement in water quality and biological condition.
- Toxicity testing and data interpretation: Laboratory-based toxicity assessments, where applicable, to evaluate sub-lethal and chronic effects on aquatic organisms and to complement field-based biological indices.

The proposed biomonitoring points, indicating both upstream (control) and downstream (impact) locations relative to operational activities, are presented in Table 26-6. These points have been strategically selected to represent reference conditions and areas potentially affected by mine discharges or diffuse runoff.

Table 26-6: Proposed Biomonitoring Points

Biomonitoring Points	Coordinates	
	Latitude (S)	Longitude (E)
WGBM1	-28.1594	26.77006
WGBM2	-28.2468	26.84216
WGBM3	-28.1147	26.73124
WGBM4	-28.1374	26.95297
WGBM5	-28.0744	26.91329
WGBM6	-28.1716	27.03492

Biomonitoring Points	Coordinates	
	Latitude (S)	Longitude (E)
WGBM7	-28.1668	26.92271
WGBM8	-28.1982	26.9268

26.1.3 Air Quality Monitoring

A dust fall monitoring programme will be implemented to assess and manage dust emissions from operational areas such as haul roads, WRDs, and TSF. Multidirectional dust fall buckets will be installed at representative points around the site to measure monthly dust deposition rates and identify dominant windblown dust sources. The collected data will be compared against the limits prescribed in the National Dust Control Regulations (GN 827 of 2013) to determine compliance. Results will be reviewed quarterly to detect trends, evaluate the effectiveness of dust suppression measures, and guide any necessary corrective actions. Where exceedances are observed, additional control measures—such as road watering, surface stabilisation, or vegetation of exposed areas—will be implemented to maintain acceptable air quality conditions and minimise nuisance impacts on nearby communities and the environment.

Table 26-7: Proposed Dust Bucket Locations

Dust Buckets	Coordinates	
	Latitude (S)	Longitude (E)
WG-001	-28.18923	26.83995
WG-002	-28.18701	26.87941
WG-003	-28.17634	26.90537
WG-004	-28.16616	26.85564
WG-005	-28.193116	26.97988
WG-006	-28.250223	26.93914
WG-007	-28.148056	26.84394
WG-008	-28.145261	26.85809
WG-009	-28.136457	26.83698
WG-010	-28.130329	26.85375

26.1.4 Radiation Monitoring

The proposed radon fallout monitoring points listed in Table 26-8. The radiation monitoring programme will form part of the mine's overall environmental monitoring plan and will be implemented to identify and evaluate potential radiological exposure from NORM that may be present in the ore and surrounding geological formations.

Radon detectors, in the form of passive radon cups, will be installed at the selected monitoring locations. These detectors will be collected and replaced every three months to ensure consistent data collection throughout the year. Once collected, the exposed detectors will be sent to the South African Nuclear Energy Corporation laboratory for analysis in accordance with national radiation protection standards. The laboratory will measure radon gas concentrations in becquerels per cubic metre and will determine whether results comply with the exposure limits set for both workers and members of the public in terms of the Regulations on the Protection of Workers from Radiation (GN

R1332) and the relevant International Commission on Radiological Protection guidelines.

All monitoring results will be summarised in quarterly reports. These reports will be used to assess variations in radiation levels, identify possible trends, and confirm that exposure remains within acceptable limits for employees and nearby communities.

Table 26-8: Proposed Radon Cup Locations

Radon Cup points	Coordinates	
	Latitude (S)	Longitude (E)
RGM_1_AND_2	-28.1759	26.90403
RGM_3_AND_4	-28.1749	26.86616
RGM_5_AND_6	-28.1906	26.84116
RGM_7_AND_8	-28.2155	26.84105
RGM_9	-28.1638	26.85756
RGM_10	-28.1684	26.87672
RGM_11	-28.164	26.87619
RGM_12	-28.1698	26.91377
RGM_13	-28.1837	26.91506
RGM_14	-28.1793	26.87858
RGM_15	-28.1836	26.87895
RGM_16	-28.1794	26.8608
RGM_17	-28.1811	26.86029
RGM_18	-28.1771	26.84797
RGM_19	-28.1829	26.85463
RGM_20	-28.1854	26.86071
RGM_21	-28.1933	26.85652
RGM_22	-28.1907	26.8504
RGM_23	-28.1578	26.87376
RGM_24	-28.1596	26.89976
RGM_25	-28.1488	26.88583

26.2 Beatrix 1, 2 and 3 Shafts

26.2.1 Groundwater Monitoring

Surface water and groundwater are monitored through a comprehensive programme designed to ensure compliance with the NWA and the WUL 08/C42K/AEFJG/8739 (dated 31 October 2018 and the subsequent amendment of 2021).

