



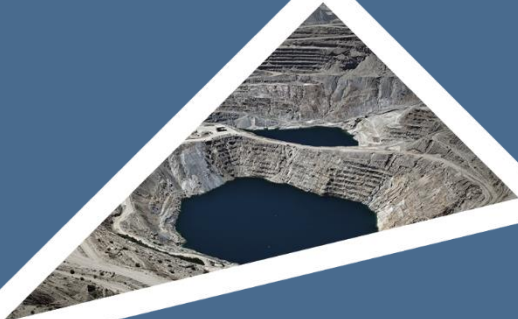
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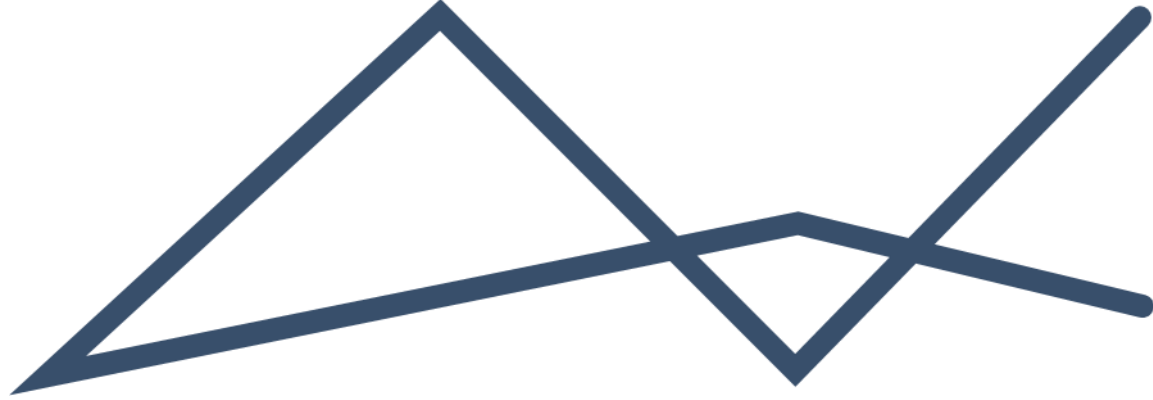
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SCOPING REPORT

PROPOSED HARMONY WEST WITS RECLAMATION AND DEPOSITION
PROJECT AND ASSOCIATED INFRASTRUCTURE

(GP) 30/5/1/2/2 (07) MR








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Table of Contents

Acronyms and Abbreviations.....	vii
Executive Summary	xi
1 Introduction	14
1.1 Report Structure	15
1.2 Details of the EAP.....	19
1.3 Specialist Consultants	19
2 Description of the Property	21
3 Description and Scope of the Proposed Activity.....	26
4 Policy and Legislative Context.....	31
4.1.1 Constitution of the Republic of South Africa	31
4.1.2 The Mineral and Petroleum Resources Development Act (MPRDA).....	31
4.1.3 The National Environmental Management Act (NEMA)	31
4.1.4 National Environmental Management Biodiversity Act (NEMBA)	44
4.1.5 National Environmental Management: Protected Areas Act	45
4.1.6 The National Environmental Management Air Quality Act (NEMAQA)	45
4.1.7 The National Water Act (NWA)	46
4.1.8 The National Environmental Management Waste Act (NEMWA).....	49
4.1.9 The National Heritage Resources Act (NHRA)	52
4.1.10 Environment Conservation Act (ECA) and associated Noise Control Regulations	53
4.1.11 The Conservation of Agricultural Resources Act (CARA)	53
4.1.12 Climate Change Act 22, 2024	54
4.1.13 National Veld and Forest Fire Act	54
4.1.14 The Spatial Planning and Land Use Management Act (SPLUMA).....	55
4.1.15 Occupational Health and Safety Act.....	55
4.1.16 National Radioactive Waste Disposal Institute Act 53 Of 2008.....	56
4.1.17 The Hazardous Substances Act, 1973 (Act No. 15 of 1973).....	56
4.2 Other Applicable Acts and Guidelines.....	56
4.2.1 National Policy and Planning Context	56
4.2.2 Provincial Policy and Planning Context	58
4.2.3 Local Policy and Planning Context.....	64
4.2.4 International Legislation and Standards.....	65
5 Need and Desirability of the Proposed Activity	68
6 Project Alternatives	79
6.1 Location Alternatives	79
6.2 Layout and Design Alternatives.....	80
6.2.1 TSF Design	80
6.2.2 Return Water Dam Location.....	80



6.2.3	Pipeline routes.....	81
6.2.4	Additional Design alternatives	81
6.3	Technology Alternatives.....	84
6.4	Process and Activity Alternatives	87
6.5	No Go Alternative.....	87
7	Stakeholder Engagement.....	88
7.1	General Approach to Scoping and Public Participation	88
7.1.1	List of Pre-identified Organs of State/ Key Stakeholders Identified and Notified	88
7.1.2	Initial Notification	90
7.1.3	Availability of Scoping Report and Public Meeting.....	91
7.2	Public Participation Progress.....	91
8	Environmental Attributes and Baseline Environment	92
8.1	Topography	92
8.2	Geology	94
8.2.1	Witwatersrand Supergroup.....	94
8.2.2	Ventersdorp Supergroup.....	94
8.2.3	Transvaal Supergroup.....	95
8.3	Climate and Rainfall	98
8.4	Cultural, Heritage and Fossil Resources	99
8.4.1	Archaeological context	99
8.4.2	Potential Site Heritage features	100
8.4.3	Findings	100
8.4.4	Palaeontology.....	103
8.5	Soils	105
8.5.1	Soil Types.....	105
8.5.2	Agriculture Potential	106
8.6	Flora and Fauna.....	107
8.6.1	Ecologically Important Information and Landscape Features	107
8.6.2	Flora.....	114
8.6.3	Fauna	117
8.7	Surface Water and Wetlands	122
8.8	Groundwater.....	126
8.8.1	Hydrocensus and Borehole Information	126
8.8.2	Aquifer Type	133
8.8.3	Aquifer Parameters	133
8.8.4	Groundwater Gradients and Flow	134
8.8.5	Groundwater Quality.....	136
8.8.6	Aquifer Classification	143



8.8.7	Overall Site Hydrogeology	144
8.9	Air Quality	145
8.10	Visual Receptors and Landscape Character	149
8.11	Socio-Economic	151
8.11.1	Municipal Profile	151
8.11.2	Demographic and Socio-Economic Characteristics	151
9	Environmental Impact Assessment.....	155
9.1	Impact Assessment Methodology.....	155
9.1.1	Determination of Environmental Risk	155
9.1.2	Impact Prioritisation	157
9.2	Impacts Identified	159
9.3	Description and Preliminary Assessment of Impacts	164
9.3.1	Preliminary Impact Assessment	164
9.3.2	Cumulative Impacts	179
10	Sensitivity Mapping.....	180
11	Plan of Study for Environmental Impact Assessment	183
11.1	Description of Alternatives to be Considered in EIA Phase.....	183
11.2	Description of the Aspects to be Assessed as part of the EIA process.....	183
11.3	Aspects to be Assessed by Specialists	184
11.4	Proposed Method of Assessing Environmental Aspects	194
11.5	Proposed Method for Assessing Duration and Significance	194
11.6	Stages at Which Competent Authorities will be Consulted	194
11.7	Description of Tasks that will be Undertaken During the EIA Process	194
11.8	Proposed Method of EIA Phase Public Participation	195
11.9	Measures to Avoid, Reverse, Mitigate, or Manage Impacts	195
12	Assumptions and Limitations.....	196
13	Undertaking Regarding Correctness of Information and Level of Agreement	197
14	References	198

List of Figures

Figure 1: Aerial imagery locality map indicating the location of the proposed new Tailings Storage Facility and associated infrastructure.	25
Figure 2: Cross section through a typical TSF	28
Figure 3: Deelkraal II TSF compartments.....	29
Figure 4: Comparison of typical Class C liner and inverted liner system	30
Figure 5: EIA process diagram	33
Figure 6: Project location in relation to various desktop sensitivities and Listing Notice 3 areas.....	39



Figure 7: Authorisation processes for new water uses.	46
Figure 8: Location of the project in relation to GPEMF zones	61
Figure 9: Summary of GISTM	66
Figure 10: Other site options (dark red polygons) to be considered in trade-off study.....	79
Figure 11: Pipeline alternatives	81
Figure 12: Example of spigot deposition (source: www.researchgate.net)	85
Figure 13: Example of paddock deposition	85
Figure 14: Example of cyclone deposition	86
Figure 15: Topographical map of study area	93
Figure 16: Regional surface geology.....	96
Figure 17: North-south geological section (AGES, 2013).....	97
Figure 18: Average high and low temperature in Carletonville (Weather Spark, 2025).	98
Figure 19: Average Hourly Temperature in Carletonville (Weather Spark, 2025).....	98
Figure 20: Average Monthly Rainfall in Carletonville (Weather Spark, 2025).....	99
Figure 21: Potential heritage sites of interest to be investigated in detail in the EIA phase	101
Figure 22: Extract of the SAHRIS PalaeoMap (Council of Geosciences) indicating the High (orange), and Zero (grey) Palaeontological Sensitivity of the proposed study area.	104
Figure 23: Palaeontological Sensitivity of the study sites in Gauteng Province by the National Environmental Web-based Screening Tool indicates a High (red) and Medium (yellow) Palaeontological Sensitivity.	105
Figure 24: Land types in study area.....	106
Figure 25: Agriculture Potential map of study area.	106
Figure 26: Map illustrating the ecosystem threat status associated with the PAOI.	107
Figure 27: Map illustrating the ecosystem protection level associated with the PAOI.....	108
Figure 28: Map illustrating the PAOI in relation to the provincial conservation plan	109
Figure 29: Map illustrating the PAOI in relation to the Gauteng Ridges	110
Figure 30: The PAOI in relation to the NPAES dataset	111
Figure 31: The PAOI in relation to the Mining Biodiversity Guidelines dataset	112
Figure 32: Map illustrating the PAOI in relation to the CWAC dataset	113
Figure 33: Map illustrating the PAOI in relation to the Groundwater Strategic Water Source Areas dataset... ..	114
Figure 34: Map illustrating the vegetation types associated with the PAOI.	115
Figure 35: Map illustrating the PAOI in relation to the South African Inventory of Inland Aquatic Ecosystems.....	123
Figure 36: Map illustrating the PAOI in relation to the National Freshwater Ecosystem Priority Areas	124
Figure 37: Terrain and Hydrology	125
Figure 38: Hydrocensus borehole localities.....	127
Figure 39: Deelkraal TSF monitoring boreholes	131
Figure 40: Kusasaletu Boreholes	132
Figure 41: Regional groundwater gradient.....	135



Figure 42: Sulphate concentration distribution in the Deelkraal TSF boreholes	141
Figure 43: Sulphate concentration distribution in the Kusasaletu TSF boreholes.....	142
Figure 44: Period, day- and night-time wind roses (WRF data, January 2022 to December 2024)).	146
Figure 45: Seasonal wind roses (WRF data, January 2022 to December 2024))).	147
Figure 46: Location of sensitive receptors relative to the Project Area of Influence.	148
Figure 47: Initial Zones of Theoretical Visibility analysis overlaid onto landcover	150
Figure 48: Merafong population groups (Statssa, Census 2022).....	152
Figure 49: Sector Output Growth (IHS Markit, 2022; Draft IDP Merafong City 2025-26)	154
Figure 50: Combined scoping sensitivity map	182

List of Tables

Table 1: Report structure	16
Table 2: Locality details	21
Table 3: Relevant NEMA listed activities	34
Table 4: Environmental Sensitivity of Project Area.	38
Table 5: Specialist Assessments/themes and Sensitivity Ratings identified by DFFE’s Web-based Screening Tool.	40
Table 6: Summary of discussions regarding the undertaking of specialist Assessments.	41
Table 7: Applicable NEMWA Activities	50
Table 8: Gauteng Provincial Environmental Management Framework Zones	60
Table 9: Needs and desirability analysis for the proposed project.	69
Table 10: Advantages and disadvantages Lined, Unlined TSF and Unlined TSF	82
Table 11: Advantages and disadvantages Pipelines Design	84
Table 12: Summary of different finds and sites identified.	102
Table 13: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website	104
Table 14: Threatened flora species that are expected to occur within the PAOI; VU = Vulnerable; LC = Least Concern; CR = Critically Endangered; EN = Endangered; NE = Not Evaluated.	117
Table 15: Threatened mammal species that are expected to occur within the PAOI; NT = Near threatened; VU = Vulnerable; LC = Least Concern.	118
Table 16: Threatened avifauna species that are expected to occur within the PAOI; LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered	119
Table 17: Threatened insect and invertebrate species that are expected to occur within the PAOI NT = Near threatened; VU = Vulnerable; LC = Least Concern	120
Table 18: Threatened avifauna species that are expected to occur within the PAOI; LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered	121
Table 19: Threatened insect and invertebrate species that are expected to occur within the PAOI NT = Near threatened; VU = Vulnerable; LC = Least Concern.....	122



Table 20: Hydrocensus boreholes	128
Table 21: Hydrocensus groundwater chemistry (Groundwater Complete, 2025)	129
Table 22: Mine monitoring boreholes	130
Table 23: Summarised aquifer parameters obtained from pump tests	134
Table 24: Groundwater chemistry (Deelkraal TSF).....	137
Table 25: Groundwater quality in catchment C23J (Kusasaletu TSF)	139
Table 26: Ratings for the aquifer quality management classification system	144
Table 27: Appropriate level of groundwater protection required.....	144
Table 28: Selected Poverty Indicators (source: Draft IDP Merafong City 2025-26)	153
Table 29: Criteria for Determining Impact Consequence.....	155
Table 30: Probability Scoring.....	156
Table 31: Determination of Environmental Risk.	157
Table 32: Significance Classes.....	157
Table 33: Criteria for Determining Prioritisation.....	158
Table 34: Determination of Prioritisation Factor.	158
Table 35: Final Environmental Significance Rating.....	159
Table 36: Identified potential environmental impacts	161
Table 37: Impact identification matrix	163
Table 38: Preliminary impact assessment	165
Table 39: Sensitivity rating and weighting	180
Table 40: Details of specialist input during the EIA phase.	185

Appendices

Appendix A: Copy of Application Form

Appendix B: EAP CV

Appendix C: Public Participation

Appendix D: Specialist Reports

Appendix E: Impact Assessment Matrix

Appendix F: DFFE Screening Tool Reports and Site Sensitivity Verification Report



ACRONYMS AND ABBREVIATIONS

AIP	:	Alien Invasive Plant
AQSR	:	Air Quality Sensitive Receptors
ASTM	:	American Standard Testing Methodology
ATD	:	Alternative Tailings Disposal Methods
CA	:	Competent Authority
CARA	:	Conservation of Agricultural Resources Act, 1983
CBA	:	Critical Biodiversity Area
CLO	:	Community Liaison Officer
CMA	:	Catchment Management Agency
CMS	:	Catchment Management Strategy
CN	:	Free Cyanide
CR	:	Critically Endangered
CWAC	:	Coordinated Waterbird Counts
DFFE	:	Department of Forestry, Fisheries and the Environment (previously DEA)
DMRE	:	Former Department of Mineral Resources and Energy (now DMPR)
DMPR	:	Department of Mineral and Petroleum Resources
DMP	:	Dust Management Plan
DWS	:	Department of Water and Sanitation
EA	:	Environmental Authorisation
ECA	:	Environmental Conservation Act
EAP	:	Environmental Assessment Practitioner
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Services (Pty) Ltd
EN	:	Endangered
EMPr	:	Environmental Management Programme
ERP	:	Emergency Response Plan
ESA	:	Ecological Support Area
FPA	:	Fire Protection Agency
GA	:	General Authorisation
Ga	:	Giga-annum
GBIF	:	Global Biodiversity Information Facility
GDARDE	:	Gauteng Department of Agriculture, Rural Development and Environment
GHG	:	Greenhouse Gas
GIS	:	Geographic Information System
GISTM	:	Global Industry Standard for Tailings Management



GN	:	Government Notice
HDPE	:	High Density Polyethylene
HIA	:	Heritage Impact Assessment
I&AP	:	Interested and Affected Party
IAEA	:	International Atomic Energy Agency
IDP	:	Integrated Development Plan
IEM	:	Integrated Environmental Management
IFC	:	International Finance Corporation
IUCN	:	International Union for Conservation of Nature
IWULA	:	Integrated Water Use License Application
K	:	Hydraulic Conductivity
LC	:	Leachable Concentration / Least Concern
LED	:	Local Economic Development
LM	:	Local Municipality
LOM	:	Life of Mine
MAE	:	Mean Annual Evaporation
MAP	:	Mean Annual Precipitation
mbc	:	Meters Below Casing
MAR	:	Mean Annual Runoff
MHI	:	Major Hazard Installation
MISS	:	Microbially Induced Sedimentary Structures
ML	:	Megalitre
MPRDA	:	Minerals and Petroleum Resources Development Act, 2002
MP	:	Moderately Protected
MR	:	Mining Right
MSDF	:	The Merafong Municipal Spatial Development Framework
MT	:	Megatonnes
NAAQS	:	National Ambient Air Quality Standards
NB	:	Nominal Bore
NCR	:	Noise Control Regulations
NAEIS	:	National Atmospheric Emissions Inventory System
NDP	:	National Development Plan
NEM:AQA	:	National Environmental Management: Air Quality Act, 2004
NEM:WA	:	National Environmental Management: Waste Amendment Act, 2008
NEMA	:	National Environmental Management Act, 2002
NEMA	:	National Environmental Management Act, 1998



NEMBA	:	National Environmental Management: Biodiversity Act, 2004
NFEPA	:	National Freshwater Priority Areas
NGO	:	Non-Governmental Organization
NHRA	:	National Heritage Resources Act, 1999
NORM	:	Naturally Occurring Radioactive Material
NNR	:	National Nuclear Regulator
NRWMP	:	National Radioactive Waste Management Policy
NT	:	Near Threatened
NWA	:	National Water Act, 1998
PA	:	Protected Area
PAOI	:	Project Area of Influence
PHRA	:	Provincial Heritage Resources Authority
PIA	:	Palaeontological Impact Assessment
POI	:	Point of Interest
PPP	:	Public Participation Process
PP	:	Poorly Protected
Ptn	:	(Farm) Portion
RE	:	Remaining Extent
REC	:	Recommended Ecological Category
RWD	:	Return Water Dam
S	:	Storativity
SAPS	:	South African Police Services
SAHRA	:	South African Heritage Resources Agency
SANS	:	South African National Standards
SCC	:	Species of Conservation Concern
SDF	:	Spatial Development Framework
SIA	:	Social Impact Assessment
SLP	:	Social & Labour Plan
SO ₄	:	Sulphate
SSVR	:	Site Sensitivity Verification Report
SPLUMA	:	Spatial Planning and Land Use Management Act
SWMP	:	Stormwater Management Plan
SWSA	:	Strategic Water Source Areas
T	:	Transmissivity
TC	:	Total concentration
TDS	:	Total Dissolved Solids



TIA	:	Traffic Impact Assessment
TSF	:	Tailings Storage Facility
U	:	Uranium
VIA	:	Visual Impact Assessment
VU	:	Vulnerable
WMA	:	Water Management Area
WML	:	Waste Management License
WP	:	Well-Protected
WRD	:	Waste Rock Dump
WRDM	:	West Rand District Municipality
WULA	:	Water Use License Application
WUL	:	Water Use License



EXECUTIVE SUMMARY

Randfontein Estates Limited (a subsidiary of Harmony Gold Mining Company) (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes (including the statutory public participation), and to compile and submit the required documentation in support of application for a proposed new West Wits Reclamation and Deposition Project. The West Wits project consists of the proposed Deelkraal II Tailings Storage Facility (TSF) and associated infrastructure on a site located approximately 13km southwest of Carltonville in the Merafong City Local Municipality, West Rand District Municipality, Gauteng Province.