Groundwater monitoring is extensive, with more than thirty boreholes forming part of the network. These boreholes are categorised into background boreholes, receptor boreholes, and plume boreholes. Background boreholes are sampled annually to establish baseline conditions, while receptor boreholes are monitored quarterly to track potential risks to nearby users. Plume boreholes are monitored bi-annually to delineate and track the migration of contamination plumes. In addition to the core suite of physico-chemical and metal parameters, groundwater monitoring incorporates strict quality assurance and control procedures, including duplicate samples, split sampling, anion–cation balance checks, and, where needed, isotope analysis to distinguish natural water chemistry from anthropogenic influences.

26.2.2 Surface Water Monitoring

Surface water monitoring is undertaken at more than ten fixed points, including spruits, dams, pans, sewage sumps, and evaporation systems. Monitoring at spruits is generally conducted on a monthly basis, while quarterly sampling is carried out at larger impoundments. The parameters analysed include pH, EC, TDS, suspended solids, alkalinity, hardness, and a wide range of nutrients and ions such as nitrates, chlorides, fluorides, sulphates, and major cations. Metals such as iron, zinc, manganese, and aluminium are also routinely tested. These indicators provide a robust picture of water quality and enable the identification of any contamination from mine effluent discharges, stormwater runoff, or other operational activities.

26.2.3 Biomonitoring

Biomonitoring is undertaken on a bi-annual basis to provide a consistent measure of the health and functionality of aquatic and wetland ecosystems potentially affected by mining activities. This programme incorporates assessments of rivers, wetlands, seeps, and depressions, using recognised tools such as WET-HEALTH to determine PES, WET-EcoServices to evaluate the ecosystem services provided, and EIS assessments to identify biodiversity and conservation value.

The bi-annual frequency ensures that monitoring captures seasonal variation in flow, water quality, and ecological functioning, thereby providing a more accurate understanding of long term trends. Findings from each monitoring cycle are used to track changes in ecosystem condition, identify emerging risks, and guide adaptive management measures.

The biomonitoring programme will continue for the LoM to ensure ongoing compliance with the NWA and other regulatory requirements, as well as to support responsible environmental stewardship. This long term commitment ensures that ecological sensitivities are recognised and managed proactively, while providing assurance to regulators, stakeholders, and local communities that mining impacts are being monitored and mitigated.

26.2.4 Air Quality Monitoring

Air quality monitoring at Beatrix Mine is undertaken through a continuous dustfall monitoring programme, designed to quantify ambient dust deposition rates in accordance with the National Dust Control Regulations (2013) and the ASTM D1739 dustfall monitoring method.

26.2.4.1 Monitoring Network

The Beatrix air quality monitoring network consists of eight fixed non-residential dustfall monitoring stations, positioned to represent conditions around the operational footprint and in surrounding agricultural land. Each station is exposed for 30 ± 2 days, after which the dustfall bucket is replaced and the sample is sent to a SANAS-accredited laboratory for gravimetric analysis in accordance with ASTM D1739.

The monitoring points and their coordinates are provided in Table 26-9.

Table 26-9: Beatrix Dustfall Monitoring Stations and Coordinates

Monitoring Point	Locality Description	Latitude (S)	Longitude (E)	Classification
BOMMAN	Bomman Dust Fallout Stand	28.27167	26.75692	Non-Residential
HANEKOM	Hanekom Dust Fallout Stand	28.23053	26.80497	Non-Residential
JANSE VAN RENSBURG	Janse van Rensburg Dust Fallout Stand	28.16350	26.69925	Non-Residential
PINGO	Pingo Dust Fallout Stand	28.19378	26.72717	Non-Residential
PRETORIUS D	Pretorius D Dust Fallout Stand	28.30867	26.76408	Non-Residential
PRETORIUS J	Pretorius J Dust Fallout Stand	28.21681	26.70202	Non-Residential
UYS	Uys Dust Fallout Stand	28.29419	26.79811	Non-Residential
VD MERWE	Van der Merwe Dust Fallout Stand	28.15094	26.71206	Non-Residential

26.2.5 Noise Monitoring

Noise monitoring at Sibanye Gold is undertaken on an annual basis to ensure compliance with national legislation and SANS. The monitoring is conducted in line with SANS 10328:2008 (methods for environmental noise impact assessments) and SANS 10103:2008 (measurement and rating of environmental noise with respect to annoyance and speech communication). These standards require measurements to be taken during the daytime (06:00–22:00) and night-time (22:00–06:00), with results compared against acceptable zone sound levels for different districts

Noise measurements are taken at four monitoring points located around the Beatrix Mine operations. These sites represented noise-sensitive receptors situated near operational shafts and nearby agricultural homesteads:

Monitoring Point	Location Description	Coordinates	Land Use Rating
NM1	No.4 Shaft – Resident 2	28°11'31.0"S; 26°43'37.1"E	Urban
NM2	No.4 Shaft – Resident 1	28°09'38.6"S; 26°42'00.5"E	Rural
NM3	No.3 Shaft – near farmhouse	28°13'43.1"S; 26°48'27.8"E	Rural
NM4	No.1 & 2 Shafts – Wynandsfontein Farm	28°17'38.8"S; 26°47'43.5"E	Rural

27 FINANCIAL PROVISION

The information presented in this section has been abstracted from two primary sources:

- The Southern Free State Mining Operation Environmental Impact Assessment and Environmental Management Programme (GCS, 2023), and
- Final Rehabilitation, Decommissioning and Mine Closure Plan for the Beatrix Gold Mine (WSP, 2023).

Together, these documents describe the rehabilitation, closure, and post closure measures applicable to the proposed SOFS Operations, and outline the financial provision required in accordance with the Financial Provisioning Regulations, 2015 (as amended) and GN R 1147 of 2020

(Appendix 4).

27.1 Determination of the Amount of Financial Provision

27.1.1 Describe the Closure Objectives and the Extent to Which They Have Been Aligned to the Baseline Environment Described Under the Regulation

27.1.1.1 Summary of Closure Objectives

The overarching closure vision is to ensure that, once operations cease, all disturbed areas are safe, stable, and non-polluting, allowing the land to be reintegrated into surrounding agricultural and eco-tourism land uses.

Key objectives include:

- Returning all disturbed land to an acceptable post-mining condition that approximates its pre-development state.
- Achieving stable, free-draining landforms to prevent erosion or ponding.
- Ensuring all tailings and waste storage facilities are capped, vegetated, and engineered to prevent dust generation and water contamination.
- Re-establishing natural drainage patterns and connectivity of streams and wetlands.
- Promoting the self-sustaining recovery of indigenous vegetation, while implementing long term alien plant control.
- Removing or repurposing redundant infrastructure and safely sealing shafts and other hazardous openings.

These closure measures are to be implemented progressively and maintained until the site demonstrates long term ecological and structural stability.

27.1.1.2 Alignment with the Baseline / Receiving Environment

The closure objectives are designed to reflect and restore the baseline environmental conditions identified in the original impact assessment and supporting studies.

The mine occurs within a commercially cultivated landscape of gentle topography, dominated by deep loamy soils, ephemeral drainage lines, and patches of natural grassland.

Alignment measures include:

- Topographic integration: Final surface profiling will mimic the natural undulating terrain and maintain original catchment drainage directions;
- Soil capability: Salvaged topsoil will be replaced and ameliorated to restore agricultural productivity consistent with baseline land capability;
- Hydrology: Drainage lines and storm water controls will ensure natural flow regimes and protect adjacent wetland systems;

- Ecology: The revegetation mix reproduces the dominant Grassland Biome species recorded in the baseline surveys, facilitating natural succession and faunal return; and
- Land use continuity: The rehabilitated land will be suitable for agriculture and eco-tourism, thereby supporting existing regional socio-economic activities.

Through these measures, post closure conditions will be compatible with the baseline receiving environment, ensuring long term stability and integration into the broader landscape in accordance with the Financial Provisioning Regulations and GN R 1147 (Appendix 4) requirements.

27.1.2 Confirm Specifically that the Environmental Objectives in Relation to Closure Have Been Consulted with Landowner and Interested and Affected Parties

Initial public engagement meetings have been undertaken with stakeholders and I&APs to discuss the project and its closure objectives. These consultations aimed to:

- Gain a deeper understanding of the project-specific environmental context.
- Provide I&APs with clear and accessible information regarding the proposed project and associated closure objectives.
- Record, address, and respond to comments and concerns raised during the consultation period, with a summary of inputs documented for consideration in the closure planning process.

These engagements ensured that closure objectives and environmental management measures were communicated, considered, and refined in consultation with stakeholders.

27.1.3 Provide a Rehabilitation Plan that Describes and Shows the Scale and Aerial Extent of the Main Mining Activities, Including the Anticipated Mining Area at the Time of Closure

Rehabilitation will be implemented in a phased, technically driven manner to ensure that disturbed areas are returned to a safe, stable, non-polluting and sustainable post-mining landscape.

The total area requiring rehabilitation at final closure is estimated at approximately 370.5 ha, including:

- Mining Infrastructure (approximately 20 ha): headgear foundations, workshops, stores, offices, access roads, and parking areas.
- Processing and Support Areas (approximately 22 ha): gold plant structures, tanks, thickeners, conveyors, and concrete slabs or footings.
- Tailings and Waste Facilities (approximately 130 ha): TSF shaping and capping, return water dams, WRDs, and laydown areas.
- Water Management Infrastructure (approximately 10 ha): PCD, trenches, sumps, and clean/dirty water separation systems.
- Shaft Complexes (approximately 12 ha): No. 1, 2 and 3 shaft collars, ventilation shafts,

decline portals, and fan foundations.