The Applicant requires additional deposition capacity for West Wits region's operations. The applicant plans on constructing the Deelkraal II Tailings Storage Facility (TSF) to cater for the additional future capacity. The proposed Deelkraal II TSF will cover an area of approximately 430 ha. This TSF will receive residue from Kusasaletu, and Savuka plants and will also assist in returning process water for reclaiming the existing Deelkraal 1 TSF and Kusasaletu TSF for processing at Kusasaletu plant. Additional planned infrastructure includes various slurry, potable, sewage and return water pipelines, access roads, power lines, pump stations and a new return water dam. Proposed upgrades to the existing Kusasaletu plant are also proposed as part of the project.

EIMS will compile and submit the required documentation in support of applications for:

- Environmental Authorisation (EA) and Waste Management License (WML) in accordance with the National Environmental Management Act – NEMA (Act 107 of 1998)- Listed activity: Listing Notice 2, Activity 6 and 15 and various Listing Notice 1 and 3 activities as well as the National Environmental Management: Waste Act – NEMWA (Act 59 of 2008)- Activity B7, B10 and B11; and
- Water Use License (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998). Water uses: Section 21 (c), Section 21 (i) and Section 21 (g). A separate application for a Water Use License (WUL) has been lodged with the Department of Water and Sanitation (DWS) for the water use triggers.
- An Air Emissions license in Accordance with the National Environmental Management: Air Quality Act, 2004 will be lodged for the planned plant upgrades.

PURPOSE OF THE SCOPING REPORT

The purpose of the scoping process is to:

- Identify the environmental policies and legislation that are relevant to the activity;
- To present the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- To identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking;
- Where appropriate, to identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process including cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- To identify the key issues to be addressed in the assessment phase;
- To agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required, as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and



- To identify suitable measures to avoid, manage, or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

PUBLIC PARTICIPATION PROCESS

The Public Participation Process (PPP) for the proposed project has been, and will continue to be, undertaken in accordance with the requirements of the National Environmental Management Act (NEMA) in line with the principles of Integrated Environmental Management (IEM). The PPP commenced on 6 February 2026 with an initial notification and call to register as interested and affected parties (I&APs). The comments received from I&APs during the initial call to register and commenting period so far have been captured in Public Participation Report in Appendix C.

Comments received during this Scoping Report review period will also be collated and added to the Public participation report submitted to the Competent Authority (CA) with the Final Scoping Report. Should the CA accept the Scoping Report, an EIA Report including an EMP, will be compiled and presented for public comment as part of this EIA process during which time further stakeholder engagement will take place.

This Scoping Report is being made available for public review and comment for a period of 30 days.

PROJECT ALTERNATIVES

The identification of location alternatives is limited due to the available open space in close proximity to the mining activities (and especially the gold processing plant). Several alternative disposal options are being assessed as part of Harmony's trade-off assessment which included deposition on the old Savuka TSF footprints and the old DF5 footprint.

Due to limited deposition capacity on these existing footprints, it is unlikely that either of these sites could, on their own, cater for the required tonnages of tailings material, however it is possible that one or both of these sites could be used in conjunction with the proposed Deelkraal II TSF, thereby potentially reducing the footprint of the Deelkraal II TSF. A trade-off study is being undertaken by Harmony in order to determine the feasibility of utilizing these other two existing footprints. If the trade-off study identifies an additional option to license and authorise another deposition site or sites the scope will be amended to include these sites. For now these additional location alternatives are still considered as possible alternative options, however this will be confirmed once the trade-off assessment has been completed. Further details regarding these location alternatives will be provided in the EIA report.

It is expected that a liner such as the inverted barrier system will be suitable to prevent any potential contaminant impact on the groundwater in the immediate area. Based on the significant benefits as a result of lining the TSF the unlined option will be discarded at scoping.

Currently cyclone deposition is the vastly preferred method of deposition for the majority of Harmony's current TSF operations due to the reasons described above. The environmental impacts associated with each deposition method are similar however cyclone deposition has higher water recovery rates and is also preferred from a geotechnical perspective. The Deelkraal II TSF is designed to utilize Cyclone deposition. As such no other deposition methods or technologies will be considered in the EIA phase and cyclone deposition is nominated as the preferred alternative.

Various other design and layout alternatives are discussed in Section 6 of this Scoping report.

ENVIRONMENTAL IMPACT ASSESSMENT

Each of the identified risks and impacts at the various project phases were assessed. The assessment criteria include the nature, extent, duration, magnitude / intensity, reversibility, probability, cumulative impact, and irreplaceable loss of resources.

The key negative impacts, in particular, will be further interrogated and assessed during the EIA phase of the project. Potential preliminary mitigation measures have been identified and will be refined based on input from the Environmental Assessment Practitioner (EAP), public consultation, and specialist assessments during the EIA



phase of the project. The associated EMPr will identify appropriate mitigation mechanisms for avoidance, minimisation and / or management of the negative impacts and enhancement of the positive aspects.

The most significant risks and impacts identified at Scoping were those that remain high or moderately high in terms of significance even post mitigation measures being considered. The following preliminary identified impacts were determined to have a potentially **moderate - high** final significance at this stage:

- Mortality / disturbance of wildlife during construction;
- Fragmentation of ecosystems and habitats during construction and operation;
- Decrease in runoff during construction, operation and decommissioning;
- Pollutants entering the surface water environment during operation;
- Groundwater quality impacts during operational phase;
- Disturbance and degradation of wetlands during construction;
- Impacts on health and human wellbeing during the operational phase of the TSF;
- Reclamation and rehabilitation of Harmony's existing TSFs (positive impact); and
- Continued employment and economic impacts during construction and operation (positive impact).

PLAN OF STUDY FOR EIA

The following specialist studies will form part of the EIA report:

- Biodiversity (Terrestrial);
- Heritage;
- Agriculture Potential, Soils and Land capability;
- Geohydrology;
- Aquatic and Wetland (including hydrogeology);
- Air quality;
- Climate Change;
- Traffic;
- Closure Costing and Rehabilitation;
- Socio-Economic;
- Hydrology;
- Palaeontology;
- Noise;
- Visual; and
- Health Risk and Radiological impact.



1 INTRODUCTION

Randfontein Estates Limited (a subsidiary of Harmony Gold Mining Company) (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes (including the statutory public participation), and to compile and submit the required documentation in support of application for a proposed new West Wits Reclamation and Deposition Project. The West Wits project consists of the proposed Deelkraal II Tailings Storage Facility (TSF) and associated infrastructure on a site located approximately 13km southwest of Carltonville in the Merafong City Local Municipality, West Rand District Municipality, Gauteng Province.

The Applicant requires additional deposition capacity for West Wits region's operations. The applicant plans on constructing the Deelkraal II Tailings Storage Facility (TSF) to cater for the additional future capacity. This TSF will receive residue from Kusasaletu, and Savuka plants and will also assist in returning process water for reclaiming the existing Deelkraal 1 TSF and Kusasaletu TSF for processing at Kusasaletu plant. Additional planned infrastructure includes various slurry, potable, sewage and return water pipelines, access roads, power lines, pump stations, a new return water dam. Proposed upgrades to the existing Kusasaletu plant (currently under care and maintenance) are also proposed as part of the project.

The proposed TSF will cover an area of approximately 430 ha as shown in Figure 1. The proposed slurry and process water / potable water pipelines will be flanged steel pipelines installed above-ground on pre-cast concrete plinths and two 3.5m wide access roads (double road), adjacent to the pipelines, will be cleared/graded to provide access for construction, maintenance and inspections (in areas where no access road is already in place). The diameter of the pipelines will be confirmed in the EIA phase once further design information becomes available.

In addition to the Deelkraal II TSF, additional infrastructure is also proposed, as follows:

- A new Return Water Dam in the vicinity of the Deelkraal II TSF;
- Upgrades to the existing Kusasaletu plant including new/upgrade of gold and new uranium sections;
- Slurry pipelines:
 - Reclaimed Slurry from Deelkraal 1 to Kusasaletu (~10,6km¹);
 - Kusasaletu Barren Tailings to Deelkraal II and booster pump station (~10,2km);
 - Reclaimed Slurry from Kusasaletu TSF to Kusasaletu Plant (~2km);
 - Slurry pipeline from Kusasaletu Plant to Savuka TSF (~4,97km); and
 - Slurry pipeline from Savuka plant to DF5 TSF (~2,9km).
- Process Water Pipelines:
 - Process Water Feed from Kusasaletu Plant to Deelkraal Reclamation (~9,54km) –
 - Return Water Feed to Kusasaletu Process Water Tank (~9,58km); -
 - Driefontein DP2 Pump Station to North Boundary Dam (~4,78km); -
 - DP2 feed to Tau Tona Reverse Osmosis Plant (~0,1km); -
 - Nursery Pumpstation #3 to Kusasaletu Process Water Tank (~9km); and
 - 2 Process Water pipelines from Kusasaletu Plant to Savuka White Tanks (~8km).
- Powerlines (all proposed powerlines will be 22kV or lower):

¹ Lengths of pipelines and powerlines provided are approximate and could change by 1 – 2 km depending on the routing alternative selected



- Powerline from Kusasaletu Plant to the existing Deelkraal TSF (~9.2km);
- Powerline from Kusasaletu Plant to the Kusasaletu TSF (~1.8km); and
- Powerline from Savuka shaft to Kusasaletu (~8.1km).
- Potable Water pipeline from Rand Water supply point to the Deelkraal TSF (~8.52km).
- Deelkraal 1 TSF Reclamation Pump Station.
- Kusasaletu TSF Reclamation Pump Station.
- New Access Roads (2x3,5m double road) adjacent to pipeline routes/OH lines and around Deelkraal II TSF (where no access road is already in place).
- Topsoil Stockpiles and overburden stockpiles.
- Ancillary construction infrastructure including workshops and laydown areas.

EIMS will compile and submit the required documentation in support of applications for of applications for:

- Environmental Authorisation (EA) and Waste Management License (WML) in accordance with the National Environmental Management Act – NEMA (Act 107 of 1998) for various triggered waste activities and
- Water Use License (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998). A separate application for a Water Use License (WUL) has been lodged with the Department of Water and Sanitation (DWS) for the water use triggers.
- An Air Emissions license in Accordance with the National Environmental Management: Air Quality Act, 2004 will be lodged for the planned plant upgrades.

Refer to Section 4 of this report for further details with respect to specific and listed activities being applied for.

The following details are relevant to the current application:

- Infrastructure will include the TSF and associated infrastructure as indicated above.
- The TSF itself will cover a total area of up to 430 ha;
- Tailing deposition method to be used: cyclone deposition.
- The current design scope of the TSF is based on a height of 65m (the final height will be confirmed in the EIA report once detailed designs are completed).
- The TSF barrier system is determined in consultation with the authorities and will follow relevant norms and standards for determination of liner requirements. An inverted barrier system is currently proposed.

1.1 REPORT STRUCTURE

This report has been compiled in accordance with the 2014 NEMA EIA Regulations, as amended. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in Table 1 below.



Table 1: Report structure

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(2)(a):	Details of – <ul style="list-style-type: none"> i. The Environmental Assessment Practitioner (EAP) who prepared the report; and ii. The expertise of the EAP, including a curriculum vitae; 	1.2 Appendix B
Appendix 2(2)(b):	The location of the activity. Including – <ul style="list-style-type: none"> i. The 21-digit Surveyor General code of each cadastral land parcel; ii. Where available, the physical address and farm name; iii. Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties; 	2
Appendix 2(2)(c):	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – <ul style="list-style-type: none"> i. A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. On a land where the property has not been defined, the coordinates within which the activity is to be undertaken; 	2 and 3
Appendix 2(2)(d):	A description of the scope of the proposed activity, including – <ul style="list-style-type: none"> i. All listed and specified activities triggered; ii. A description of the activities to be undertaken, including associated structures and infrastructure; 	3
Appendix 2(2)(e):	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	4
Appendix 2(2)(f):	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	5
Appendix 2(2)(h):	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including – <ul style="list-style-type: none"> i. Details of all alternatives considered; ii. Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; 	6, 7 and 9



Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	<ul style="list-style-type: none"> v. The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts – <ul style="list-style-type: none"> a. Can be reversed; b. May cause irreplaceable loss or resources; and c. Can be avoided, managed or mitigated; vi. The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; vii. Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. The possible mitigation measures that could be applied and level of residual risk; ix. The outcome of the site selection matrix; x. If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and xi. A concluding statement indicating the preferred alternatives, including preferred location of the activity; 	
<p>Appendix 2(2)(i):</p>	<p>A plan of study for undertaking the environmental impact assessment process to be undertaken, including –</p> <ul style="list-style-type: none"> i. A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity; ii. A description of the aspects to be assessed as part of the environmental impact assessment process; iii. Aspects to be assessed by specialists; iv. A description of the proposed method of assessing the environmental aspects, including a description of the proposed method assessing the environmental aspects to be assessed by specialists; v. A description of the proposed method of assessing duration and significance; vi. An indication of the stages at which the competent authority will be consulted; vii. Particulars of the public participation process that will be conducted during the environmental impact assessment process; and viii. A description of the tasks that will be undertaken as part of the environmental impact assessment process; ix. Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored; 	<p>11</p>
<p>Appendix 2(2)(j)</p>	<p>An undertaking under oath or affirmation by the EAP in relation to –</p> <ul style="list-style-type: none"> i. The correctness of the information provided in the report; ii. The inclusion of comments and inputs from stakeholders and interested and affected parties; and iii. Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties; 	<p>13</p>



Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(2)(k):	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	13
Appendix 2(2)(l):	Where applicable, any specific information required by the competent authority; and	None at this stage
Appendix 2(2)(m):	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	None at this stage



1.2 DETAILS OF THE EAP

EIMS is appointed by the applicant as the independent EAP and to assist in preparing and submitting the EA&WML application, Scoping and EIA Reports, and undertaking a Public Participation Process (PPP) in support of the proposed tailings storage facility. The contact details of the EIMS consultant and EAP who compiled this Report are as follows:

- Name: John von Mayer
- Tel No: +27 11 789 7170
- Fax No: +27 86 571 9047
- Project E-mail address: westwits@eims.co.za

In terms of Regulation 13 of the EIA Regulations (GN R. 982) as amended, an independent EAP, must be appointed by the applicant to manage the application. EIMS is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Considers all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

EIMS is a private and independent environmental management consulting firm that was founded in 1993. EIMS has in excess of 32 years' experience in conducting EIA's, including many EIA's for mines and mining related projects. Please refer to the EIMS website (www.eims.co.za) for company details and examples of EIA documentation currently available.

John von Mayer is a principal consultant at EIMS and has been involved in numerous large projects the past 16 years. He has experience in Project Management, small to large scale Environmental Impact Assessments, Environmental Auditing, Water Use Licensing, and Public Participation. He is a Registered Professional Natural Scientist (400336/11) with the South African Council Natural and Scientific Professions (SACNASP) as well as a registered Environmental Assessment Practitioners Association of south Africa (EAPASA) Environmental Practitioner (2019/1247). The Curriculum Vitae of the EAP that is responsible for the compilation of this Report is included in Appendix B.

1.3 SPECIALIST CONSULTANTS

Specialist studies are being undertaken to address the key impacts that require further investigation and these include:

- Biodiversity (Terrestrial);
- Heritage;
- Agriculture Potential, Soils and Land capability;
- Geohydrology;
- Climate Change;
- Aquatic and Wetland;
- Air quality;



- Noise;
- Palaeontology;
- Visual;
- Hydrological;
- Social; and
- Health Risk and Radiological.

Engineering inputs have been obtained to inform the design of the TSF. A closure assessment including a cost assessment will also be included as part of the studies conducted during the EIA phase.

The specialist studies listed above will involve the gathering of data relevant to identifying and assessing preliminary environmental impacts that may occur because of the proposed project. These preliminary impacts were assessed according to pre-defined impact rating methodology (Section 9.1). Preliminary mitigation / management measures to minimise potential negative impacts or enhance potential benefits are put forward in this Scoping Report and will be adjusted where relevant during the EIA phase once further assessments are concluded and input from the public has been considered.



2 DESCRIPTION OF THE PROPERTY

Table 2 indicates the farm portions that fall within the proposed project including details on the project location as well as the distance from the proposed project area to the nearest towns.

Table 2: Locality details

Application Area (Ha)	<ul style="list-style-type: none"> • Approximately 430 Hectares /4,3 km² for the TSF footprint. • Approximately 11 ha / 0.11km² for new Return Water Dam. • Approximately 10 km of slurry pipelines (with a 4m wide servitude) • Approximately 25km of new process and potable water pipelines (with a 4m wide servitude) • Approximately 3ha for new reclamation pump station: 0.03 km². • Approximately 37ha for topsoil's stockpiles. • Approximately 70ha total for the various associated construction laydown areas. <p>Planned upgrades to the Kusasaletu plant will all be within the existing plant footprint.</p>		
Magisterial District	Merafong City Local Municipality within the West Rand District Municipality (Gauteng Province).		
Distance and direction from nearest towns	The site is approximately 13km southwest of Carletonville. The geographic coordinates at the centre of the proposed Deelkraal II TSF site are 26°28'10.51"S, 27°16'56.07"E.		
Property Details	Farm Name:	Portion:	21 Digit Surveyor General Code
	Deelkraal II TSF, reclamation pump station, topsoil stockpiles, RWD and associated laydown areas Centre point: 26°27'58.21"S, 27°17'32.72".		
	Kleinfontein 141 IQ	2	T0IQ00000000014100002
	Kleinfontein 141 IQ	5	T0IQ00000000014100005
	Kleinfontein 141 IQ	6	T0IQ00000000014100006
	Deelkraal 142 IQ	23	T0IQ00000000014200023
	Deelkraal 142 IQ	3	T0IQ00000000014200003
	Deelkraal 142 IQ	59	T0IQ00000000014200059
	Deelkraal 142 IQ	60	T0IQ00000000014200060
	<p style="text-align: center; color: #0070C0;">New Process Water Pipelines:</p> <p style="text-align: center;">Process Water Feed to Deelkraal Reclamation Start: 26°27'22.37"S, 27°21'26.43"E Middle: 26°26'37.70"S, 27°19'45.69"E End: 26°27'29.40"S, 27°16'38.62"E</p> <p style="text-align: center;">Process Water Feed to Kusasaletu Process Water Tank Start: 26°27'30.82"S, 27°16'47.64"E Middle: 26°26'55.21"S, 27°19'34.04"E End: 26°27'22.29"S, 27°21'25.89"E</p> <p style="text-align: center;">DP2 to North Boundary Dam Start: 26°23'49.17"S, 27°25'58.07"E Middle: 26°24'52.03"S, 27°25'40.75"E</p>		



End: 26°24'45.98"S, 27°24'25.98"E

DP2 feed to Tau Tona RO Plant

Start: 26°24'47.62"S, 27°25'44.70"E

Middle: 26°24'48.26"S, 27°25'45.71"E

End: 26°24'49.05"S, 27°25'46.90"E

Nursery Pumpstation #3 to Kusasaletu Proces Water Tank

Start: 26°24'50.97"S, 27°24'25.62"E

Middle: 26°25'41.64"S, 27°22'16.40"E

End: 26°27'22.29"S, 27°21'26.33"E

2 x Process Water Pipelines Kusasaletu to Savuka White Tanks

Start: 26°27'22.27"S, 27°21'26.09"E

Middle: 26°26'4.20"S, 27°21'56.26"E

End: 26°25'24.05"S, 27°23'59.57"E

New Slurry Pipelines:

Reclaimed Slurry from Deelkraal 1 to Kusasaletu

Start: 26°27'29.83"S, 27°16'39.32"E

Middle: 26°26'48.69"S, 27°19'7.82"E

End: 26°27'25.95"S, 27°21'37.98"E

Kusasaletu Barren Tailings to Deelkraal II

Start: 26°27'24.44"S, 27°21'29.53"E

Middle: 26°26'48.69"S, 27°19'7.82"E

End: 26°27'51.94"S, 27°17'20.31"E

Reclaimed Slurry Kusasaletu TSF - Kusasaletu Plant

Start: 26°28'12.30"S, 27°21'45.85"E

Middle: 26°27'44.69"S, 27°21'46.67"E

End: 26°27'22.17"S, 27°21'39.17"E

Savuka Plant to DF5 TSF

Start: 26°25'17.30"S, 27°23'51.83"E

Middle: 26°24'56.58"S, 27°24'13.22"E

End: 26°24'12.61"S, 27°24'28.45"E

Slurry pipeline from Kusasaletu Plant to Savuka TSF

Start: 26°27'21.89"S, 27°21'29.50"E

Middle: 26°26'46.51"S, 27°21'29.25"E

End: 26°26'10.81"S, 27°20'56.45"E

New Potable Water Pipeline:

Start: 26°26'58.81"S; 27°21'15.10"E

Middle: 26°26'51.58"S, 27°19'0.95"E

End: 26°27'28.87"S, 27°16'38.14"E

New Powerlines:

Kusasaletu Plant to Deelkraal

Start: 26°27'23.38"S, 27°21'33.53"E

Middle: 26°26'50.14"S, 27°19'9.04"E



End: 26°27'29.55"S, 27°16'38.94"E

Kusasaletu plant - Kusasaletu TSF

Start: 26°27'23.38"S, 27°21'33.53"E

Middle: 26°27'47.43"S, 27°21'50.11"E

End: 26°28'12.37"S, 27°21'44.23"E

Savuka shaft – Kusasaletu Plant

aStart: 26°25'27.70"S, 27°24'14.77"E

Middle: 26°25'47.77"S, 27°22'7.33"E

End: 26°27'27.58"S, 27°21'27.59"E

Kleinfontein 141 IQ	4	T0IQ00000000014100004
Kleinfontein 141 IQ	5	T0IQ00000000014100005
Kleinfontein 141 IQ	6	T0IQ00000000014100006
Kleinfontein 143 IQ	7	T0IQ00000000014300007
Kleinfontein 143 IQ	35	T0IQ00000000014300035
Doornfontein 118 IQ	1	T0IQ00000000011800001
Doornfontein 118 IQ	2	T0IQ00000000011800002
Doornfontein 118 IQ	11	T0IQ00000000011800011
Doornfontein 118 IQ	12	T0IQ00000000011800012
Doornfontein 118 IQ	13	T0IQ00000000011800013
Doornfontein 118 IQ	14	T0IQ00000000011800014
Doornfontein 118 IQ	25	T0IQ00000000011800025
Doornfontein 118 IQ	27	T0IQ00000000011800027
Doornfontein 118 IQ	28	T0IQ00000000011800028
Buffelsdoorn 143 IQ	1	T0IQ00000000014300001
Blyvooruitzicht 116 IQ	3	T0IQ00000000011600003
Blyvooruitzicht 116 IQ	4	T0IQ00000000011600004
Blyvooruitzicht 116 IQ	6	T0IQ00000000011600006
Buffelsdoorn 143 IQ	9	T0IQ00000000014300009
Buffelsdoorn 143 IQ	13	T0IQ00000000014300013



	Buffelsdoorn 143 IQ	31	T0IQ0000000014300031
	Blyvooruitzicht 116 IQ	5	T0IQ0000000011600005
	Blyvooruitzicht 116 IQ	7	T0IQ0000000011600007
	Blyvooruitzicht 116 IQ	10	T0IQ0000000011600010
	Blyvooruitzicht 116 IQ	13	T0IQ0000000011600013
	Blyvooruitzicht 116 IQ	24	T0IQ0000000011600024
	Blyvooruitzicht 116 IQ	62	T0IQ0000000011600062
	Blyvooruitzicht 116 IQ	93	T0IQ0000000011600093
	Blyvooruitzicht 116 IQ	100	T0IQ0000000011600100
	Blyvooruitzicht 116 IQ	107	T0IQ0000000011600107
	Driefontein 113	1	T0IQ0000000011300001
	Existing Kusasalethu Plant (to be upgraded) Centre point: 26°27'26.75"S, 27°21'30.90"E		
	Buffelsdoorn 143 IQ	9	T0IQ0000000014300009
	Buffelsdoorn 143 IQ	35	T0IQ0000000014300035

The locality and extent of the proposed TSF and associated infrastructure is shown in Figure 1, and the proposed tailings storage facility and associated pipelines are also shown. It should be noted that this is a preliminary layout and is subject to change throughout the course of the EIA process. The final layouts will only be presented in the EIA report.

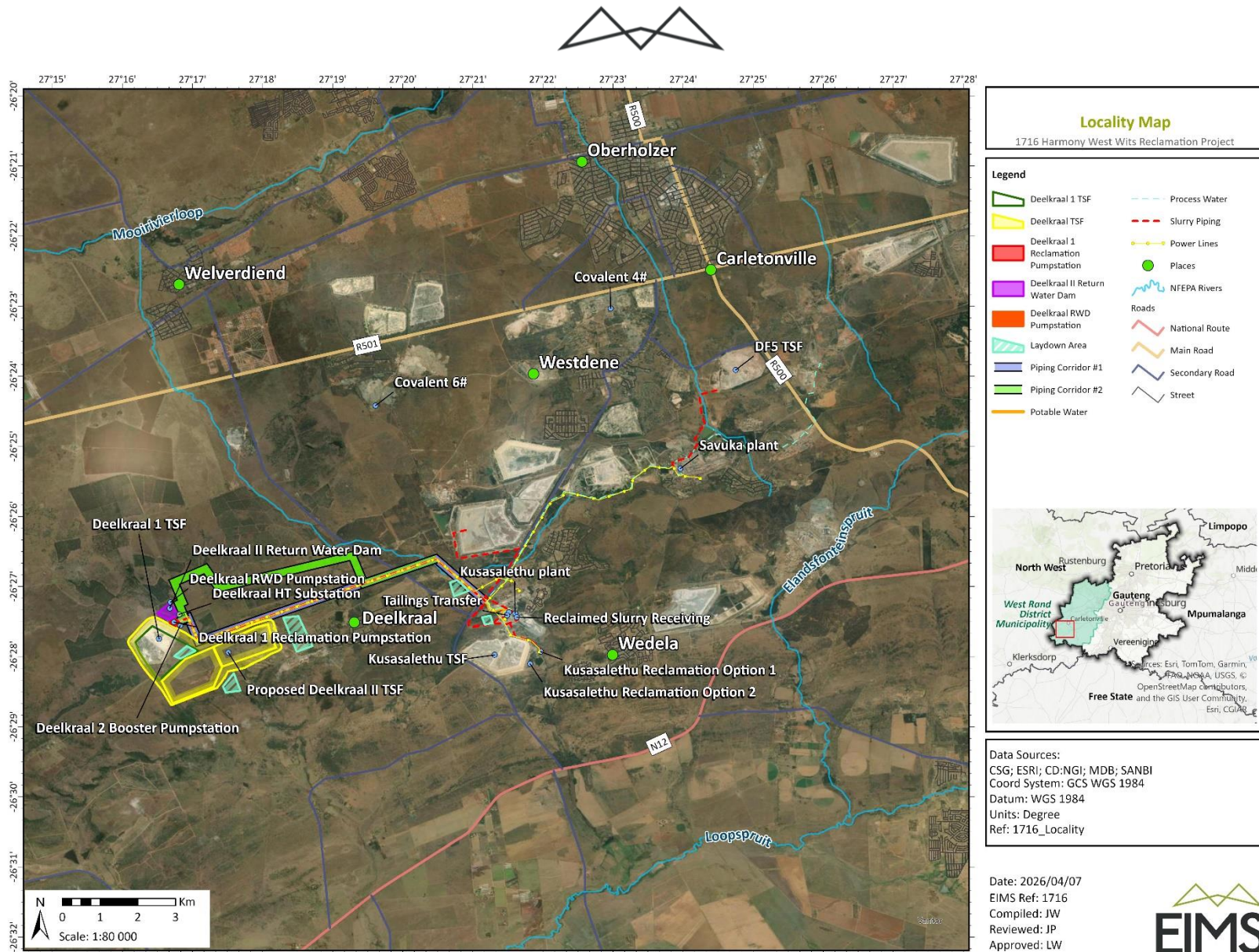


Figure 1: Aerial imagery locality map indicating the location of the proposed new Tailings Storage Facility and associated infrastructure.



3 DESCRIPTION AND SCOPE OF THE PROPOSED ACTIVITY

Randfontein Estates Limited (a subsidiary of Harmony Gold Mining Company) (hereafter referred to as the applicant) has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to assist with undertaking the required authorisation processes and to compile and submit the required documentation in support of application for the proposed new Deelkraal II Tailings Storage Facility (TSF) project and associated infrastructure on a site located approximately 13km southwest of Carletonville in the Merafong City Local Municipality, West Rand District Municipality, Gauteng Province (i.e. the Proposed Harmony West Wits Reclamation and Deposition Project).

The Applicant requires additional deposition capacity for West Wits region's operations. The applicant plans on constructing the Deelkraal II Tailings Storage Facility (TSF) to cater for the additional future capacity. This TSF will receive residue from Kusasaletu, and Savuka plants and will also assist in returning process water for reclaiming the existing Deelkraal 1 TSF and Kusasaletu TSF for processing at Kusasaletu plant. Additional planned infrastructure includes slurry, potable, sewage and return water pipelines, access roads, pump stations, a return water dam and a power line. Proposed upgrades to the existing Kusasaletu plant are also proposed as part of the project.

The Savuka Plant treats tailings from the Savuka Dormant TSFs (Old North TSFs) at a rate of 330 000 tpm and deposits the subsequent tailings on Savuka 5 & 7 TSFs. Harmony plans on re-mining Deelkraal 1 Dormant TSF and Kusasaletu TSF amongst other potential future sources. These TSFs will be processed through the Kusasaletu Plant at 500 000 tpm. The planned Life of Mine (LOM) for the West Wits region exceed the available deposition capacity of the existing TSFs. Therefore additional deposition capacity is required.

The Kusasaletu Plant will accommodate future reclamation operations and will therefore need site/s to deposit the tailings. Harmony owns ground, located adjacent to the Deelkraal 1 Dormant TSF, that can be used i.e. for the proposed Deelkraal II TSF. The Deelkraal 1 Dormant TSF and adjacent virgin ground footprint combined geometry will accommodate the future reclamation operations deposition rate and capacity. The proposed TSF will cover an area of approximately 430 ha as shown in Figure 1.

The West Wits Reclamation (WWR) Concept Study explores ways to unlock the potential of recycling historic gold tailings using the existing Kusasaletu and Savuka process plants and infrastructure. The Concept Study (SGS Bateman, 2024) evaluated different options for the treatment of the Deelkraal 1 and Kusasaletu Tailings Storage Facilities (TSF) at the existing processing plants. The reworked tailings will be deposited on a new TSF, referred to as Deelkraal II, assumed to be constructed on a site adjacent to the existing Deelkraal TSF. While reviewing the preliminary metallurgy testwork results it became evident that the Deelkraal TSF contained higher grades of accessible gold and it was agreed that that TSF would be reclaimed first, with the Kusasaletu TSF being reclaimed thereafter (SGS Bateman, 2024).

In addition to the Deelkraal II TSF, additional infrastructure is also proposed, as follows:

- A new Return Water Dam in the vicinity of the Deelkraal II TSF;
- Upgrades to the existing Kusasaletu plant including new/upgrade of gold and new uranium sections;
- Slurry pipelines:
 - Reclaimed Slurry from Deelkraal 1 to Kusasaletu (~10,6km²);
 - Kusasaletu Barren Tailings to Deelkraal II and booster pump station (~10,2km);
 - Reclaimed Slurry from Kusasaletu TSF to Kusasaletu Plant (~2km);
 - Slurry pipeline from Kusasaletu Plant to Savuka TSF (~4,97km); and
 - Slurry pipeline from Savuka plant to DF5 TSF (~2,9km).

² Lengths of pipelines and powerlines provided are approximate and could change by 1 – 2 km depending on the routing alternative selected



- Process Water Pipelines:
 - Process Water Feed from Kusasaletu Plant to Deelkraal Reclamation (~9.54km) –
 - Return Water Feed to Kusasaletu Process Water Tank (~9,58km); -
 - Driefontein DP2 Pump Station to North Boundary Dam (~4,78km); -
 - DP2 feed to Tau Tona Reverse Osmosis Plant (~0,1km); -
 - Nursery Pumpstation #3 to Kusasaletu Process Water Tank (~9km); and
 - 2 Process Water pipelines from Kusasaletu Plant to Savuka White Tanks (~8km).
- Powerlines (all powerlines will be 22kV or lower):
 - Powerline from Kusasaletu Plant to the existing Deelkraal TSF (~9.2km);
 - Powerline from Kusasaletu Plant to the Kusasaletu TSF (~1.8km); and
 - Powerline from Savuka shaft to Kusasaletu Plant (~8.1km)
- Potable Water pipeline from Rand Water supply point to the Deelkraal TSF (~8.52km).
- Deelkraal 1 TSF Reclamation Pump Station.
- Kusasaletu TSF Reclamation Pump Station.
- New Access Roads adjacent to pipeline routes/OH lines and around Deelkraal II TSF (where no access road is already in place).
- Topsoil Stockpiles and overburden stockpiles.
- Ancillary construction infrastructure including workshops and laydown areas.

All pipelines listed above will be flanged steel pipelines installed above-ground on pre-cast concrete plinths and two 3.5m wide access roads, adjacent to the pipelines, will be cleared/graded to provide access for construction, maintenance and inspections (for areas where no access road is already in place). The diameter of the pipelines will be confirmed in the EIA phase once further design information becomes available.

EIMS will compile and submit the required documentation in support of applications for:

- Environmental Authorisation (EA) and Waste Management License (WML) in accordance with the National Environmental Management Act – NEMA (Act 107 of 1998)- Listed activity: Listing Notice 2, Activity 6 and 15 as well as various Listing Notice 1 and 3 activities and also the National Environmental Management: Waste Act – NEMWA (Act 59 of 2008)- Activity B7, B10 and B11; and
- Water Use License (WUL) in accordance with the National Water Act – NWA (Act 36 of 1998). Water uses: Section 21 (c), Section 21 (i) and Section 21 (g). A separate application for a Water Use License (WUL) has been lodged with the Department of Water and Sanitation (DWS) for the water use triggers.
- An Air Emissions license in Accordance with the National Environmental Management: Air Quality Act, 2004 will be lodged for the planned plant upgrades.

A Tailings Storage Facility (TSF) is an engineered structure designed to safely contain and manage mining waste, known as tailings. It's not just a simple dam; it's a complex system that includes embankments, associated works, and procedures for managing the tailings and the water they contain. The primary goals of a TSF are to permanently store tailings and reclaim water for reuse in mining operations.

Key aspects related to tailings storage facilities are presented below

1. Tailings Transportation and Deposition:

- Tailings, a slurry of fine rock particles and water, are transported from the processing plant to the TSF, typically via pipelines.



- The tailings are then deposited within the TSF, usually in a controlled manner to allow for the separation of solids and water.

2. Separation of Water and Solids:

- TSFs are designed to facilitate the settling and consolidation of the tailing's solids, allowing water to separate and be reclaimed.
- This separation can occur naturally through gravity or through mechanical processes.
- The reclaimed water is often recycled back into the mining process, reducing water consumption.

3. Embankment Construction and Maintenance:

- TSFs often feature embankments, or "tailings dams," constructed from locally sourced materials, including the tailings themselves.
- These embankments are designed to withstand the weight and pressure of the stored tailings and to prevent leakage or breaches.
- The embankments are typically raised progressively as the TSF fills with tailings.

4. Water Management:

- TSFs must also have systems in place to manage surface water runoff and groundwater infiltration.
- This may involve the use of drainage systems, seepage collection systems, and other measures to prevent uncontrolled water discharge.

5. Monitoring and Closure:

- TSFs are subject to ongoing monitoring to ensure their stability and safety.
- This monitoring may involve remote sensing, on-site inspections, and other techniques.
- At the end of the mine's life, the TSF is decommissioned, and the tailings are typically covered and revegetated to minimize environmental impacts.

Figure 2 below shows a simplified cross-sectional diagram indicating the relevant design features typically associated with a TSF.

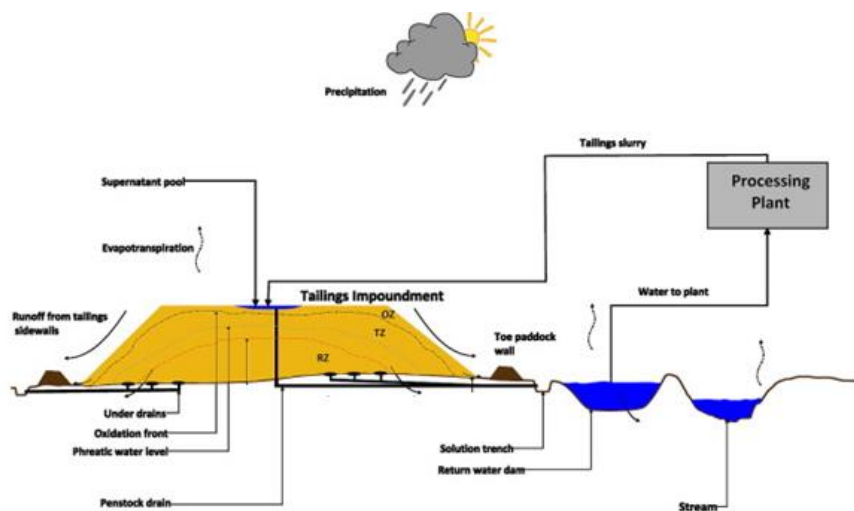


Figure 2: Cross section through a typical TSF



The construction phase of the project will consist of site establishment, site clearance, excavation, topsoil stockpiling, layering and compacting, prior to deposition of tailings at the site. Details and locations regarding additional infrastructure such as construction camps, access roads, temporary laydown areas and other associated infrastructure such as pump stations will be presented in the EIA report.

The TSF will be constructed in three separate compartments as indicated in the figure below.



Figure 3: Deelkraal II TSF compartments

Key parameters of the Deelkraal II TSF design are as follows:

- Maximum final height: 65m (to be confirmed in detailed design phase).
- Footprint area: Up to 430 Ha (combined total area for all three compartments).
- Total capacity:
- Total capacity:
 - Compartment 1 – 80.85 Mt
 - Compartment 2 – 53.9 Mt
 - Compartment 3 – 57.6 Mt
- Total deposition period at 330 000 tonnes per month for compartment 1[1]: 2028 to 2048 (20 years)
- Total deposition period at 220 000 tonnes per month for compartment 2: 2028 to 2048 (20 years)
- Total deposition period at 300 000 tonnes per month for compartment 3: 2036 to 2039 (4 years)
- Total deposition period at 400 000 tonnes per month for compartment 3: 2040 to 2048 (9 years)
- Maximum rate of rise: 4.98m/year.
- Deposition method: Cyclone.

The following operational activity details are relevant to the current application:

- An underdrainage system is provided beneath the RWD basin Tailings material be delivered to the site using new proposed slurry pipelines and deposition infrastructure.



- TSF barrier system will be determined in consultation with the authorities and in compliance with relevant norms and standards for determination of liner requirements in terms of the NEM:WA (GN R. 636). The waste material solutes classify as a Type 3 waste. This requires a Class C liner system. An inverted barrier system is recommended. It is a cost-effective alternative and has superior performance to a Class C barrier (**Figure 4**).
- With respect to water use, existing licenced water sources will be used and recirculated through the proposed Deelkraal II facility.