- Boreholes and Monitoring Wells (approximately 1 ha): decommissioning and sealing of boreholes and flares.
- Roads and Powerlines (approximately 25 ha): rehabilitation of haul and access roads, servitudes, and power reticulation corridors.
- Security and Fencing (approximately 0.5 ha): boundary and shaft area fencing, signage, and guardhouse footprints.
- Ancillary and Community Areas (approximately 150 ha): Satellite areas, buffer zones, topsoil stockpiles, and temporary laydown areas.

Rehabilitation will be carried out progressively throughout the LoM and finalised in three integrated phases: (1) Decommissioning and Infrastructure Removal; (2) Active Landform Rehabilitation and Ecological Recovery; and (3) Maintenance, Monitoring, and Aftercare leading to Post Closure Land Use and Relinquishment.

27.1.3.1 Phase 1 – Decommissioning and Infrastructure Removal

This phase will commence immediately upon cessation of production activities and aims to remove all redundant infrastructure, eliminate safety hazards, and prepare the site for reshaping.

Key actions will include:

- Infrastructure Decommissioning:
    - All surface infrastructure (plants, offices, conveyor systems, electrical reticulation, powerlines, and services) will be dismantled in a controlled sequence. Salvageable components will be recovered for reuse, and waste will be segregated for recycling or disposal at licensed facilities.
- Foundation and Subsurface Removal:
    - Concrete foundations, footings, and slabs will be removed to a minimum depth of 1 m below natural ground level. Recovered material will be reused as inert fill, while contaminated material will be disposed of in compliance with the National Environmental Management: Waste Act (Act 59 of 2008).
- Shaft and Portal Closure:
    - All vertical shafts, inclines, and ventilation openings will be sealed, capped, and fenced according to DMPR closure specifications to prevent unauthorised access and subsidence. Capping materials will comprise reinforced concrete plugs with adequate load-bearing strength and long term durability.
- Water Management Infrastructure:
    - PCDs and storm water structures will remain functional through the

decommissioning period. Sediments will be removed, and clean- and dirty water systems maintained separately until geochemical monitoring confirms that all areas are free-draining and non-polluting.

- Waste and Hazardous Material Handling:
    - Hydrocarbon storage tanks, oil separators, and chemical storage facilities will be emptied, cleaned, and dismantled. Contaminated soils will be excavated and disposed of at a licensed H:H facility. Inert construction debris (bricks, gravel, concrete) will be crushed for reuse as backfill or road sub-base.

By the conclusion of Phase 1, the surface will be free of standing structures, and residual footprints will be ready for landform re-profiling and soil reinstatement.

27.1.3.2 Phase 2 – Active Landform Rehabilitation and Ecological Recovery

This phase is the core of the rehabilitation process, aimed at restoring land capability, soil health, hydrological function, and vegetation cover across all disturbed areas.

- Landform Re-Profiling
    - Regrading of Surfaces: All disturbed areas—including the TSF, WRDs, haul roads, and laydown areas—will be reshaped to emulate the natural terrain, ensuring continuous, free-draining contours and slope gradients compatible with surrounding topography.
    - TSF Slope Stabilisation: The TSF side slopes will be shaped to ≤ 18° and bench-stabilised with contour berms every 3 – 5 m of vertical height. The crest will be crowned to shed rainfall evenly and prevent ponding.
    - Drainage Re-establishment: Natural drainage lines disrupted by mining will be reconstructed to reconnect upstream and downstream catchments, directing runoff into vegetated swales or natural channels.
- Soil Replacement and Amelioration
    - Stockpiled topsoil will be reapplied to a minimum depth of 150 mm across all reshaped areas. Where subsoil compaction is evident, ripping to 500 mm depth will precede topsoiling.
    - Soils will be ameliorated with lime, compost, and balanced N:P:K fertiliser to restore pH and nutrient levels. Laboratory testing will guide precise amendment rates.
    - Any deficiency in topsoil availability will be addressed through redistribution prioritising high-visibility and erosion-sensitive areas first.

- Revegetation and Habitat Recovery
    - A seed mixture representative of the Dry Highveld Grassland Biome will be used, dominated by *Themeda triandra, Eragrostis curvula, Aristida congesta,* and *Cynodon dactylon*.
    - On steep or erosion-prone slopes, hydroseeding will be employed for rapid stabilisation.
    - Vegetation establishment will be monitored seasonally, targeting ≥ 80 % cover within 24 months.
    - If self-succession is inadequate after 18 months, reseeding or additional soil enrichment will be implemented.
- Erosion and Water Quality Control
    - Contour berms, gabions, energy dissipaters, and vegetated channels will be installed to control runoff and minimise sedimentation into adjacent watercourses.
    - PCDs will remain until monitoring confirms that surface water quality meets RQOs.
    - Hydrological monitoring points will record runoff, infiltration, and sediment load to assess system stability.
- Alien Invasive Plant Control
    - A five-year alien vegetation management plan will target *Acacia mearnsii*, *Eucalyptus camaldulensis*, and *Opuntia ficus-indica* through mechanical removal and follow-up herbicide treatment.
    - Control will be integrated into the monitoring schedule to ensure eradication before handover.