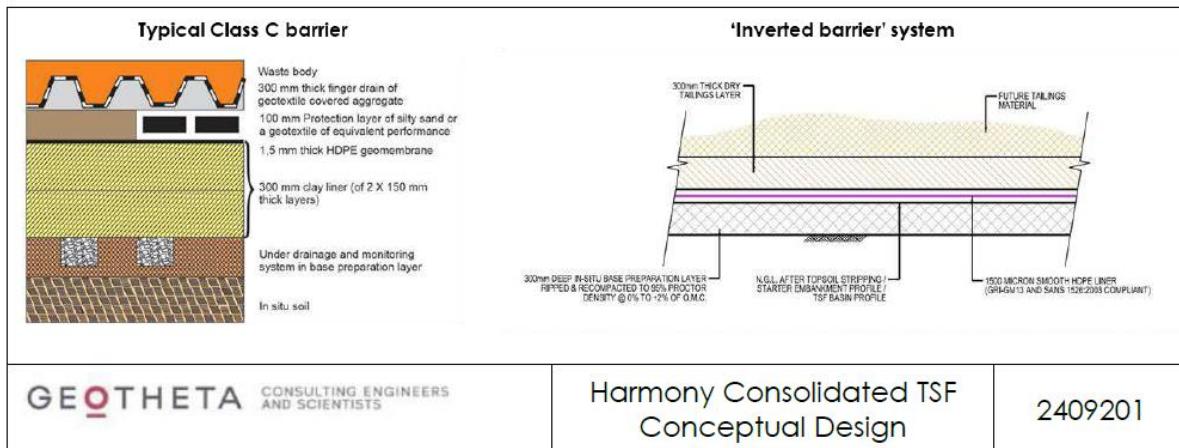


Figure 4: Comparison of typical Class C liner and inverted liner system

Further design detail will be provided in the EIA report once detailed design work has been completed by the engineering team.

The construction timeline is estimated at 564 days (including timeframes for tender evaluations). This extended construction period will require further rigorous timeline and deposition access planning which will need to be confirmed with the construction contractor(s). Construction is expected to commence in 2027 if all approvals are in place. A detailed closure plan will be developed during the life of the TSF. The objectives for the closure and rehabilitation of the TSF is to prevent pollution to the surrounding environment and ensure a stable facility is maintained.



4 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which relates to the proposed project.

4.1.1 CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The constitution of any country is the supreme law of that country. The Bill of Rights in chapter 2 section 24 of the Constitution of South Africa Act (Act No. 108 of 1996) makes provisions for environmental issues and declares that: “Everyone has the right -

- a) to an environment that is not harmful to their health or well-being; and
- b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:
 - i. prevent pollution and ecological degradation;
 - ii. promote conservation; and
 - iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development”.

The EIA and associated impact mitigation actions are conducted to fulfil the requirement of the Bill of Rights.

4.1.2 THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT (MPRDA)

The MPRDA aims to “make provision for equitable access to, and sustainable development of, the nation’s mineral and petroleum resources”. The MPRDA outlines the procedural requirements that need to be met to acquire mineral and petroleum rights in South Africa. The MPRDA further governs the sustainable utilisation of South Africa’s mineral resources.

Several amendments have been made to the MPRDA. These include, but are not limited to, the amendment to Section 102 which concerns the amendment of rights, permits, programmes and plans, to requiring the written permission from the Minister for any amendment or alteration; and the Section 5A(c) requirement that landowners or land occupiers receive twenty-one (21) days’ written notice prior to any activities taking place on their properties. One of the most recent amendments requires all mining related activities to follow the full NEMA process as per the 2014 EIA Regulations, which came into effect on 4 December 2014 as was last amended in June 2021.

In support of the separate WML application specifically, the applicant is required to conduct an EIA process comprising of the preparation of environmental Scoping and EIA Reports, an EMP, as well as Interested and Affected Party (I&AP) consultations, all of which must be submitted to the DMPr for adjudication. This report has been compiled in accordance with Regulation 49 of the MPRDA and Regulation 21 and Appendix 2 of the EIA Regulations (2014, as amended) in order to satisfy the criteria for a Scoping Report. This Scoping Report pertains to both the NEMA and the WML application for the proposed West Wits Reclamation and Deposition Project.

4.1.3 THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA)

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process, as well as conduct the public participation process towards an application for EA/WML. In South Africa, EIA’s became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant EA. On 21 April 2006, the Minister of Environmental Affairs and Tourism (now DFFE) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended in June 2010 and again in December 2014 as well as April 2017 and June 2021. The 2014 NEMA EIA Regulations (as amended) are applicable to this project.



Mining activities, including activities such as the proposed TSF officially became governable under the NEMA EIA Regulations (as amended) in December 2014 with the competent authority identified as the DMPR for the waste listed activities and for the NEMA listed activities.

The objective of the EIA Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of the listed activities that are triggered by the proposed project. The purpose of these procedures is to provide the competent authority with adequate information to make informed decisions which ensure that activities which may impact negatively on the environment to an unacceptable degree are not authorised, and that activities which are authorised are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIA's in order to apply for, and be considered for, the issuing of an EA/WML. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA/WML for any listed activity.

An environmental Scoping and Impact Assessment process is reserved for activities which have the potential to result in significant impacts which are complex to assess. Scoping and Impact Assessment studies accordingly provide a mechanism for the comprehensive assessment of activities that are likely to have more significant environmental impacts. Figure 5 below provides a graphic representation of all the components of a full EIA process.

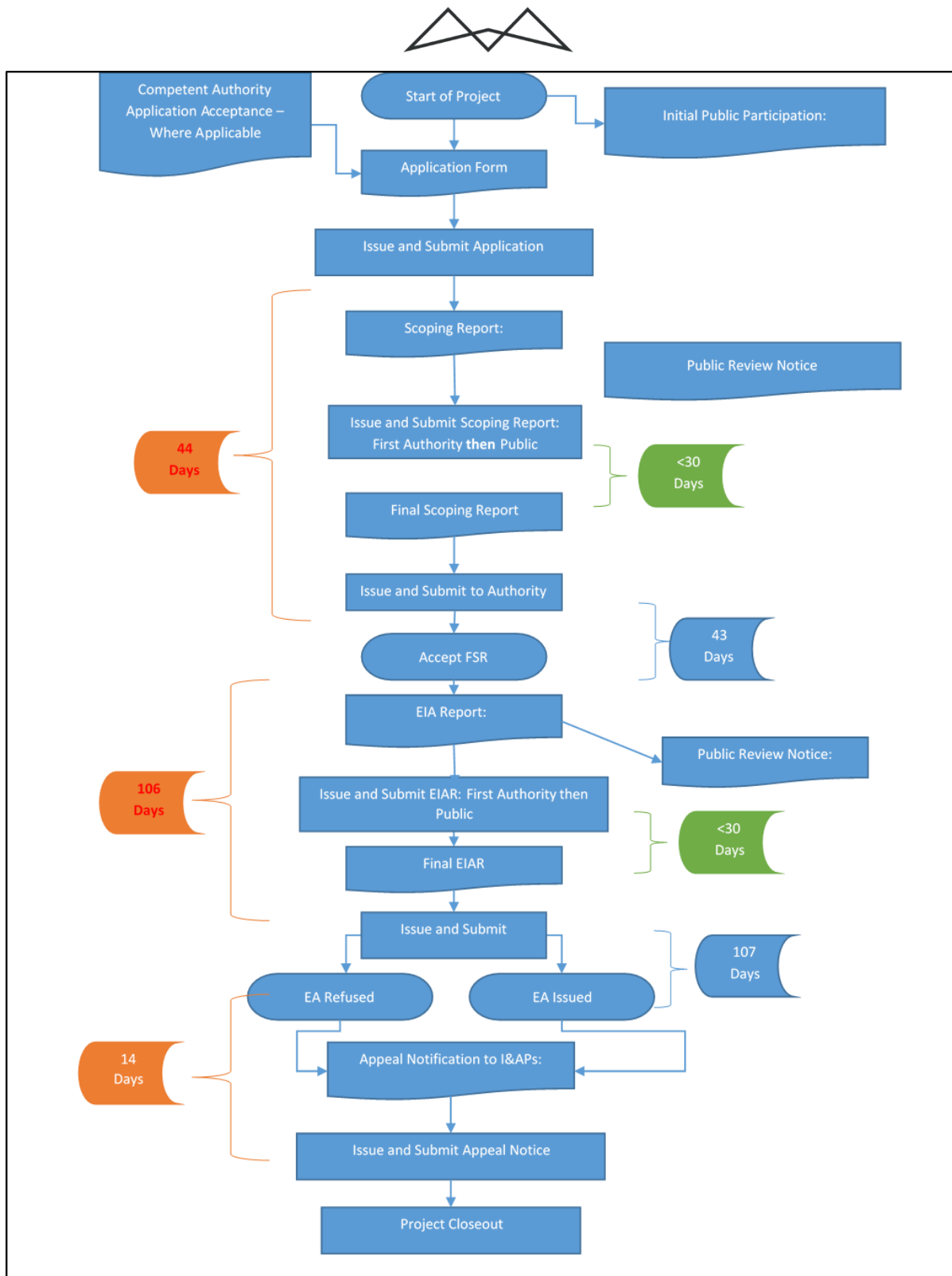


Figure 5: EIA process diagram

NEMA sets out the general objectives of IEM in South Africa, including to (section 23(2)), of which the following two are of relevance for this report:

- Identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities. This is to be done with a view to minimising negative impacts, maximising benefits and promoting compliance with the principles of environmental management set out in section 2 (of NEMA).



- Ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them

Section 24P of the NEMA requires that an applicant for an environmental authorisation relating to prospecting, mining or production must, before the Minister responsible for mineral resources issues the EA, comply with the prescribed financial provision for the rehabilitation, closure and ongoing post decommissioning management of negative environmental impacts. Therefore, the potential environmental liabilities associated with the proposed activity must be quantified and the method of financial provision indicated in line with the NEMA Financial Provision Regulations (2015). The financial provision costs will be presented in the EIA Report.

4.1.3.1 LISTED ACTIVITIES

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIA's in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the process to be followed when applying for EA for any listed activity.

The proposed TSF and associated infrastructure requires both an EA and a WML to operate, this will be undertaken as an integrated application. The listed activities that are triggered by the project in terms of the 2014 EIA Regulations GN983, 984 and 985 promulgated under the National Environmental Management Act (Act 107 of 1998 - NEMA) are specified in Table 3 below:

Table 3: Relevant NEMA listed activities

Name of activity	Aerial extent of the activity	Listed Activity	Applicable listing notice
<p>Pipelines:</p> <p><i>The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes-</i></p> <p><i>(i) with an internal diameter of 0,36 metres or more; or</i></p> <p><i>(ii) with a peak throughput of 120 litres per second or more.</i></p> <p><i>In order to deposit on the TSF, slurry and return water pipelines will need to be constructed. The residue deposition pipelines will have a NB diameter of more than 0.36m with a peak throughput of more than 120 ℓ/s.</i></p> <p>The new slurry and process water pipelines for the TSF will trigger this activity due to the lengths, diameters and flow rates.</p>	<p>~25km total length for all associated new pipeline routes</p>	Activity 10	GN983
<p>Pipelines for TSF and Maintenance Road</p> <p><i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging,</i></p>	<p>~25km total length for all associated</p>	Activity 19	GN983



Name of activity	Aerial extent of the activity	Listed Activity	Applicable listing notice
<p><i>excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</i></p> <p>The proposed pipelines and maintenance road will likely intersect wetlands and may require infilling of more than 10m³ to ensure structural integrity.</p>	<p>new pipeline routes</p>		
<p>Tailings Storage Facility – Mining Right variation</p> <p><i>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.</i></p> <p>The project is proposed on an area with an existing mining right ((GP) 30/5/1/2/2 (07) MR) and may require amendment through a MPRDA Section 102 application.</p>	<p>430ha</p>	<p>Activity 21D</p>	<p>GN983</p>
<p>Tailings Storage Facility</p> <p><i>The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.</i></p> <p>Proposed TSF will require a Water Use License in terms of Section 21(g) and 21(c) and (i) water uses. An Air Emissions License will also be required for the Kusasaletu Plant.</p>	<p>430ha</p>	<p>Activity 6</p>	<p>GN984</p>
<p>Tailings Storage Facility and associated infrastructure</p> <p><i>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for-</i></p>	<p>430ha</p>	<p>Activity 15</p>	<p>GN984</p>



Name of activity	Aerial extent of the activity	Listed Activity	Applicable listing notice
<p><i>(i) the undertaking of a linear activity; or</i> <i>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</i></p> <p>The TSF and proposed infrastructure will result in clearance of over 20ha of indigenous vegetation.</p>			
<p>Tailings Storage Facility and associated infrastructure</p> <p><i>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</i></p> <p><i>c. Gauteng</i></p> <p><i>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</i></p> <p><i>ii. Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans.</i></p> <p>Clearance of vegetation in the preparation of the construction footprint will result in a potential impact on listed endangered ecosystem and critical biodiversity areas. The project site covers various ESA and CBA areas.</p>	430ha	Activity 12	GN985
<p>Tailings Storage Facility and associated infrastructure</p> <p><i>"The development of-</i></p> <p><i>(ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs-</i></p> <p><i>(a) within a watercourse;</i></p>	Exact areas TBC	Activity 14	GN985



Name of activity	Aerial extent of the activity	Listed Activity	Applicable listing notice
<p><i>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.</i></p> <p><i>c. Gauteng</i></p> <p><i>i. A protected area identified in terms of NEMPAA, excluding conservancies;</i></p> <p><i>ii. National Protected Area Expansion Strategy Focus Areas;</i></p> <p><i>iii. Gauteng Protected Area Expansion Priority Areas;</i></p> <p><i>iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;</i></p> <p><i>v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004);</i></p> <p><i>vi. Sensitive areas identified in an environmental management framework adopted by the relevant environmental authority.</i></p> <p>The proposed footprint for the TSF, pipelines and access roads are located within 32m of wetlands, will exceed 10 square metres and will result in a potential impact on listed endangered ecosystem and critical biodiversity areas.</p>			

4.1.3.2 THE NATIONAL WEB-BASED ENVIRONMENT SCREENING TOOL, 2019

On the 5th of July 2019, the Department of Forestry, Fisheries and the Environment (DFFE) issued a Notice of the requirement to submit a report generated by the National Web-based Environmental Screening Tool in terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and Regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended. The submission of this report is compulsory when applying for environmental authorisation in terms of Regulation 19 and Regulation 21 of the Environmental Impact Assessment Regulations, 2014 effective from the 4th of October 2019. The Screening reports for the various project components are provided in Appendix F of this report. The main findings to be discussed from the screening report are listed below.

The following summary of the study area's environmental sensitivities were identified in the Environmental Screening Report. The environmental sensitivities for the various proposed development footprints are indicated on Table 4.



Table 4: Environmental Sensitivity of Project Area.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation (Solar PV) Theme		X		
Defence Theme				X
Palaeontology Theme		X		
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

The information collected by the specialists and EAP’s assessment may be used to confirm or dispute (as may be applicable) the environmental sensitivity ratings identified by the National Screening Tool. The EAP has undertaken a site sensitivity verification (Appendix F) and EAP’s assessments/theme and sensitivity ratings identified by the Screening Tool are summarized in Table 5 below. Table 6 presents these Specialist Assessments/Studies as well as the motivations behind the EAP’s decision of recommending or not recommending the undertaking of certain Specialist Assessments.

The project location in relation to various desktop sensitivities and applicable NEMA Listing Notice 3 areas is presented in **Figure 6** below.

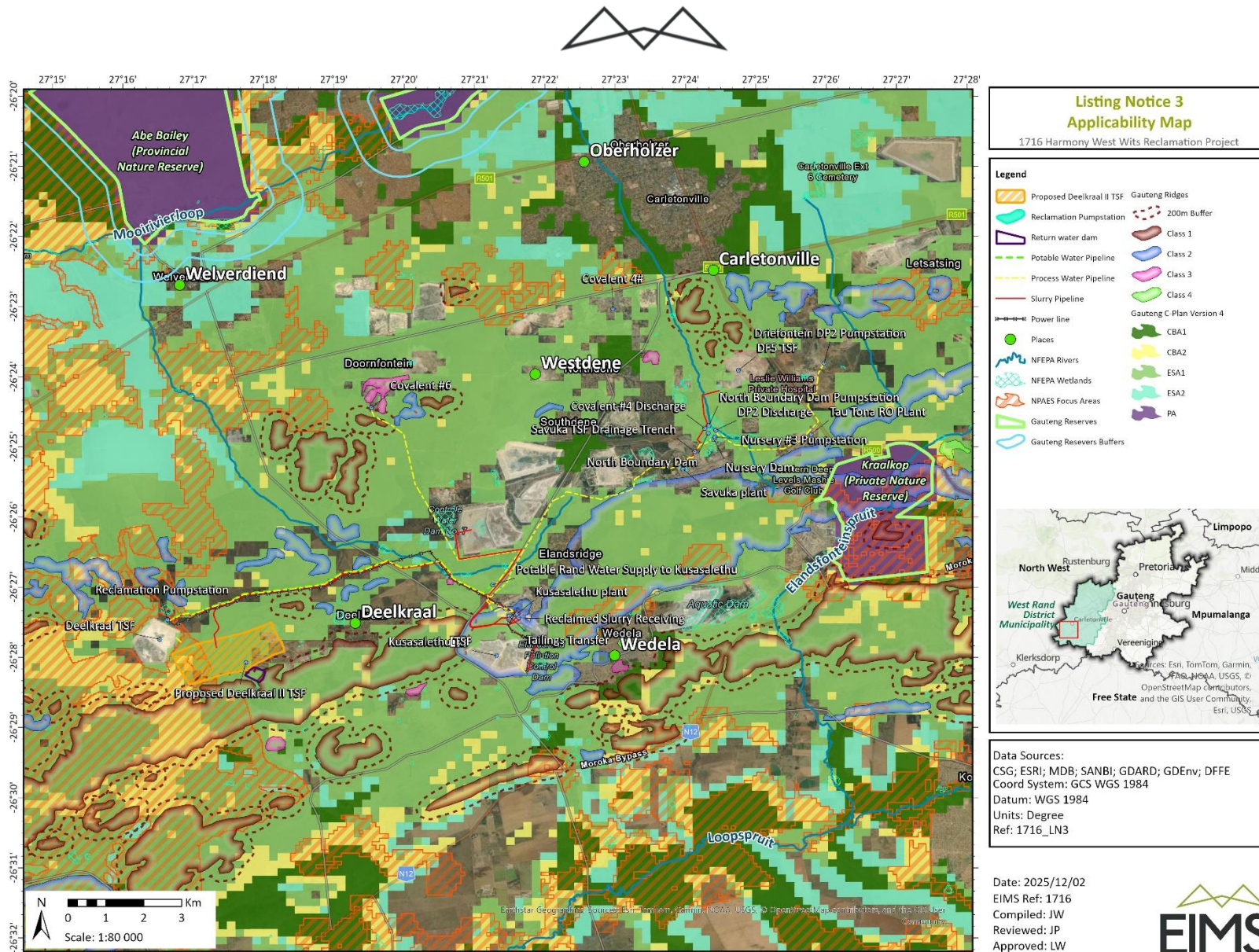


Figure 6: Project location in relation to various desktop sensitivities and Listing Notice 3 areas



Table 5: Specialist Assessments/themes and Sensitivity Ratings identified by DFFE’s Web-based Screening Tool.

Assessment Theme	Sensitivity Rating (Screening Report)	Sensitivity Rating (Site Verification)	Response
Agriculture Theme	High	Medium	Relative Agricultural Sensitivity was assessed to be high by the Site Sensitivity Verification Report (SSVR) included in Appendix F. The SSVR found that there are some agricultural activities within the study area. Based on the aspects of the proposed development and current environmental conditions on site, it is anticipated that there will be low - moderate impacts on the agricultural potential. A medium sensitivity is suggested.
Animal Species Theme	Medium	Medium	The proposed development site has been transformed mainly due to the mining and agricultural activities which have disturbed the fauna habitats. Although the study area falls within Critical Biodiversity Area (CBA) 1 and CBA 2 areas and various ESA areas, the mining activities have significantly disturbed the natural ecosystem and therefore, there is a low likelihood of vulnerable, species of conservation concern (SCC) and/or protected fauna present within the area. However, even though the impacts on animal life is anticipated to be relatively low, the extent of the site and potential presence of important biodiversity cannot be excluded.
Aquatic Biodiversity Theme	Very High	High	Relative Aquatic Biodiversity Theme Sensitivity was assessed to be Very High-Sensitive for TSF and pipeline infrastructure. Based on review of desktop information as well as site verification, it was found that there are several pre-identified wetlands in and around the proposed development footprint. A high sensitivity is suggested.
Archaeological and Cultural Heritage Theme	Low	Medium	Relative Archaeological and Cultural Heritage Theme Sensitivity was assessed to be Medium Sensitive for the TSF and pipeline infrastructure. Potential heritage features may exist on the site and a medium sensitivity is therefore recommended for now. This will be confirmed once the heritage specialist has completed their fieldwork and detailed EIA-phase assessments.
Civil Aviation Theme	High	Low	The proposed development blends in with the existing land uses in the area and there is no anticipated impacts on civil aviation emanating from the project. The proposed development does not entail the establishment of high-rise structures, use of high frequency electromagnetic radiation nor reflecting infrastructure. Therefore, based on the aspects of the proposed development and current environmental conditions on site, it is anticipated that there will be low impacts on Civil Aviation.
Defence Theme	Low	Low	Relative Defence Theme Sensitivity was confirmed as Low there are no military bases / facilities present within the vicinity of the project site. Therefore, based on the aspects of the proposed development and current environmental conditions on site, it is anticipated that there will be low impacts on defence facilities.
Palaeontology Theme	High	High	Based on the PalaeoMap from SAHRIS, the Palaeontological Sensitivity of the proposed area of the project footprint occurs in an area with high palaeo-sensitivity. The geology of the development indicates that fossils may be present in the development footprint which could be affected during certain construction activities. A high sensitivity is therefore confirmed.
Plant Species Theme	Medium	Medium	Relative Plant Species Sensitivity was assessed to be moderate as the proposed development site has been transformed mainly due to the mining and agricultural activities which have disturbed the plant habitats. Based on the aspects of the proposed development and



Assessment Theme	Sensitivity Rating (Screening Report)	Sensitivity Rating (Site Verification)	Response
			current environmental conditions on site, it is anticipated that there will be moderate impacts on the plant species and a medium sensitivity is confirmed.
Terrestrial Biodiversity Theme	Very High	Medium	Relative Terrestrial Biodiversity Sensitivity was assessed to be Medium Sensitive as the SSVR found that the proposed development site has been transformed mainly due to the mining and agricultural activities which have disturbed the natural habitats and ecosystems.

Table 6: Summary of discussions regarding the undertaking of specialist Assessments.

SPECIALIST ASSESSMENT	DICUSSION AND MOTIVATION
Agricultural Impact Assessment	The SSVR found that there are some agricultural activities within the study area. Although it is anticipated that there will be minimal impact on agricultural activities and/or land and as such, an Agricultural Impact Assessment is recommended by the EAP to confirm the potential impacts and outline the necessary mitigation measures.
Archaeological and Cultural Heritage Impact Assessment	Based on the potential sensitivities, a Heritage Impact Assessment (HIA) is recommended by the EAP to identify the heritage features and provide mitigation measures.
Palaeontology Impact Assessment	Based on the 1:250 000 SAHRIS PalaeoMap and the National Web-Based Screening Tool Report, the study area is located within a Medium Palaeo-Sensitivity area. The study area is located on an area which has been transformed. Based on the very high palaeo-sensitivity rating in the screening tool report, consequently the EAPs recommendation that a Palaeontological Impact Assessment be undertaken for the project as there may be impacts on palaeontology.
Terrestrial Biodiversity Impact Assessment	The National Web-Based Screening Tool Report found that the Relative Terrestrial Biodiversity Impact Assessment Theme Sensitivity is Very High-Sensitive. Based on desktop datasets and site sensitivity verification, the pipeline section consists of largely intact pristine vegetation. The area is considered to fall within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA). Therefore, a Terrestrial Biodiversity Impact Assessment is recommended by the EAP and must be undertaken in line with the Protocol for The Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN 320, 2020 as amended) to confirm presence of Flora or Fauna, Avifauna, SCC, or protected species within the development site, verify site terrestrial biodiversity sensitivity and provide necessary mitigation measures.
Plant Species Assessment	Similarly, to the rationale above, the EAP recommends that a Terrestrial Biodiversity Assessment be undertaken to confirm if there are no Flora or Fauna SCC, or protected species within the development site. The Plant Species Assessment will be covered by the Terrestrial Biodiversity Impact Assessment.
Animal Species Assessment	Similarly, to the rationale above for Terrestrial Biodiversity Impact Assessment, the EAP recommends that a Terrestrial Biodiversity Assessment be undertaken to confirm protected species within the development site. The Animal Species Assessment will be covered by the Terrestrial Biodiversity Impact Assessment.
Aquatic Biodiversity Impact Assessment	Based on review of desktop information and site verification, it was found that there are pre-identified wetlands around the proposed development footprint. Even though these wetlands were noted to have been already impacted upon by the mining activities and therefore not in their natural state, their Present Ecological State (PES) and Site Ecological Importance (SEI) cannot be undermined. Therefore, the EAP recommends that an Aquatic Biodiversity Assessment be undertaken to assess the PES, SEI, risk matrix and provide necessary mitigation measures.



SPECIALIST ASSESSMENT	DISCUSSION AND MOTIVATION
Hydrology Assessment	The proposed development entails the establishment of a medium-high hazardous waste facility which its integrity can be influenced by hydrological conditions and inversely, it can impact the hydrological conditions. Provided that hydrological analysis can assist in analysing the scope of the flood, position the runoff pollution sources, and predict geomorphological change on runoff, the EAP recommends a Hydrology Assessment be undertaken for the project.
Noise Impact Assessment	A Noise Impact Assessment (NIA) predicts the impact that noise, from a proposed development, is likely to have on the surrounding area. An NIA is usually associated with large industries or developments with excessive noise generation such engineering companies, printing presses, textile mills, and metal works which immensely generate noise pollution. The noise from the machine's mechanical pneumatic drills, saws, and rotating belts usually produces intolerable sounds and are a nuisance to the public. Considering that the proposed development is for a TSF within an area used for similar activities, the EAP recommend a Noise Impact Compliance Statement is sufficient for the project.
Health Impact Assessment	Health impact assessment (HIA) is a tool that can help communities, decision makers, and practitioners make choices that improve public health. A health impact assessment can be used to evaluate objectively the potential health effects of a project or policy before it is built or implemented. HIA is usually undertaken for projects which can have health impacts on the surrounding communities. Based on the proposed project description, the establishment of the TSF can be associated with health impacts especially cumulative health impacts considering the existing TSF's in the area. Therefore, the EAP recommends a Health Risk and Radiological Assessment be undertaken for the project.
Socio-Economic Assessment	The overarching aim of undertaking a Socio-Economic Assessment of a projects is to develop an understanding of the current social and economic environment and aims to assess or assesses the potential impact of the project on the socio-economic environment. Socio-Economic Assessment are usually undertaken for projects which have an impact and/or affect the social and/or economic structures such as low-cost housing projects, mixed-use developments, upgrading of informal settlements, linear projects transecting different communities, etc. Based on the project information and the purpose of the development largely relating to the nature of the project being the same activity already undertaken on the site, minimal socio-economic influence / change is anticipated. However, the EAP recommends a Socio-Economic Assessment for the project due to the surrounding social structures and potential cumulative socio-economic impacts which may emerge from the project.
Ambient Air Quality Impact Assessment	Air Quality Impact Assessment (AQIA) is an evaluation, using approved computer models, of the ambient air quality impacts that the public may be expected to be exposed to due to air pollution emissions from one or more facilities. AQIA is an important technique for determining the relative contribution to ground level pollutant concentrations of specific current or future source emissions at receptor sites. AIQA is usually undertaken is for projects which will potentially emit and/or increase pollutant concentrations during construction and/or operational phases. Based on the project information, the EAP recommends an Air Quality Impact Assessment for the project as it will TSF processes will potentially emit and/or increase pollutant concentrations, especially dust from the TSF and emissions associated with the Kusasaletu plant upgrades.
Additional Specialist Assessments Identified by the EAP	
Geohydrology Assessment	Hydrogeological assessments consider how proposed developments may be affected by groundwater and nearby surface water, in terms of potential flood risk and impact on structural foundations. Provided that the nature of the proposed development is a hazardous waste facility and it may affected and/or be affected by groundwater and the pre-identified nearby wetlands, the EAP recommends a Geohydrology Assessment be undertaken for the project.
Landscape/Visual Impact Assessment	Although the development is a TSF proposed within an area used for similar land uses however based on the proposed height of the TSF a Landscape / Visual Impact Assessment is recommended by the EAP.



SPECIALIST ASSESSMENT	DISCUSSION AND MOTIVATION
Financial Provisions: Closure Costing	Financial provision plan is a form of security assessment. Before mining companies undertake mining activities, mining companies must assess what it will cost to rehabilitate the impact of their operations on the environment, and then they must set aside and secure the amount of money needed to cover that cost until the money is needed for rehabilitation. Therefore, a Financial Provisions Closure costing is recommended by the EAP.
Climate Change Impact Assessment	Climate change impact assessments seek to characterize, diagnose, and project risks or impacts of environmental change on people, communities, economic activities, infrastructure, ecosystems, or valued natural resource. The need to undertake Climate Change Impact Assessments as part of EIA Projects which may influence climate change has been on the rise as competent authorities seek to assess how the project has considered climate change. The EAP recommends that a Climate Change Impact Assessment be undertaken to evaluate how the TSF will impact on climate change and also how future climate change could affect the project.



4.1.4 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (NEMBA)

The National Environmental Management Biodiversity Act (Act No. 10 of 2004 – NEMBA) provides for the management and conservation of South Africa's biodiversity within the framework of the NEMA as well as the protection of species and ecosystems that warrant national protection. Within the framework of this act, various regulations are promulgated which provide specific requirements and management measures relating to protecting threatened ecosystems, threatened or protected species as well as the control of alien and invasive species. A summary of these regulations is presented below.

The National List of Ecosystems that are Threatened and Need of Protection (GN 1002 of 2011) are promulgated under the NEMBA and these Regulations provide for listing of threatened or protected ecosystems in one of the following categories:

- Critically Endangered (CR) ecosystems, being ecosystems that have undergone severe degradation of ecological structure, function or composition as a result of human intervention and are subject to an extremely high risk of irreversible transformation;
- Endangered (EN) ecosystems, being ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems;
- Vulnerable (VU) ecosystems, being ecosystems that have a high risk of undergoing significant degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems or endangered ecosystems; and
- Protected ecosystems, being ecosystems that are of high conservation value or of high national or provincial importance, although they are not listed as critically endangered, endangered or vulnerable.

Further regulations published under the NEMBA are the threatened or protected Species Regulations (GN R 152 OF 2007) which aims to:

- (a) further regulate the permit system set out in Chapter 7 of the Biodiversity Act insofar as that system applies to restricted activities involving specimens of listed threatened or protected species;
- (b) provide for the registration of captive breeding operations, commercial exhibition facilities, game farms, nurseries, scientific institutions, sanctuaries and rehabilitation facilities and wildlife traders;
- (c) provide for the regulation of the carrying out of a specific restricted activity, namely hunting;
- (d) provide for the prohibition of specific restricted activities involving specific listed threatened or protected species;
- (e) provide for the protection of wild populations of listed threatened species; and
- (f) provide for the composition and operating procedure of the Scientific Authority.

The Alien and Invasive Species Lists are promulgated under the NEMBA with the aim of protecting the quality and quantity of arable land in South Africa. Loss of arable land should be avoided and declared Weeds and Invaders in South Africa are categorised according to one of the following categories, and require control or removal:

- Category 1a Listed Invasive Species: Category 1a Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be combated or eradicated;
- Category 1b Listed Invasive Species: Category 1b Listed Invasive Species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be controlled;
- Category 2 Listed Invasive Species: Category 2 Listed Invasive Species are those species listed by notice in terms of section 70(1)(a) of the Act as species which require a permit to carry out a restricted activity within an area specified in the Notice or an area specified in the permit, as the case may be; and



- Category 3 Listed Invasive Species: Category 3 Listed Invasive Species are species that are listed by notice in terms of section 70(1)(a) of the Act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of Act, as specified in the Notice.

In giving effect to the above, the Alien and Invasive Species Regulations (GNR 1020 of 2020) provide for amongst others, the prevention of the spread or allowing the spread of, any specimen of a listed invasive species.

4.1.5 NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT

The National Environmental Management Protected Areas Act (Act No. 57 of 2003 – NEMPAA) is intended to “provide for the protection and conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes and seascapes” and creating a “national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity”.

The NEMPAA defines various kinds of protected areas, namely: “special nature reserves, national parks, nature reserves (including wilderness areas) and protected environments; world heritage sites; marine protected areas; specially protected forest areas, forest nature reserves and forest wilderness areas declared in terms of the National Forests Act, 1998 (Act 84 of 1998); and mountain catchment areas declared in terms of the Mountain Catchment Areas Act, 1970 (Act 63 of 1970)”.

The project area marginally overlaps with a NPAES Priority Focus Areas to the west (**Figure 6**).

4.1.6 THE NATIONAL ENVIRONMENTAL MANAGEMENT AIR QUALITY ACT (NEMAQA)

The National Environmental Management: Air Quality Act (Act No. 39 of 2004 as amended – NEMAQA) is the main legislative tool for the management of air pollution and related activities. The Object of the Act is:

- To protect the environment by providing reasonable measures for –
 - i. the protection and enhancement of the quality of air in the republic;
 - ii. the prevention of air pollution and ecological degradation; and
 - iii. securing ecologically sustainable development while promoting justifiable economic and social development; and
- Generally, to give effect to Section 24(b) of the constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

4.1.6.1 LISTED ACTIVITIES AND ASSOCIATED MINIMUM EMISSIONS STANDARDS

The NEMAQA mandates the Minister of Environment to publish a list of activities which result in atmospheric emissions and consequently cause significant detrimental effects on the environment, human health and social welfare. All scheduled processes as previously stipulated under the Air Pollution Prevention Act (APPA) are included as listed activities with additional activities being added to the list. The updated Listed Activities and Minimum National Emission Standards were published on the 22nd November 2013 (Government Gazette No. 37054). Precious metals mineral processing plants are listed as a default category that requires reporting under NEMAQA.

According to the NEMAQA, air quality management control and enforcement is in the hands of local government with District and Metropolitan Municipalities as the licensing authorities. Provincial government is primarily responsible for ambient monitoring and ensuring municipalities fulfil their legal obligations, with national government primarily as policy maker and co-ordinator. Each sphere of government must appoint an Air Quality Officer responsible for co-ordinating matters pertaining to air quality management. Given that air quality management under the old Act was the sole responsibility of national government, local authorities have in the past only been responsible for smoke and vehicle tailpipe emission control.

The National Pollution Prevention Plans Regulations were published in March 2014 (Government Gazette 37421) and tie in with the National Greenhouse Gas (GHG) Emission Reporting Regulations which took effect on 3 April 2017. In summary, the Regulations aim to prescribe the requirements that pollution prevention plans of



greenhouse gases declared as priority air pollutants, need to comply with in terms of the NEMAQA. The Regulations specify who needs to comply, and by when, as well as prescribing the content requirements. Mines do have an obligation to report on the GHG emissions under these Regulations. In addition, the Kusasaletu plant requires an Air Emissions License for various activities triggered under the NEMAQA.

4.1.6.2 NATIONAL DUST CONTROL REGULATIONS

Dustfall is assessed for nuisance impact and not for inhalation health impact. The National Dust Control Regulations (Department of Environmental Affairs, March 2026) prescribes measures for the control of dust in residential and non-residential areas. Acceptable dust fall rates are measured (using American Standard Testing Methodology at and beyond the boundary of the premises where dust originates. In addition to the dust fall limits, the National Dust Control Regulations prescribe monitoring procedures and reporting requirements. Dust that may be created from the proposed TSF will be managed in accordance with these Regulations. In addition to the dustfall limits, the NDCR prescribe monitoring procedures and reporting requirements.

4.1.7 THE NATIONAL WATER ACT (NWA)

The National Water Act, 1998 (Act 36 of 1998 – NWA) makes provision for two types of applications for water use licenses, namely individual applications and compulsory applications. The NWA also provides that the responsible authority may require an assessment by the applicant of the likely effect of the proposed license on the resource quality, and that such assessment be subject to the NEMA EIA Regulations. A person may use water if the use is –

- Permissible as a continuation of an existing lawful water use ;
- Permissible in terms of a general authorisation (GA);
- Permissible under Schedule 1; or
- Authorised by a license.

These water use processes are described in Figure 7.

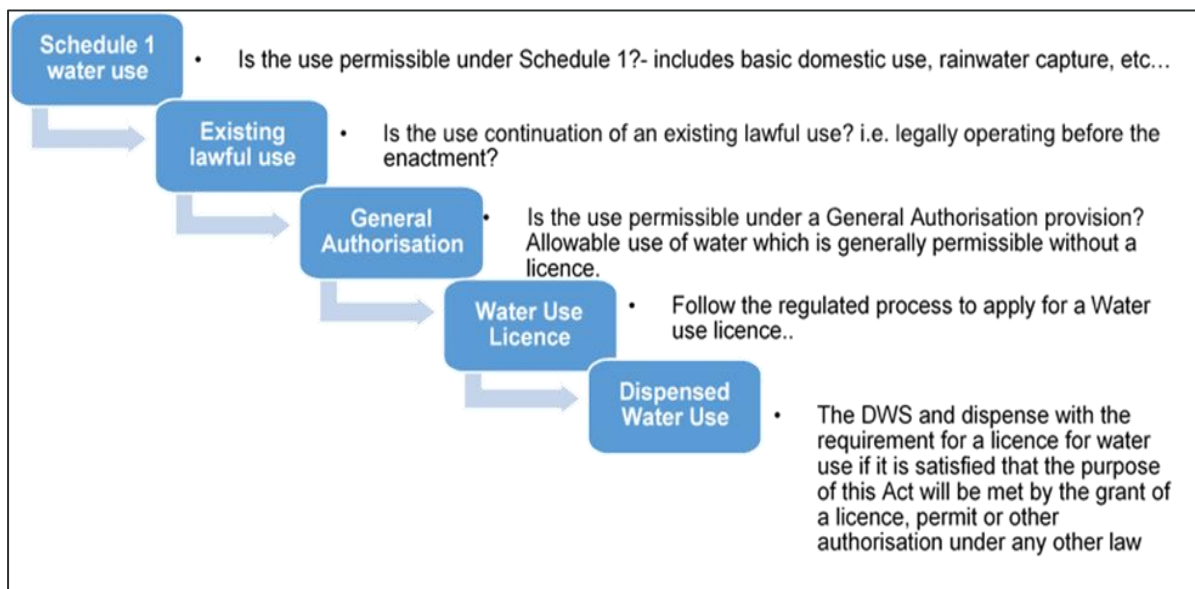


Figure 7: Authorisation processes for new water uses.