Phase 2 will culminate in a landscape that visually and ecologically blends with its surroundings, demonstrating re-established soil productivity, hydrological balance, and biodiversity potential.

27.1.3.3 Phase 3 – Maintenance, Monitoring, and Aftercare

This phase ensures that rehabilitated areas achieve long term stability and self-sustainability prior to relinquishment.

- Vegetation and Soil Monitoring
    - Bi-annual vegetation surveys will record species diversity, canopy cover, and evidence of succession. Dead or diseased plants will be replaced.
    - Soil samples will be analysed annually for pH, organic matter, and nutrient status to confirm ongoing fertility.

- Erosion and Stability Surveillance
    - After each significant rainfall (> 25 mm), rehabilitated slopes and drainage lines will be inspected for erosion or gullying. Any failures will be repaired promptly using appropriate materials.
    - The TSF and WRDs will undergo annual geotechnical inspections to verify slope integrity and surface stability.
- Water Quality and Hydrological Monitoring
    - Groundwater monitoring will continue quarterly, and surface water sampling monthly, to ensure no deterioration relative to baseline conditions.
    - Parameters such as pH, electrical conductivity, sulphate, nitrate, and metals will be analysed, and results compared to DWS guidelines.
- Reporting and Regulatory Review
    - Findings will be consolidated in Annual Performance Assessment Reports (PARs) to the DMPR, documenting progress and compliance.
    - The Closure Plan and Financial Provision will be reviewed every three years and adjusted for inflation, progress, and regulatory changes.

This phase will continue for at least three to five years post closure, or until performance criteria are achieved.

27.1.3.4 Post Closure Land Use and Relinquishment Criteria

The final rehabilitated landscape will support agricultural use, grazing, and potential eco-tourism, reflecting the baseline land capability and socio-economic setting of the Free State Province. Rehabilitation is designed to achieve a self-sustaining ecosystem integrated into the existing agricultural mosaic, promoting long term community benefit.

Relinquishment will only be considered once the following criteria are satisfied:

- Physical and Geotechnical Stability:
    - All landforms are stable with a factor of safety ≥ 1.5.
    - No active erosion, settlement, or ponding is evident.
- Chemical and Hydrological Stability:
    - Surface- and groundwater quality remain within baseline parameters for three consecutive years.
    - No acid generation or contamination risk persists from TSFs or waste rock facilities.

- Ecological Functionality:
    - Indigenous vegetation cover ≥ 80 %, demonstrating natural regeneration and minimal maintenance requirements.
    - Alien species eradicated and controlled through follow-up monitoring.
    - Evidence of faunal recolonisation and ecological succession consistent with reference conditions.
- Land Capability and Socio-Economic Integration:
    - Soils support agricultural or grazing use equivalent to pre-mining capability.
    - Where feasible, certain infrastructure (e.g., boreholes, access roads) may be retained for community or agricultural benefit in consultation with landowners.
- Regulatory Compliance and Verification:
    - All rehabilitation and monitoring obligations completed to the satisfaction of DMPR and DWS.
    - Independent specialists verify performance against approved closure objectives and GN R1147 standards.

Once these criteria are achieved and verified, the mine will submit a closure certificate application under Section 43 of the MPRDA. Approval will formally release the holder from residual environmental liability, confirming that the site has reached a stable and sustainable post-mining condition.

27.1.4 Explain Why It Can Be Confirmed that the Rehabilitation Plan Is Compatible with the Closure Objectives

The compatibility between the rehabilitation plan and the closure objectives is reflected in the following key alignments:

27.1.4.1 Physical and Geotechnical Stability

The closure objective of ensuring all landforms and engineered structures are physically stable is addressed through the rehabilitation plan's focus on re-profiling disturbed areas, stabilising TSF slopes to ≤18°, and capping shafts and vent openings. Bench stabilisation, erosion control, and slope revegetation are included to meet geotechnical safety standards. These measures guarantee long term slope stability and prevent subsidence or erosion, ensuring that final landforms are consistent with baseline topography and safe for future land use.

27.1.4.2 Hydrological and Water Quality Integrity

Closure objectives require that no residual contamination persists post closure and that water systems return to free-draining, non-polluting conditions. The rehabilitation plan supports this through the design and maintenance of PCD, clean/dirty water separation, and progressive

decommissioning of water management infrastructure only after quality benchmarks (as per DWS RQOs) are achieved. The use of low permeability cover systems on the TSF minimises infiltration and oxidation, preventing groundwater contamination and aligning directly with the closure goal of chemical stability.

27.1.4.3 Soil Productivity and Land Capability

The closure objective of restoring soil productivity is fulfilled through the rehabilitation plan's detailed soil management framework. Topsoil conservation, replacement to a depth of 150 mm, and amelioration using lime and nutrients recreate the baseline agricultural potential. The final land capability is designed to equal or exceed pre-mining conditions, supporting dryland farming and grazing consistent with regional land use prior to mining.