The NWA defines 11 water uses. A water use may only be undertaken if authorised by the Department of Water and Sanitation (DWS). The water uses for which an authorisation or license can be issued include:

- 21(a) Taking water from a water resource;
- 21 (b) Storing water;



- 21 (c) Impeding or diverting the flow of water in a watercourse;
- 21 (d) Engaging in a stream flow reduction activity contemplated in section 36;
- 21 (e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- 21 (f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;
- 21 (g) Disposing of waste in a manner which may detrimentally impact on a water resource;
- 21 (h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- 21 (i) Altering the bed, banks, course or characteristics of a watercourse;
- 21 (j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- 21 (k) Using water for recreational purposes.

Various Section 21 (c), Section 21 (i) and Section 21 (g) water uses are triggered by the project. A separate application for a Water Use License (WUL) has been lodged with the Department of Water and Sanitation (DWS) for the water use triggers.

Regulations Regarding the Safety of Dams in terms of section 123(1) of the national water act, 1998 In South Africa, dam safety regulations are governed by the Dam Safety Office (DSO) under the Department of Water and Sanitation (DWS). These regulations apply to dams with a safety risk, which are generally those with a wall height exceeding 5 meters and a storage capacity greater than 50,000 cubic meters. The regulations mandate registration, classification, licensing, and adherence to specific procedures for construction, operation, maintenance, and decommissioning. The TSF itself will constitute a dam with a safety risk in terms of these regulations. Dams with a safety risk must be classified in terms of the regulations and registered with the DSO.

4.1.7.1 NWA GOVERNMENT NOTICE 704 (GN 704)

GN 704 (Government Gazette 20118 of June 1999) was established to provide regulations on the use of water for mining and related activities aimed at the protection of water resources. The five main principal conditions of GN 704 applicable to this project are:

- Condition 4 – which defines the area in which, mine workings or associated structures may be located, with reference to a watercourse and associated flooding. Any residue deposit, dam, reservoir together with any associated structure or any other facility should be situated outside the 1:100 year flood-line. Any underground or opencast mining, prospecting or any other operation or activity should be situated or undertaken outside of the 1:50 year flood-line. Where the flood-line is less than 100 metres away from the watercourse, then a minimum watercourse buffer distance of 100 metres is required for infrastructure and activities;
- Condition 5 – which indicates that no residue or substance which causes or is likely to cause pollution of a water resource may be used in the construction of any dams, impoundments or embankments or any other infrastructure which may cause pollution of a water resource;
- Condition 6 – which describes the capacity requirements of clean and dirty water systems. Clean and dirty water systems must be kept separate and must be designed, constructed, maintained and operated to ensure conveyance the 1:50 year peak flow. Clean and dirty water systems should not spill into each other more frequently than once in 50 years. Any dirty water dams should have a minimum freeboard of 0.8m above full supply level;



- **Condition 7** – which describes the measures which must be taken to protect water resources. All dirty water or substances which may cause pollution should be prevented from entering a water resource (by spillage, seepage, erosion, etc.) and ensure that water used in any process is recycled as far as practicable; and
- **Condition 10** – which describes the requirements for operations involving extraction of material from the channel of a watercourse. Measures should be taken to prevent impacts on the stability of the watercourse, prevent scour and erosion resulting from operations, prevent damage to in-stream habitat through erosion, sedimentation, alteration of vegetation and flow characteristics, construct treatment facilities to treat water before returning it to the watercourse, and implement control measures to prevent pollution by oil, grease, fuel and chemicals.

The proposed Deelkraal II TSF itself will not be located within the 1:100 year floodline of a watercourse however various project components will be located within 100m from the edge of a watercourse (i.e. wetlands) or could overlap with various wetlands. Harmony will be required to obtain exemption in terms of GN704 for various mining activities in these areas.

4.1.7.2 CATCHMENT MANAGEMENT STRATEGIES

South Africa is divided into nineteen Water Management Areas (WMAs). The delegation of water resource management from central government to catchment level is achieved by establishing Catchment Management Agencies (CMAs) at WMA level. Each CMA progressively develops a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA. This is to ensure that on a regional scale, water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The main instrument that guides and governs the activities of a WMA is the Catchment Management Strategy (CMS) which, while conforming to relevant legislation and national strategies, provides detailed arrangements for the protection, use, development, conservation, management and control of the region's water resources.

The proposed development site is situated within the Upper Vaal Water Management Area (WMA 8). The TSF and associated infrastructure is all located within quaternary catchment C23E. The Upper Vaal WMA is responsible for assessing the availability of local surface water and groundwater resources. It is responsible for managing water quality, including long-term trends and short-term impacts. It is responsible for managing water supply to local authorities and district councils. The Upper Vaal WMA is used for industrial, mining, power generation, commercial agriculture, nature conservation, and urban and rural human settlements. The main watercourses in these quaternary catchments include the Mooirivierloop (C23E) and the Loopspruit (C23E), with several non-perennial drainages in both quaternaries. Water quality at sampling point SW06, which is a downstream point on the Loopspruit (C23J) indicate elevated concentrations of Nitrate, Chloride, Electrical Conductivity, Fluoride and Sulfate that exceeds the In-Stream Water Quality Guidelines for the Vaal Barrage subcatchment. Elevated concentration of Nitrate, Chloride, Electrical Conductivity and Sulfate that exceeds the In-Stream Water Quality Guidelines for the Vaal Barrage sub-catchment was observed in the unnamed river which is a tributary of the Mooirivierloop.

The nearest River to the study area is the Elandsfonteinspruit River to the south-east of the site, however, this river is only labelled in the 1:500,000 river dataset for South Africa. The NGI's 1:50,000 topographical map data illustrates numerous non-perennial river systems to the north and south, both of which converge to the south east of the site. The northern system feeds the Elandsfonteinspruit, enabling perennial flows (per the NGI's classification). The northern and southern system are associated with a vlei to the east and dams both north and south to the site. The applicant is required to apply for a Water Use License to ensure that any water resources (surface and groundwater as well as wetlands) affected by the proposed project activities are licensed and managed in accordance with the relevant water and environmental legislation.

The broad management objectives for the Upper Vaal WMA focus on supporting socio-economic development while protecting water resources. Key objectives include ensuring water supports growth, equity, and job creation; allocating water for urban, industrial, and mining needs; and managing water quality and quantity to



protect aquatic ecosystems. Achieving these goals involves strategies like demand management, improving water infrastructure, and protecting ecological systems.

Harmony will submit an IWULA to ensure that any water resources (surface and groundwater as well as wetlands) affected by the proposed project activities are licensed and managed in accordance with the relevant water and environmental legislation.

4.1.8 THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (NEMWA)

On 2 June 2014, the National Environmental Management: Waste Amendment Act came into force. Waste is accordingly no longer governed by the MPRDA but is subject to all the provisions of the National Environmental Management: Waste Act, 2008 (NEMWA).

The objectives of this Act are:

- a) to protect health, well-being and the environment by providing reasonable measures for-
 - i. minimising the consumption of natural resources;
 - ii. avoiding and minimising the generation of waste;
 - iii. reducing, re-using, recycling and recovering waste;
 - iv. treating and safely disposing of waste as a last resort;
 - v. preventing pollution and ecological degradation;
 - vi. securing ecologically sustainable development while promoting justifiable economic and social development;
 - vii. promoting and ensuring the effective delivery of waste services;
 - viii. remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and
 - ix. achieving integrated waste management reporting and planning;
- b) to ensure that people are aware of the impact of waste on their health, well-being and the environment;
- c) to provide for compliance with the measures set out in paragraph (a); and
- d) generally, to give effect to section 24 of the Constitution in order to secure an environment that is not harmful to health and well-being.

Section 16 of the NEMWA must also be considered which states as follows:

1. A holder of waste must, within the holder's power, take all reasonable measures to-
 - a) *"Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;*
 - b) *Reduce, re-use, recycle and recover waste;*
 - c) *Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;*
 - d) *Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;*
 - e) *Prevent any employee or any person under his or her supervision from contravening the Act; and*
 - f) *Prevent the waste from being used for unauthorised purposes."*



These general principles of responsible waste management will be incorporated into the requirements in the EMPr to be implemented for this project.

Waste can be defined as either hazardous or general in accordance with Schedule 3 of the NEMWA (2014) as amended. “Schedule 3: Defined Wastes” has been broken down into two categories – Category A being hazardous waste; and Category B being general waste.

In order to attempt to understand the implications of these waste groups, it is important to ensure that the definitions of all the relevant terminologies are defined:

- Hazardous waste: means “any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristic of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles.”
- Residue deposits: means “any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right.”
- Residue stockpile: means “any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or, production right or an old order right, including historic mines and dumps created before the implementation of this Act.”
- General waste: means “waste that does not pose an immediate hazard or threat to health or to the environment and includes – domestic waste; building and demolition waste; business waste; inert waste; or any waste classified as non-hazardous waste in terms of the regulations made under Section 69.”

Furthermore, the NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities. The proposed new TSF waste management activities in terms of Category B of GN R. 921 which states that “*a person who wishes to commence, undertake or conduct an activity listed under this Category, must conduct an environmental impact assessment process, as stipulated in the environmental impact assessment regulations made under section 24(5) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as part of a waste management license application.*”

4.1.8.1 WASTE MANAGEMENT ACTIVITIES

The listed activities that are triggered by the project in terms of GN921 promulgated under the National Environmental Management Waste Act (Act 59 of 2008 - NEMWA) are specified in Table 7 below:

Table 7: Applicable NEMWA Activities

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
Category A, Activity 14	The decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule.	The current licensed Landfill Site located on the Deelkraal II TSF site needs to be decommissioned
Category B, Activity B7	The disposal of any quantity of hazardous waste to land.	TSF operation
Category B, Activity B10	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).	TSF construction
Category B, Activity B11	The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and	TSF establishment for mining activities



The Department of Mineral and Petroleum Resources (DMPR) has been identified as the CA for both the NEMA and NEM:WA activities listed activities triggered by the project. A separate application for a Water Use License (WUL) has also been lodged with the Department of, Water and Sanitation (DWS) for the water use triggers

4.1.8.2 NEMWA WASTE CLASSIFICATION AND MANAGEMENT REGULATIONS, 2013 (GN R. 634)

These regulations pertain to waste classification and management, including the management and control of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation which is relevant to the proposed project. The purpose of these Regulations is to –

- Regulate the classification and management of waste in a manner which supports and implements the provisions of the Act;
- Establish a mechanism and procedure for the listing of waste management activities that do not require a Waste Management License;
- Prescribe requirements for the disposal of waste to landfill;
- Prescribe requirements and timeframes for the management of certain wastes; and
- Prescribe general duties of waste generators, transporters and managers.

Waste classification, as presented in Chapter 4 of these regulations, entails the following:

- Wastes listed in Annexure 1 of these Regulations do not require classification in terms of SANS 10234;
- Subject to sub regulation (1), all waste generators must ensure that the waste they generate is classified in accordance with SANS 10234 within one hundred and eighty (180) days of generation;
- Waste must be kept separate for the purposes of classification in terms of sub regulation (2), and must not be mixed prior to classification;
- Waste-must be re-classified in terms of sub regulation (2) every five (5) years, or within 30 days of modification to the process or activity that generated the waste, changes in raw materials or other inputs, or any other variation of relevant factors;
- Waste that has been subjected to any form of treatment must be re-classified in terms of sub regulation (2), including any waste from the treatment process; and
- If the Minister reasonably believes that a waste has not been classified correctly in terms of sub regulation (2), he or she may require the waste generator to have the classification peer reviewed to confirm the classification.

Furthermore, Chapter 8 of the Regulations stipulates that unless otherwise directed by the Minister to ensure a better environmental outcome, or in response to an emergency so as to protect human health, property or the environment –

- Waste generators must ensure that their waste is assessed in accordance with the Norms and Standards for Assessment of Waste for Landfill Disposal set in terms of section 7(1) of the Act prior to the disposal of the waste to landfill;
- Waste generators must ensure that the disposal of their waste to landfill is done in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7(1) of the Act; and
- Waste managers disposing of waste to landfill must only do so in accordance with the Norms and Standards for Disposal of Waste to Landfill set in terms of section 7 (1) of the Act.



The TSF barrier system will be determined in consultation with the authorities and will be in compliance with these norms and standards. An inverted barrier system is currently proposed.

4.1.8.3 NEMWA NATIONAL NORMS AND STANDARDS FOR THE DISPOSAL OF WASTE TO LANDFILL, 2013 (GN R. 636)

Once the waste has been assessed and waste type determined, these Norms and Standards can be used to determine the minimum requirements for the landfill and containment barrier design. This will distinguish between Class A, Class B, Class C, or Class D landfills and the associated containment barrier requirements. Although these Norms and Standards prescribe the containment barrier or liner design for each determined waste type, the recent amendments in chapter 3 of the regulations to the planning and management of residue stockpiles and residue deposits, a competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of the regulations. The recommendation should be founded on a risk analysis based on the characteristics and classification in regulation 4 and 5 of these Regulations, towards determining the appropriate mitigation and management measures.

4.1.8.4 THE REGULATIONS REGARDING THE PLANNING AND MANAGEMENT OF RESIDUE STOCKPILES AND RESIDUE DEPOSITS AND ASSOCIATED AMENDMENT

These Regulations promulgated under the waste act, which pertain to the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation, were published in 2015 and were amended in 2018. The Regulations and associated amendment relate to the assessment of impacts and the analyses of risks relating to the management of residue stockpiles and residue deposits, and involve the following:

- The identification and assessment of environmental impacts arising from the establishment of residue stockpiles and residue deposits must be done as part of the environmental impact assessment conducted in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- A risk analysis based on the characteristics and the classification set out in regulation 4 (characterisation of residue stockpiles and residue deposits) and 5 (classification of residue stockpiles and residue deposits) of these regulations must be used to determine the appropriate mitigation and management measures; and
- A competent person must recommend the pollution control measures suitable for a specific residue stockpile or residue deposit on the basis of a risk analysis as contemplated in regulations 4 and 5 of these Regulations.

As stated in Section 4.1.8.3, the proposed new TSF will be subject to these regulations. In this regard, the containment barrier design (including requirements for a liner and nature of the liner), will be addressed in accordance with chapter 3 of these Regulations and their associated amendments.

4.1.9 THE NATIONAL HERITAGE RESOURCES ACT (NHRA)

The National Heritage Resources Act (Act 25 of 1999 – NHRA) stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, *“no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority...”* The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through the NEMA, MPRDA and the Development Facilitation Act (FDA) legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorisations are granted for a development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impact Processes required by the NEMA and MPRDA. This change requires us to evaluate the Section of these Acts relevant to heritage (Fourie, 2008).



The NEMA 23(2)(b) states that an integrated environmental management plan should, “...*identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*”. A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be taken into account of in the EIA Regulations under the NEMA relates to the Specialist Report requirements (Appendix 6 of EIA Regulations 2014, as amended).

The MPRDA defines ‘environment’ as it is in the NEMA and, therefore, acknowledges cultural resources as part of the environment. Section 39(3)(b) of this Act specifically refers to the evaluation, assessment and identification of impacts on all heritage resources as identified in Section 3(2) of the NHRA that are to be impacted on by activities governed by the MPRDA. Section 40 of the same Act requires the consultation with any State Department administering any law that has relevance on such an application through Section 39 of the MPRDA. This implies the evaluation of Heritage Assessment Reports in Environmental Management Plans or Programmes by the relevant heritage authorities (Fourie, 2008).

In accordance with the legislative requirements and EIA rating criteria, the regulations of the South African Heritage Resources Agency (SAHRA) and Association of Southern African Professional Archaeologists (ASAPA) have also been incorporated to ensure that a comprehensive and legally compatible Heritage Report is compiled.

4.1.10 ENVIRONMENT CONSERVATION ACT (ECA) AND ASSOCIATED NOISE CONTROL REGULATIONS

The Environment Conservation Act (Act 73 of 1989 – ECA) was, prior to the promulgation of the NEMA, the backbone of environmental legislation in South Africa. To date the majority of the ECA has been repealed by various other Acts, however Section 25 of the Act and the Noise Regulations (GN R. 154 of 1992) promulgated under this section are still in effect. These Regulations serve to control noise and general prohibitions relating to noise impact and nuisance.

In terms of section 25 of the ECA, the National Noise Control Regulations (GN R. 154 – NCRs) published in Government Gazette No. 13717 dated 10 January 1992, were promulgated. The NCRs were revised under GN R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Provincial noise control regulations have been promulgated in Gauteng, Free State and Western Cape Provinces. The project falls in Gauteng and therefore will need to comply with the Gauteng NCR’s.

The NCRs will need to be considered in relation to the potential noise that may be generated mainly during the construction phase of the proposed project. The two key aspects of the NCRs relate to disturbing noise and noise nuisance.

Section 4 of the Regulations prohibits a person from making, producing or causing a disturbing noise, or allowing it to be made produced or caused by any person, machine, device or apparatus or any combination thereof. A disturbing noise is defined in the Regulations as “*a noise level which exceeds the zone sound level or if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more.*”

Section 5 of the NCRs in essence prohibits the creation of a noise nuisance. A noise nuisance is defined as “*any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person*”. The South African National Standard 10103 also applies to the measurement and consideration of environmental noise and should be considered in conjunction with these Regulations.

4.1.11 THE CONSERVATION OF AGRICULTURAL RESOURCES ACT (CARA)

The law on Conservation of Agricultural Resources (Act 43 of 1983) aims to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection



of the vegetation and the combating of weeds and invader plants. In order to achieve the objectives of this Act, control measures related to the following may be prescribed to land users to whom they apply:

- The cultivation of virgin soil;
- The utilisation and protection of land which is cultivated;
- The irrigation of land;
- The prevention or control of waterlogging or salination of land;
- The utilisation and protection of vleis, marshes, water sponges, water courses and water sources;
- The regulating of the flow pattern of run-off water;
- The utilisation and protection of the vegetation;
- The grazing capacity of veld, expressed as an area of veld per large stock unit;
- The maximum number and the kind of animals which may be kept on veld; The prevention and control of veld fires;
- The utilisation and protection of veld which has burned;
- The control of weeds and invader plants;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;
- The protection of water sources against pollution on account of farming practices;
- The construction, maintenance, alteration or removal of soil conservation works or other structures on land; and
- Any other matter which the Minister may deem necessary or expedient in order that the objects of this Act may be achieved.

Further, different control measures may be prescribed in respect of different classes of land users or different areas or in such other respects as the Minister may determine. Preliminary impacts on the soil, biodiversity and water resources have been identified with regards to the proposed West Wits Reclamation and Deposition Project, and mitigation and management measures recommended. These will be updated during the EIA phase of this project as and where necessary.

4.1.12 CLIMATE CHANGE ACT 22, 2024

The Climate Change Act sets out the functions of the Presidential Climate Commission, which includes providing advice on the Republic's climate change response to ensure the realisation of the vision for effective climate change response and the long-term just transition to a climate-resilient and low-carbon economy and society.

The Climate Change Act 22 of 2024 intends to enable the development of an effective climate change response and a long-term, just transition to a low-carbon and climate-resilient economy and society for South Africa in the context of sustainable development; and to provide for matters connected therewith. Harmony will be required to comply with greenhouse gas reporting requirements.

4.1.13 NATIONAL VELD AND FOREST FIRE ACT

The National Veld and Forest Fire Act 101 of 1998 is a key piece of legislation in South Africa aimed at reforming the legal framework surrounding veld and forest fires. Its primary purpose is to prevent and manage wildfires through coordinated efforts, particularly in rural and fire-prone areas. The Act encourages the formation of Fire Protection Associations (FPAs), which are legally recognized bodies that facilitate local collaboration among landowners, municipalities, and other stakeholders to predict, prevent, and suppress veldfires. These



associations play a vital role in fire management by offering training, support, and technical expertise to their members.

For private developers and landowners, the Act imposes several important obligations. They are legally required to take reasonable precautions to prevent fires from starting or spreading from their property. This includes maintaining firebreaks, ensuring that controlled burns are conducted safely and in accordance with regulations, and joining or cooperating with local FPAs. Failure to meet these responsibilities can result in legal liability, especially if negligence leads to damage or loss caused by a fire. In such cases, landowners may face civil claims for damages, making it essential for them to understand and comply with the Act's provisions.

In essence, the Act not only promotes proactive fire management but also establishes a framework for accountability. Private developers and landowners must be vigilant and informed, as their actions—or lack thereof—can have significant legal and financial consequences. By participating in FPAs and adhering to fire safety regulations, they contribute to a safer and more resilient environment for their communities and the broader ecosystem.

4.1.14 THE SPATIAL PLANNING AND LAND USE MANAGEMENT ACT (SPLUMA)

The Spatial Planning and Land Use Management (Act 16 of 2013 – SPLUMA) is set to aid effective and efficient planning and land use management, as well as to promote optimal exploitation of minerals and mineral resources. The SPLUMA was developed to legislate for a single, integrated planning system for the entire country. Therefore, the Act provides a framework for a planning system for the country and introduces provisions to cater for development principles; norms and standards; inter-governmental support; Spatial Development Frameworks (SDFs) across national, provincial, regional and municipal areas; Land Use Schemes; and municipal planning tribunals. Furthermore, the SPLUMA strengthens the position of mining right holders when land needs to be rezoned for mining purposes. No rezoning applications will be required for the West Wits Reclamation and Deposition project as all properties fall within the existing mining right and are zoned for mining use.

4.1.15 OCCUPATIONAL HEALTH AND SAFETY ACT

The Occupational Health and Safety Act (Act 85 of 1993 - OHS) provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work; to establish an advisory council for occupational health and safety; and to provide for matters connected therewith. Worker safety will form part of the contractor's safety requirements and be guided by the OHS. This would entail a full health and safety file including but not limited to pre-mobilization medical assessments, work environment and task specific risk assessments and method statements etc. The project will be required to comply with the OHS and or Mine Health and Safety Act (dependent on the specific aspect of the production operations). Therefore, safety of all personnel will be guided by overarching South African legislation.

The Major Hazard Installation Regulations (GNR 692 of 30 July 2001) are promulgated under the OHS and apply to employers, self-employed persons and users, who have on their premises, either permanently or temporarily, a major hazard installation or a quantity of a substance which may pose a risk that could affect the health and safety of employees and the public.

A "major hazard installation" (MHI) means an installation-

- a) where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or
- b) where any substance is produced, processed, used, handled or stored in such a form and quantity that it has the potential to cause a major incident.

No MHI assessment is required for the West Wits Reclamation and Deposition project in terms of this Act.



4.1.16 NATIONAL RADIOACTIVE WASTE DISPOSAL INSTITUTE ACT 53 OF 2008

In terms of this Act the generators of radioactive waste are responsible for technical, financial and administrative management of such waste within the national regulatory framework at their premises and when such waste is transported to an authorised waste disposal facility. The generators of radioactive waste are responsible for technical, financial and administrative management of such waste within the national regulatory framework at their premises and when such waste is transported to an authorised waste disposal facility.

Generators of radioactive waste must:

- A) develop and implement site-specific waste management plans based on national policy;
- B) provide all relevant information on radioactive waste as required by the chief executive officer;
- C) demonstrate compliance with any conditions of a radioactive waste disposal certificate;
- D) provide site access to staff of the Institute for inspection against any conditions of the radioactive waste disposal certificate.

The TSF slurry is considered radioactive waste. Generators of radioactive waste remain responsible for all liabilities in connection with such radioactive waste under their control.

4.1.17 THE HAZARDOUS SUBSTANCES ACT, 1973 (ACT NO. 15 OF 1973)

The Hazardous Substances Act, 1973 (Act No. 15 of 1973) in South Africa regulates substances that can cause harm to human health. It categorizes these substances based on their risk level and controls their manufacture, sale, use, and disposal. The Act also provides for inspections, enforcement measures, and penalties for violations. The Act defines hazardous substances as materials or mixtures that can cause harm to human health, ranging from mild irritation to severe illness or death.

The Act addresses the control of substances that can cause injury, ill-health, or death due to their hazardous properties. This includes substances found in mine tailings, which often contain heavy metals like arsenic, lead, and mercury. The Act aims to regulate the handling, use, and disposal of these substances to protect human health and the environment.

4.2 OTHER APPLICABLE ACTS AND GUIDELINES

Other applicable acts and guidelines include various provincial and local guidelines and plans which are further described below.

4.2.1 NATIONAL POLICY AND PLANNING CONTEXT

4.2.1.1 INTERIM GUIDANCE ON THE MANAGEMENT OF NORM TAILINGS AND WASTE ROCK

The National Nuclear Regulator (NNR) exercises regulatory control related to nuclear safety and security for all the activities and facilities as defined in the NNR Act. The process waste generated at a mining and minerals processing facility, also known as slurry, is naturally radioactive because of the associated radionuclides in the uranium and thorium decay series that accompany the metals that are mined. The slurry, also referred to as Naturally Occurring Radioactive Material (NORM) residue, is pumped to containment areas for permanent or temporary storage and thus qualifies as radioactive waste facilities named NORM tailings dams, also interchangeably referred to as Tailings Storage Facilities (TSF).

This document provides guidance for the implementation of the requirements as set out in the draft General Nuclear Safety Regulations on the management of NORM tailings and waste rock. Due to the lengthy promulgation process for regulations, and the fact that the guidance provided is based on draft regulations, the Executive has resolved to issue this document as interim guidance. This document will be revised once the regulations in question have been promulgated.

The guidance is applicable to all NORM facilities which carry out activities and operations involving NORM tailings and waste rock containing uranium, thorium and their progeny. This guide extends to both authorised facilities



regulated by the NNR and prospective applicants who wish to handle, process and dispose of NORM tailings and waste rock in terms of the provisions of the NNR Act and associated regulations.

This guideline contains information that provide guidance in terms of best practice in terms of EIA aspects that is related to mining and specifically mineral processing. While the best practice guidance must be taken into account, this document does not take the place of legal advice in a specific situation governed by legislation.

Key aspects of an NNR-approved Closure Plan include:

- **Decommissioning Strategy:** The plan specifies the methods for dismantling the facility, removing or treating radioactive materials, and decontaminating equipment and site surfaces.
- **Environmental Protection:** It includes measures to prevent or mitigate environmental damage from decommissioning activities, such as controlling dust, managing waste, and protecting water resources.
- **Public and Worker Safety:** The plan outlines procedures for protecting the health and safety of workers involved in decommissioning and the public who may be affected by the process.
- **Long-Term Stewardship:** The plan addresses the long-term management of any residual risks or contamination, ensuring that the site remains safe for the future.
- **Financial Assurance:** It demonstrates that sufficient financial resources are available to implement the closure plan and manage any long-term liabilities.
- **Regulatory Compliance:** The plan must be developed in accordance with the NNR's regulations and guidance documents.

4.2.1.2 NATIONAL RADIOACTIVE WASTE MANAGEMENT POLICY AND STRATEGY

The purpose of the National Radioactive Waste Management Policy and Strategy (NRWMP) published in 2005 is: *To ensure the establishment of a comprehensive radioactive waste governance framework by formulating, in addition to nuclear and other applicable legislation, a policy, and implementation strategy in consultation with all stakeholders.*

Within the national framework, the NRWMP is viewed as the starting point for the definition and selection of an appropriate solution for the management of radioactive waste. The NRWMP also addresses options for managing radioactive waste generated through the nuclear industry, as well as waste containing un-concentrated naturally occurring radioactive materials from the mining and minerals processing industries. In consideration of options for radioactive waste management, the document takes cognisance of the International Atomic Energy Agency (IAEA) radioactive waste management principles (IAEA, 1995). In guiding the national strategy for radioactive waste management, several strategic points of reference in dealing with radioactive waste are defined. Two of the guiding principles that are of importance in terms of managing NORM are Principle No. 4 and Principle No. 13:

The aim (of a radioactive waste management strategy) shall be to achieve a maximum degree of passive safety in storage and disposal (Principle No. 4). The deliberate dilution of radioactive waste is not acceptable, however, in the case of NORM waste, the dilution of higher concentration material with lower concentration material will be considered if all relevant regulatory concerns are addressed (Principle No. 13).

In implementing the NRWMP, South Africa followed the IAEA guidelines regarding the definition and classification of radioactive waste as presented in IAEA.

4.2.1.3 THE MINING AND BIODIVERSITY GUIDELINES, 2013

The Mining and Biodiversity Guidelines (2013) was developed by the Department of Mineral Resources, the Chamber of Mines, the SANBI and the South African Mining and Biodiversity Forum, with the intention to find a balance between economic growth and environmental sustainability. The Guideline is envisioned as a tool to “foster a strong relationship between biodiversity and mining, which will eventually translate into best practice within the mining sector. It provides a tool to facilitate the sustainable development of South Africa’s mineral resources, in a way that enables regulators, industry and practitioners to minimise the impact of mining on the



country's biodiversity and ecosystem services. It provides the mining sector with a practical, user-friendly manual for integrating biodiversity considerations into the planning processes and managing biodiversity during the operational phases of a mine, from exploration through to closure. The Guideline provides explicit direction in terms of where: mining-related impacts are legally prohibited; biodiversity priority areas may present high risks for mining projects; and biodiversity may limit the potential for mining.

In identifying biodiversity priority areas, which have different levels of risk against mining, the Guideline categorises biodiversity priority areas into four categories of biodiversity priority areas in relation to their importance from a biodiversity and ecosystem service point of view as well as the implications for mining in these areas:

- A) Legally protected areas, where mining is prohibited;
- B) Areas of highest biodiversity importance, which are at the highest risk for mining;
- C) Areas of high biodiversity importance, which are at a high risk for mining; and
- D) Areas of moderate biodiversity importance, which are at a moderate risk for mining.

The study area location will be assessed against the Mining and Biodiversity Guidelines (2013) spatial dataset to determine which categories it falls within. Based on review of available information the project appears to be located within Category C and D due to the existing mining activities in the area (**Figure 31**).

4.2.1.4 NOISE STANDARDS

There are a few South African scientific standards (SABS) relevant to noise from mines, industry and roads. They are:

- South African National Standard (SANS) 10103:2008 – 'The measurement and rating of environmental noise with respect to annoyance and to speech communication';
- SANS 10210:2004 – 'Calculating and predicting road traffic noise';
- SANS 10328:2008 – 'Methods for environmental noise impact assessments';
- SANS 10357:2004 – 'The calculation of sound propagation by the Concave method';
- SANS 10181:2003 – 'The Measurement of Noise Emitted by Road Vehicles when Stationary'; and
- SANS 10205:2003 – 'The Measurement of Noise Emitted by Motor Vehicles in Motion'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. With regards to SANS 10103:2008, the recommendations are likely to inform decisions by authorities, but non-compliance with the standard will not necessarily render an activity unlawful per se.

4.2.2 PROVINCIAL POLICY AND PLANNING CONTEXT

4.2.2.1 GAUTENG NATURE CONSERVATION BILL, 2014

The Gauteng Nature Conservation Bill, 2014 provides for the sustainable use and protection of biodiversity in Gauteng. Key provisions included regulations for professional hunting, the preservation of caves, the establishment of zoos, and the appointment of nature conservators). The Gauteng Nature Conservation Bill, 2014 is still in draft form and was never passed into law. Consequently, Gauteng nature conservation is still regulated by the outdated Transvaal Nature Conservation Ordinance 12 of 1983.

4.2.2.2 TRANSVAAL NATURE CONSERVATION ORDINANCE 12 OF 1983

The Transvaal Nature Conservation Ordinance regulates activities related to nature conservation within the former Transvaal province. The ordinance makes provisions for the hunting, catching, and sale of different types of animals, including protected and exotic species. It required written permission to hunt or catch certain



animals and set out procedures for the issuance of licenses for landowners. It also provided for the establishment of nature reserves and other conservation areas. The ordinance defined offenses and penalties for contravening its provisions. The ordinance could be applicable to the West Wits Reclamation and Deposition project if any protected species are identified in site during the detailed specialist assessments. This will be confirmed in the EIA phase.

4.2.2.3 PROVINCIAL CONSERVATION PLAN – THE GAUTENG CONSERVATION PLAN

Bioregional plans are one of a range of decision support tools provided for in the Biodiversity Act that can be used to enable biodiversity conservation in priority areas. The purpose of a bioregional plan is to inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity (Desmet et al., 2013). The purpose of the conservation plans is to inform land-use planning and development on a provincial scale and to aid in natural resource management, with one of the outputs being a map of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). These are classified into different categories, namely Protected Areas, CBA1 areas, CBA2 areas, ESA1 areas, ESA2 areas, Other Natural Areas (ONAs) and areas with No Natural Habitat Remaining (NNR) based on biodiversity characteristics, spatial configuration and requirements for meeting targets for both biodiversity patterns and ecological processes.

Critical Biodiversity Areas (CBAs) – Areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems. Ecological Support Areas (ESAs) - Areas are required to support and sustain the ecological functioning of Critical Biodiversity Areas (CBAs). For terrestrial and aquatic environments, these areas are functional but are not necessarily pristine natural areas. They are however required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the CBAs, and which also contributes significantly to the maintenance of Ecological Infrastructure.

The Gauteng C-Plan focuses on the mapping of biodiversity priority areas within the Gauteng Province, as compiled by the Gauteng Department of Agriculture, Rural Development and the Environment GDARDE. The C-Plan was consulted in order to determine the location of areas of increased ecological or conservation importance and sensitivity within the vicinity of the study area. This is done by providing a map of biodiversity priority areas, referred to as CBAs and ESAs. According to information obtained from SANBI, CBAs are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of CBAs and/or in delivering ecosystem services. The primary purpose of a map of CBAs and ESAs is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes.

The key output of a systematic biodiversity plan is a map of biodiversity priority areas. The Conservation plan delineates CBAs, Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and areas that have been irreversibly modified from their natural state. The conservation of CBAs is crucial, in that if these areas are not maintained in a natural or near-natural state, biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017). According to the latest Gauteng Conservation Plan (C-Plan v4), the project site falls within areas of CBA 1 and CBA 2 as well as ESA 1 and ESA 2 (**Figure 6**).

4.2.2.4 THE GAUTENG ENVIRONMENTAL MANAGEMENT FRAMEWORK TOOL

The Gauteng Department of Agriculture and Rural Development have developed an *Environmental Management Framework Tool* to streamline the requirements for an environmental impact assessment (EIA) (reduce EIA requirements), reduce timeframes for approvals and to contribute towards reducing the cost of doing business in Gauteng. In this tool, a number of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) listed activities are excluded from the requirement to obtain an environmental authorisation (EA). This exclusion is currently only applicable to activities that fall within Environmental Management *Zones 1 and 5* of



the Gauteng Provincial Environmental Management Framework Zones (GPEMF). **Table 8** indicates the various zones of the GPEMF including Zones 1 and 5.

Table 8: Gauteng Provincial Environmental Management Framework Zones

Zone	Intention
Zone 1: Urban development zone	The intention with this zone is to streamline urban development activities in it and to promote development infill, densification and concentration of urban development, in order to establish a more effective and efficient city region that will minimise urban sprawl into rural areas.
Zone 2: High control zone (within the urban development zone)	This zone is sensitive to development activities. Only conservation should be allowed in this zone. Related tourism and recreation activities must be accommodated in areas surrounding this zone.
Zone 3: High control zone (outside the urban development zone)	This zone is sensitive to development activities and in several cases also have specific values that need to be protected. Conservation and related tourism and recreation activities should dominate development in this zone.
Zone 4: Normal control zone	This zone is dominated by agricultural uses outside the urban development zone. Agricultural and rural development that support agriculture should be promoted.
Zone 5: Industrial and large commercial focus zone Intention	The intention with Zone 5 is to streamline non-polluting industrial and large-scale commercial (warehouses etc.) activities in areas that are already used for such purposes and areas that are severely degraded but in proximity to required infrastructure.

Review of the latest GPEMF v12 (GDARD, 2022), the study area falls within Zones 1, 3 and 4 of the GPEMF. Considering that Site falls within Zones 1, 3 and 4, the site is not exempted from the process of an EA through the GPEMF (**Figure 8**). In addition, the study area is located within CBA 1 and 2 and ESA 1 and 2 area which triggers Listing Notices 3 which are activities not exempted from an EA process through the GPEMF. Therefore, an EA application will be required.

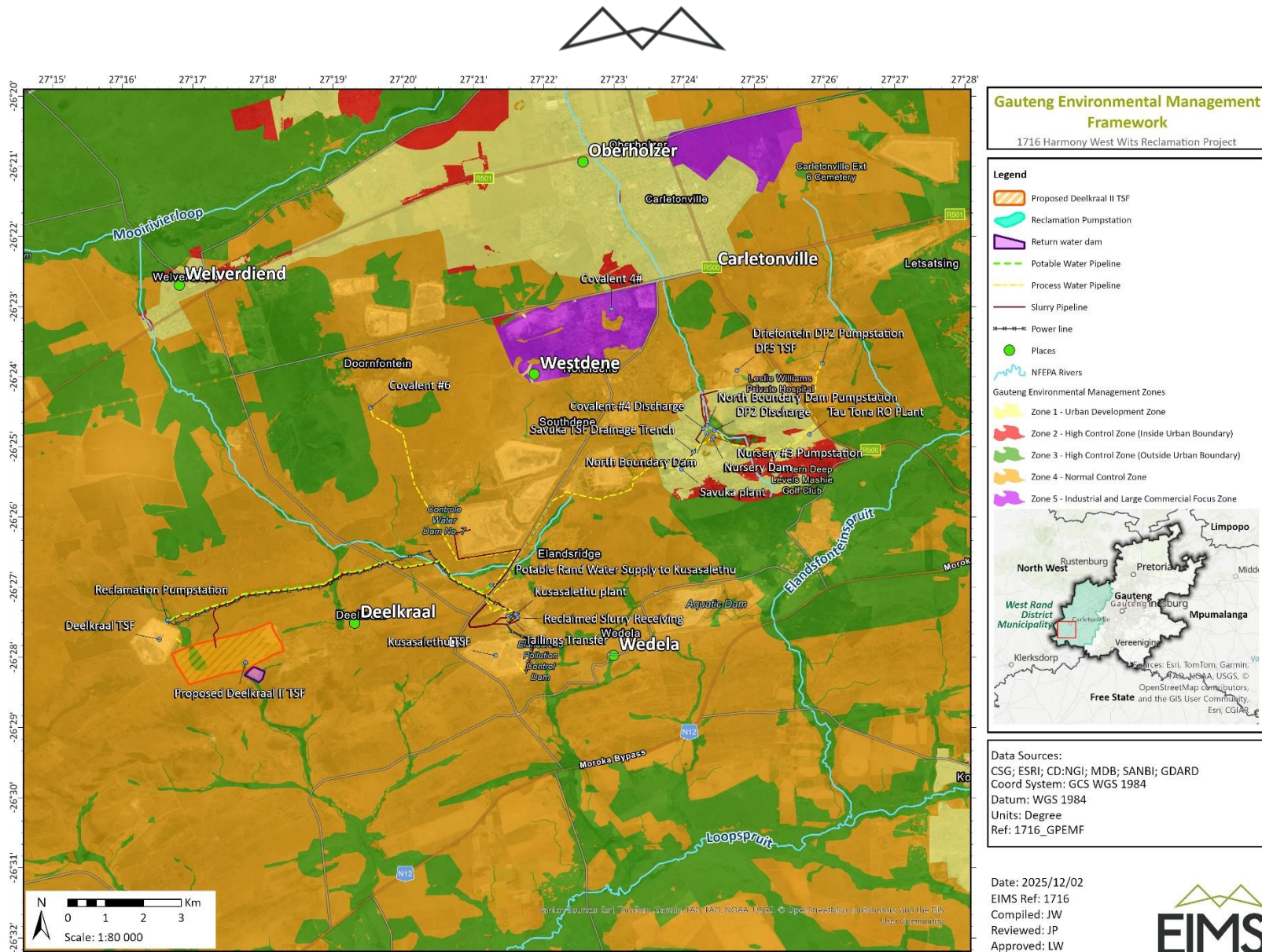


Figure 8: Location of the project in relation to GPEMF zones



4.2.2.5 THE GAUTENG RIDGES GUIDELINE, 2025

The quartzite ridges of Gauteng are one of the most important natural assets in the northern provinces of South Africa. This is because these ridges, and the area immediately surrounding the ridges, provide habitat for a wide variety of fauna and flora, some of which are Red List, rare or endemic species or, in the case of certain of the plant species, are found nowhere else in South Africa or the world. The ridges also fulfil functions that are necessary for the sustainability of ecosystems such as the recharging of groundwater, wetlands and rivers, wildlife dispersal and providing essential habitat for pollinators. Ridges also have a socio-cultural role in that they provide aesthetically pleasing environments that are valued by residents, tourists and recreational users. Human activities such as urbanization, mining and the planting of alien vegetation may undermine the contribution that ridges make to the environment.