27.1.4.4 Ecological Function and Biodiversity Restoration

The plan's revegetation strategy, based on indigenous Grassland Biome species such as *Themeda triandra* and *Eragrostis curvula*, ensures that ecological functionality and biodiversity objectives are achieved. Alien invasive species control, succession monitoring, and reintroduction of native vegetation are incorporated to restore ecosystem integrity. This directly supports the closure objective of establishing self-sustaining vegetation communities representative of the natural environment.

27.1.4.5 Socio-Economic and Land Use Integration

Closure objectives include reintegrating the rehabilitated landscape into the local economy through productive land use. The plan ensures this by aligning final landforms and soil capability with agricultural and grazing potential, while retaining certain infrastructure (e.g., roads or boreholes) for community or agricultural benefit. This compatibility ensures that closure contributes positively to the Matjhabeng Local Municipality IDP and the Free State Provincial Growth and Development Strategy.

27.1.4.6 Monitoring and Adaptive Management

Both closure planning documents require ongoing monitoring to confirm stability and environmental recovery. The rehabilitation plan embeds a three-year post closure monitoring and maintenance period, covering groundwater, surface water, vegetation, and erosion control. Results are integrated into the annual Environmental PARs submitted to DMPR, ensuring that adaptive management can address any deviations from closure performance targets.

27.1.5 Calculate and State the Quantum of the Financial Provision Required to Manage and Rehabilitate the Environment in Accordance with the Applicable Guideline

In accordance with the Financial Provisioning Regulations, 2015 (GN R1147), and consistent with the requirements of Appendix 4, the financial provision has been determined to cover all activities required to rehabilitate, decommission, and close both the Beatrix (1, 2, 3 Shaft as associated infrastructure) and SOFS Operations.

The closure cost estimate was developed using the consolidated closure framework that integrates

both operations, ensuring that all potential liabilities—scheduled, unscheduled, and post closure—are captured in accordance with best practice and regulatory guidance. The cost model includes direct rehabilitation works, engineering and professional services, environmental monitoring, contingency allowances, and post closure maintenance for a minimum of three years after cessation of operations.

WSP undertook a detailed review and update of the closure costing to reflect the extension of the mine's operational life to 2042. The model provides a defensible and auditable basis for financial provisioning that meets the requirements of the DMPR and the NEMA. It considers the full range of closure and rehabilitation obligations associated with the following facilities:

- Shafts 1, 2 and 3 Complexes (including collar and portal sealing, capping, and fencing).
- Metallurgical and Processing Plant (structural dismantling, demolition, concrete removal, and landform rehabilitation).
- TSF (reshaping, capping, drainage, and revegetation).
- WRDs (re-profiling, erosion control, and vegetation establishment).
- Return Water and Evaporation Dams, PCD, and storm water systems.
- General Infrastructure, access roads, power reticulation, and ancillary areas within the SOFS MR.

Based on the updated WSP assessment, the following financial provisions have been established:

- Unscheduled closure (immediate, premature closure scenario): R 864 870 755.90 (exclusive of VAT).
- Scheduled closure (planned, end-of-life closure scenario): R 744 223 291.86 (exclusive of VAT).

These figures represent the most recent and credible assessment of closure liabilities for the combined Beatrix (1, 2, 3 Shaft as associated infrastructure) and SOFS areas. They demonstrate that sufficient funds have been set aside to achieve:

- Physical stability of all rehabilitated landforms.
- Chemical stability and pollution prevention through engineered cover systems and water quality management.
- Ecological and socio-economic sustainability through soil restoration, revegetation, and productive post-mining land use.

The quantum will continue to be reviewed annually and updated every three years in accordance with GN R1147 (Appendix 4), ensuring that the financial provision remains adequate, transparent, and aligned with evolving closure planning, operational changes, and inflationary adjustments.

27.1.6 Confirm that the Financial Provision will be provided as Determined

The DMPR currently holds a valid and enforceable financial guarantee (Reference No. CQ/G/30309/1024/018) issued in favour of the Minister Responsible for Mineral Resources and Energy. This financial guarantee, issued by Centriq Insurance Company Limited (FSP 3417) on 3 October 2024, provides assurance of the mine's compliance with the statutory obligation to determine and maintain financial provision for prospecting, exploration, mining, and production operations in accordance with Regulation 8 of the Financial Provisioning Regulations, 2015 (GN R1147).

In line with Regulation 11 of GN R1147, the financial provision will continue to be:

- Reviewed annually and updated in accordance with changes to the mine plan, operational footprint, and closure cost model.
- Audited and verified by an independent specialist to confirm accuracy and adequacy.
- Maintained through an approved financial instrument (bank or insurer guarantee) lodged with the DMPR to ensure immediate accessibility by the Minister, should rehabilitation or closure obligations not be met.

This mechanism ensures that sufficient, ring-fenced financial resources are always available to achieve the long term objectives of safe, stable, and non-polluting post-mining conditions, in accordance with the Financial Provisioning Regulations, 2015, NEMA and the MPRDA.

27.1.7 Mechanisms for monitoring compliance with and Performance Assessment against the Environmental Management Programme and reporting thereon

Monitoring and performance assessment are critical components of the environmental management framework for the operations. The purpose of these mechanisms is to ensure that all mining, rehabilitation, and closure activities are implemented in accordance with the approved EMPr, and that they remain effective in preventing pollution, conserving biodiversity, and ensuring long term sustainability of the post-mining landscape.

The monitoring system is designed to:

- Track the implementation and effectiveness of impact management actions identified in the EMPr.
- Verify compliance with the Financial Provisioning Regulations, 2015 (GN R1147) and associated performance criteria outlined in Appendix 4.
- Provide early detection of potential environmental degradation, enabling prompt corrective action.
- Facilitate transparent reporting to the Department of Mineral Resources and Energy and other competent authorities through annual PARs.

Monitoring activities will continue throughout the operational, decommissioning, and post closure

phases. They include the observation and evaluation of physical, chemical, and biological indicators to ensure that rehabilitation measures achieve the objectives of a safe, stable, non-polluting, and self-sustaining environment.

27.1.8 Indicate the Frequency of the Submission of the Performance Assessment / Environmental Audit Report

The frequency of environmental audits and performance assessments is determined by both legislative requirements and operational needs. In general, most audits are conducted annually, with certain compliance audits, such as legal reviews, taking place every two years. Annual audits include the environmental performance audit, ISO 14001 EMS audit, and external Closure Plan and cost audit, while WUL audits may occur annually or biennially. These audits are carefully scheduled to align with Sibanye Gold's financial year and budget cycle, ensuring that environmental obligations are integrated with operational and financial planning.

Formal auditing continues throughout the post closure monitoring period until a closure certificate is issued by the relevant authority. During this time, audit findings are documented within the EMS, corrective measures are identified and implemented, and progress is tracked to ensure effective rehabilitation outcomes. Although the frequency of non-legislated audits may be reduced in the post closure period, this is subject to consultation with stakeholders and regulatory authorities. This approach ensures that performance assessments and audit reports remain regular, transparent, and aligned with the mine's closure and rehabilitation obligations.

28 EMERGENCY PREPAREDNESS AND RESPONSE

The Sibanye Gold Mandatory Code of Practice (COP) (Appendix G) sets out the requirements for emergency preparedness and response across Sibanye's operations. The COP is issued in terms of Section 9 of the MHSA and complies with the DMPR Guideline DMR 16/3/2/1-A5.

The primary purpose of the COP is to ensure that all reasonably foreseeable emergency situations that may threaten the health and safety of employees and other affected persons are adequately identified, planned for, and managed. It establishes a structured framework for the early detection of emergencies, effective communication, coordinated response, evacuation, rescue, medical care, and post-incident reporting.

The document is underpinned by a formal risk management process in accordance with Section 11 of the MHSA. Hazards associated with emergency situations are identified through baseline risk assessments, and control measures are developed following the hierarchy of controls, namely elimination, control at source, minimisation, and the use of personal protective equipment. The COP is subject to review following serious incidents, changes in operating conditions, or at least every five years.

Key emergency preparedness measures addressed include detection and early warning systems for fires, flammable gases, carbon monoxide, flooding, seismic events, and chemical releases; communication systems to ensure continuous contact between underground workings, control

rooms, and external emergency services; and the provision of emergency medical care, including trained personnel, equipment, and response protocols.

The COP provides detailed procedures for mine evacuation and escape, including the use and management of self-contained self-rescuers, refuge bays, escape routes, and inter-shaft evacuation arrangements. Specific emergency scenarios are comprehensively covered, such as underground and surface fires, flammable gas explosions, total power failures, flooding or water inrushes, methane accumulation, missing persons underground, exposure to blasting fumes, heat disorders, fatal accidents, seismic events, chemical spillages, shaft accidents, compressed air failures, slimes dam failures, industrial action, and water shortages.

Clear roles and responsibilities are assigned to key personnel during emergencies, including control room operators, environmental engineering officials, mine overseers, operations and engineering managers, mine rescue services, medical services, and support functions. The establishment and operation of emergency control centres, record keeping, and communication protocols are also defined.

29 ENVIRONMENTAL AWARENESS PLAN

29.1 Manner in which the Applicant Intends to Inform His or Her Employees of Any Environmental Risk which may result from their Work

Sibanye Gold implements a structured training and awareness programme to ensure that employees and contractors understand the environmental risks associated with their work. All employees and contractors undergo mandatory induction training at the time of appointment, which is refreshed annually or as required by the Training Department. This training covers general environmental awareness, the responsibilities of employees and contractors under the EMS, and key compliance requirements in terms of environmental legislation and authorisations (Sibanye-Stillwater, 2024a).

The induction programme further includes training on the company's Environmental, Social and Governance (ESG) commitments, significant environmental aspects and impacts of mining activities, and site-specific requirements such as water use, waste handling, biodiversity protection, noise control, and land and soil management. These requirements are aligned with the EMPr, WULs and other applicable legislation. Employees are also informed of the benefits of environmental management and the potential consequences of non-compliance (Sibanye-Stillwater, 2024b).

In addition to general induction, operational awareness training is conducted annually for employees who carry out tasks with significant environmental aspects, such as waste management or water resource use. This training is delivered by the Environmental Team and may be supplemented by ad hoc, on-the-job competency training. Task-specific management training is also provided, focusing on topics such as environmental legislation updates and internal EMS audits. This is delivered either by the Environmental Team or by external service providers where specialist expertise is required (Sibanye-Stillwater, 2024a).

Through this tiered approach, Sibanye Gold ensures that all employees and contractors are

consistently informed about the environmental risks associated with their roles, while also equipping operational and managerial staff with the specialist knowledge needed to mitigate these risks.

29.2 Manner in which Risks will be dealt with in Order to Avoid Pollution or the Degradation of the Environment

Sibanye Gold manages identified environmental risks by integrating training with procedural guidance and operational controls. Training modules include detailed information on significant environmental aspects and impacts, highlighting how daily operations may contribute to risks such as water contamination, waste mismanagement, noise pollution, or biodiversity loss. Employees are instructed on the specific measures required to minimise these impacts, as set out in approved procedures and environmental authorisations (Sibanye-Stillwater, 2024b).

The training also promotes a culture of compliance and responsibility by emphasising the benefits of sound environmental management and the consequences of non-compliance, both for the organisation and for individuals. For example, refresher programmes and toolbox talks reinforce behavioural expectations, such as reporting incidents, stopping unsafe practices, and following correct waste segregation or spill response procedures (Sibanye-Stillwater, 2024a).

At operational level, task-specific procedures are implemented to guide employees in risk management. These include measures for correct waste handling, monitoring water use, implementing dust and noise control, and ensuring archaeological and ecological resources are protected. Where required, external providers support specialist training to ensure continuous improvement and alignment with evolving legislation. The Applicant further monitors training outcomes through internal audits and reporting structures, ensuring that awareness translates into effective environmental performance (Sibanye-Stillwater, 2024b).

Through this integrated approach of induction, awareness, and task-specific training, supported by ongoing monitoring and reporting, Sibanye Gold seeks to minimise pollution, prevent environmental degradation, and uphold its commitments under its EMS and ESG Policy.

30 SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

No specific information has been requested by the DMPR in relation to this application.

31 UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports;

b) the inclusion of comments and inputs from stakeholders and I&APs;

c) the inclusion of inputs and recommendations from the specialist reports where relevant; and

d) that the information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by interested and affected. parties are correctly reflected herein.

31.1 Undertaking Under Oath/Affirmation

I, Paula Jane Tolksdorff swear under oath / affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.



Signature of the registered Environmental Assessment Practitioner

GCS Environment South Africa (Pty) Ltd

Date: 15 January 2026

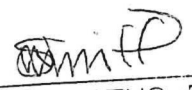


Signature of the Commissioner of Oaths:

Date: 15 January 2026

I certify that the DEPONENT has acknowledged that he/she knows and understands the contents of this affidavit, that he/she does not have any objection to taking the oath, and that he/she considers it to be binding on his/her conscience and which was sworn to and signed before me

at Rivonia on this the 15 day of January 2026 and that the administering oath complied with the regulations contained in Goverment Gazette No. R1258 of 21 July 1972, as amended.



COMMISSIONER OF OATHS (RSA)
Wendy Sherriff CA(SA)
63 Wessel Road, Woodmead
Johannesburg

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Appendix A:Environmental Assessment Practitioner Curriculum Vitae

Appendix B: Hydrogeological Study for Beatrix Mine, compiled by SRK Consulting (SRK , 2019)

Appendix C: Biodiversity Baseline Assessment Report, Section D: Wetland Assessment, compiled by NSS (NSS, 2016b)

Appendix D: Biodiversity Baseline Assessment Report, Section C: Faunal Assessment, compiled by NSS (NSS, Biodiversity Baseline Assessment Report, 2016a)

Appendix E: Beatrix Mining Areas of Sibanye Gold, Between Welkom and Theunissen, Lejweleputswa District, Orange Free State Province Heritage Study: Heritage Audit Report undertaken by PGS Heritage (Pty) Ltd. (PSG, 2017)

Appendix F: Water Use Licence 08/C42K/AEFJG/8739

Appendix G: Mandatory Code of Practice for Emergency Preparedness and Response

Appendix H: Public Participation Report