The environmental right, which is set out in section 24 of the Constitution, requires government to take -
“...reasonable legislative and other measures that –

- (i) prevent pollution and ecological degradation;
- (ii) promote conservation; and
- (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

The conservation of ridges therefore falls within the ambit an environmental right. The guidelines were first promulgated in 2001, updated in 2019 and recently in June 2025. The guideline applies to all ridges in Gauteng. For the purposes of the report, a ridge includes hills, koppies, mountains, kloofs and gorges and/or a landscape type or topographic feature that is characterized by two or more of the following features - a crest, plateau, cliff or footslope. In addition, ridges are characterized by slopes of 5° or more (that is equivalent to slopes of > 8.8% or > 1: 11 gradient) when modelled in a Geographic Information System digital elevation model that is based on 20m contour intervals at a scale of 1:50 000.

The general objective of GDARDE is that the ecological and socio-cultural value of ridges must be conserved. The ridges have, however, undergone different degrees of habitat loss due to human activities such as urban development and quarrying. The approach which the Department has adopted to realizing its general objective is to provide for the maximum feasible conservation of a ridge within the existing constraints of the habitat loss that has already taken place. To give practical effect to this policy, the Department has classified all ridges in Gauteng into one of four classes, based on the existing extent and percentage of area converted to urban development or other human activities. The classes are as follows -

- a) Class 1 ridges include ridges of which 5% or less of their surface area has been converted to urban development, quarries and/or alien vegetation. (Approximately 58% of ridges currently fall within Class 1, including the Suikerbosrand and parts of the Magaliesberg.)
- b) Class 2 ridges are those in respect of which 5-34% of the ridge area has been irreversibly transformed by human activity. (Approximately 23% of ridges currently fall within Class 2, including parts of the Magaliesberg, ridges falling within the Cradle of Humankind World Heritage Site, the Klipriviersberg, the Bronberg and the Skurweberg).
- c) Class 3 ridges are those that have been transformed by 35-65%, as a result of human activity (Approximately 8% of ridges currently fall within Class 3, including the Northcliff, Roodepoort and Krugersdorp ridges).
- d) Class 4 are those that have been transformed as a result of human activity by 65% or more. (Approximately 11% of ridges currently fall within Class 4, including the Melville Koppies and the Linksfield Ridge).



A review of the latest Gauteng Ridges dataset from GDARDE indicated that the study area is located within a Class 1 Ridge Buffer Zone and a Class 2 Ridge (**Figure 29**). **It should be noted that portions on the pipelines are located within areas identified as Class 2 Ridges and the proposed TSF is partly located on an area identified as a Class 4 Ridge as per the dataset.** Based on the Sensitive Ridge datasets from GDARDE, there are Class 1 and Class 2 sensitive ridges and associated buffer areas within the study area. There are several class 4 Ridges as well. The guidelines which are applicable to the use and development of the Class 2 and Class 4 ridges are set out below:

a) Class 2 ridges:

Development activities and uses that have significant environmental impact on a Class 2 ridge will not be permitted. Only low impact activities might be permitted. Low impact development activities, such as tourism facilities, which comprise of an ecological footprint of 5% or less of the property may be supported. (The ecological footprint includes all areas directly impacted on by a development activity, including all paved surfaces, landscaping, property access and service provision). Low impact development activities on a ridge will not be supported where it is feasible to undertake the development on a portion of the property abutting the ridge.

b) Class 4 ridges:

Further development activities will not be supported in areas of the ridge where the remaining contiguous extent of natural habitat is 4ha or more.

Considering that the proposed development within these sensitive ridges are pipelines and access roads along an already disturbed area with existing pipelines and access roads, the potential impact is anticipated to be low and as such, the activities are likely to be supported by the relevant department (GDARDE). The following requirements for applications that must follow an environmental impact assessment process will apply:

- a) Applications involving activities on a ridge that must be subjected to an environmental impact assessment in any form must, in addition to any other requirements of law, be supported by a study or studies which, as a minimum, describe –
- i. the ecological conditions – including the functional, hydrological and compositional aspects – of the ridge,
 - ii. flora and fauna – including any mammals, birds, reptiles, amphibians and invertebrates - that are present on the ridge,
 - iii. the impacts of the proposed activity on ecology conditions, flora and fauna,
 - iv. the stability of the slope and any implications thereof for the application, and
 - v. the cultural, historical, open space and visual value aspects as well as the current use and value of the ridge for social purposes and the extent to which the proposed activity will impact on these uses or values
- b) **Applications involving developments on a ridge falling within Class 1, 2 or 3 must also be supported by a study on service provision and access. The study on service provision and access must, as a minimum, describe the location of access roads to the site; what services are available; and - if no services are available - how the site will be serviced and the impact that any new infrastructure contemplated may have on the ridge.**

An ecological management plan must accompany an application which sets out the measures and responsibilities in respect of the management the ecological integrity of the property, other than the specific area where the development activity is proposed. GDARDE must and will be consulted in the initial stages of this application.



4.2.3 LOCAL POLICY AND PLANNING CONTEXT

4.2.3.1 WEST RAND DISTRICT MUNICIPALITY REGIONAL GROWTH AND DEVELOPMENT STRATEGY

The vision of the West Rand District Municipality Regional Growth and Development Strategy is to “develop and sustain an integrated, socio-economically and economically thriving and green environment with a unified society”. In order to achieve the above Vision, the Regional Growth and Development Strategy identified the following critical requirements:

- Ensure the WRDM is connected – with more people enjoying the benefits of flourishing activity centres where shops, jobs, services and recreation are within walking and travelling distance of their homes, with fast and reliable travel to and from local centres and regional opportunities, with a comprehensive, efficient and networked public transport system and pedestrian routes and access to rural and tourism areas.
- Ensure the WRDM is attractive – with quality urban and rural areas that are well-maintained, new developments which comply with high design standards, clean and safe environments and well-preserved heritage and natural areas.
- Ensure the WRDM is sustainable – with resources well managed and planned for, viable and cost-effective service provision; and where the environment is valued as a vital resource and meaningful open space is provided for all.
- Ensure the WRDM is well managed – where development decisions are predictable, fair and cost-effective, partnerships are developed, planning takes place on a continuous basis, formal systems for data collections are in place, and data is used to support and improve planning.

The WRDM Green IQ was compiled in (2012) and is a commitment to make the West Rand District the greenest district in South Africa and an African example of how sustainable development should be conducted. The Green IQ is a comprehensive strategy, built on 5 pillars, namely:

- **PEOPLE:** To create a place where people come first, a place characterized by equity, dignity and possibility; where everyone has the opportunity to build a better life for themselves, their children.
- **ECONOMY:** To restructure the economy to seize future development opportunities; to foster local resilience; to serve the people of the West Rand and to be an example of participatory prosperity.
- **ENVIRONMENT:** To make the precious natural resources available for future generations; create a low-carbon built environment dedicated to quality of life; and regenerate rural areas with a new sense of purpose.
- **ENERGY:** To facilitate the creation of new independent power producers to generate renewable, affordable and reliable energy to power new industries and create competitive advantages.
- **INNOVATION:** To establish itself as a centre of excellence in green technology and green living; attract the best minds; and encourage and support the industries of the future.

The West Rand Municipality's Green IQ goals related to mining focus on mitigating environmental impacts, such as addressing pollution from mining activities, and diversifying the economy to reduce reliance on mining.

4.2.3.2 MERAFONG MUNICIPAL SPATIAL DEVELOPMENT FRAMEWORK

In terms of chapter 5 of the Municipal Systems Act, 2000 (Act 32 of 2000), the municipality's Integrated Development Plan “...must reflect a Spatial Development Framework which must include the provision for basic guidelines for a Land Use Management System for the municipality”. The Merafong Municipal Spatial Development Framework (MSDF), forms part of a hierarchy of plans feeding into the Integrated Development Plan (IDP). The Spatial Development Framework serves as an input into the IDP and concentrates on the spatial aspects of development planning, whereas the IDP focuses on broader developmental issues. Following the SDF in the hierarchy are Sector Plans.



The MSDF aims to guide the future spatial development of the Merafong City municipality by focusing on integrating segregated urban areas, restructuring the urban form for efficiency, and prioritizing the development of a connected network of towns while considering factors like infrastructure provision, mobility, and settlement viability, particularly within mining communities, to create a more accessible and business-friendly environment for residents and businesses alike; essentially aiming to achieve a balanced and sustainable urban landscape through strategic land use planning. Overall, the Merafong MSDF serves as a roadmap for the municipality's future development, aiming to create a more inclusive, efficient, and sustainable urban environment by strategically managing land use and infrastructure investments. The study area is located in area identified / earmarked for mining in the MSDF.

4.2.3.3 INTEGRATED WASTE MINIMISATION PLANS

The West Rand District Municipality's Integrated Waste Minimisation Plan is a strategy designed to reduce the amount of waste generated within the district by promoting waste reduction, reuse, and recycling initiatives, aiming to achieve sustainable solid waste management practices across the municipalities of Randfontein, Mogale City, Westonaria, and Merafong City, all while adhering to national environmental legislation and minimizing environmental impact; key aspects include community awareness campaigns, improved waste collection systems, and collaborating with businesses and industries to minimize waste at its source.

The Merafong City Local Municipality Solid Waste Management Plan aims to address the issue of waste disposal in the area by implementing a comprehensive strategy that includes waste reduction, recycling initiatives, proper collection systems, and a designated landfill site, with a strong focus on community engagement to promote sustainable waste management practices, while also considering the unique challenges posed by the region's mining history and potential environmental impacts. Waste management for project shall align with these Integrated Waste Minimisation Plans.

4.2.4 INTERNATIONAL LEGISLATION AND STANDARDS

4.2.4.1 GLOBAL INDUSTRY STANDARD ON TAILINGS MANAGEMENT (GISTM) AND SOCIAL PERFORMANCE

The Global Industry Standard on Tailings Management (GISTM) was established to improve the safety and environmental integrity of tailings facilities worldwide. The GISTM is organised around six Topic areas, 15 Principles and 77 auditable Requirements. The aim of the standard is to adopt an integrated approach to tailings management. Social performance spans all six Topic Areas of the Standard, with specialist components defined in 14 (18 %) of the Standard's 77 Requirements, with a further 18 Requirements (23 % of the Standard) requiring operators to integrate social performance inputs into processes, systems, and decisions about tailings facility management (Joyce & Kemp, 2020).

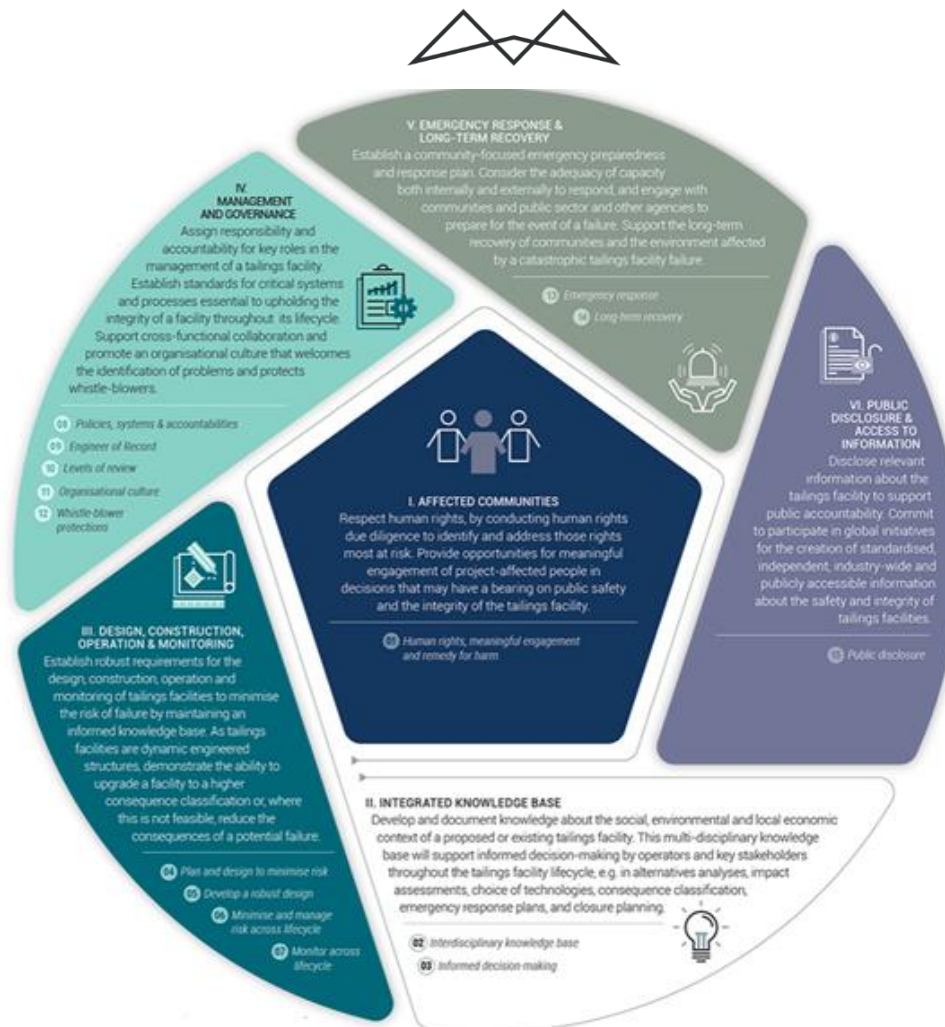


Figure 9: Summary of GISTM

Under Topic I, Affected Communities, there are four explicit social performance requirements namely: consideration of human rights throughout the lifecycle of the TSF; Free, prior, informed consent of indigenous and tribal people; meaningful engagement; and a grievance mechanism.

Topic II, Integrated Knowledge Base, package social, environmental, and local economic conditions together. Understanding of local context, human exposure and vulnerability is important in this topic. Impact assessment and mitigation plans fall under this topic.

Although Topic III, Design, Construction, Operation and Monitoring deals mainly with technical aspects, social requirements are included when additional steps to minimise consequences are considered, and in the mention that international standards should be followed if involuntary resettlement is required.

Topic IV, Management and Governance requires the establishment of a tailings governance framework and confirms the Environmental and Social Management System (ESMS) as an integral component. This topic nominates one or more Accountable Executive(s) as responsible for, amongst other matters, avoiding or minimising the consequences of a tailings facility failure for local people. Other requirements include multi-disciplinary risk assessments, and the review and audit of the ESMS as it relates to the tailings facility.

Topic V, Emergency Preparedness and Recovery, is critically important from a social performance perspective. It requires meaningful engagement with employees and contractors in the development of Emergency Preparedness and Response Plans, and 'locks in' the role of project-affected people in the co-development of community-focused emergency preparedness measures. Topic V also cover the long-term recovery of people and the environment in the event of a catastrophic failure event – a topic that is not covered in any other tailings or social performance standard. Requirement 14.1 asks operators to take reasonable steps, before a failure



event, to meaningfully engage with public sector agencies and other organisations that would participate in medium- and long-term social and environmental post-failure response strategies. These agencies are likely to be quite different to the first responder groups engaged. Topic V would involve post hoc impact assessments, and stakeholder engagement to develop and implement plans that enable the participation of affected people in restoration and recovery works and ongoing monitoring activities.

The documents listed under Topic VI, Public Disclosure and Access to Information, will likely be in the hands of other functions, such as external affairs and legal, many of these concerns fall within the purview of social performance. Regularly publishing and updating information and responding to reasonable requests for additional information is fundamental to meaningful engagement at the local-level, and for generating trust across the stakeholder spectrum (Joyce & Kemp, 2020). Harmony aims to align their operations with the requirements of the GISTM.



5 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITY

The applicant owns and operates a number of Gold Mines and plants in the Carletonville Region of Gauteng and requires additional deposition capacity for West Wits region's operations. The applicant plans on constructing the Deelkraal II Tailings Storage Facility (TSF) to cater for the additional future capacity. This TSF will receive residue from Kusasaletu, and Savuka plants and will also assist in returning process water for reclaiming the existing Deelkraal 1 TSF and Kusasaletu TSF for processing at Kusasaletu plant. The West Wits Reclamation and Deposition project will allow for the continuation of jobs and investment into the area. Further thereto, the reclamation will result in the removal and cleaning of old historic tailings facilities in accordance too the new waste legislation and regulations, thereby removing potential sources of pollution from the old areas and allowing Harmony to rehabilitate these old footprints and open them to other land uses. This will create substantial investment in the area and ensure Harmony is able to keep mining activities ongoing into the future.

The needs and desirability analysis component of the "Guideline on need and desirability in terms of the EIA Regulations (Notice 819 of 2014)" includes, but is not limited to, describing the linkages and dependencies between human well-being, livelihoods and ecosystem services applicable to the area in question, and how the proposed development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, opportunity costs, etc.). **Table 9** present the needs and desirability analysis undertaken for the project based on the guideline on need and desirability in terms of the EIA regulations.



Table 9: Needs and desirability analysis for the proposed project.

Ref No.	Question	Answer
1	Securing ecological sustainable development and use of natural resources	
1.1	How were the ecological integrity considerations taken into account in terms of: Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets, Ecological drivers of the ecosystem, Environmental Management Framework, Spatial Development Framework (SDF) and global and international responsibilities.	<p>A number of specialist studies will inform this application and include:</p> <ul style="list-style-type: none"> • Biodiversity (Terrestrial) • Heritage • Agriculture Potential, Soils and Land capability • Geohydrology • Aquatic and Wetland • Air quality • Hydrology • Palaeontology • Noise (compliance statement) • Social • Visual • Health Risk and Radiological • Closure Costing <p>The conclusions of these studies will be included in the EIA report. Further, the mitigations and mitigations stemming from the specialists assessments will be included in the EMPr for implementation.</p>
1.2	How will this project disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Refer to baseline ecological statement in Section 8 below, and the impact assessment in Section 8.11 of this report. Further details will be provided in the EIA report.
1.3	How will this development pollute and / or degrade the biophysical environment? What measures were explored to either avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	



Ref No.	Question	Answer
1.4	<p>What waste will be generated by this development? What measures were explored to avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and / or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?</p>	<p>Significant amounts of waste will not be generated during the operational phase, apart from the tailings material itself. During construction the types of waste generated include sewage waste, biodegradable wastes, and non-biodegradable solid waste as well as general construction waste. Waste has been identified as an impact and assessed in Section 9. However, it is anticipated that the following measures can be utilised to reduce the impact of the waste on the receiving environment:</p> <ul style="list-style-type: none"> • Waste must be stored correctly. • All hazardous waste such as oil must be stored separately and disposed of at a registered facility. • Proof of disposal must be kept by the Applicant.
1.5	<p>How will this project disturb or enhance landscapes and / or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?</p>	<p>A heritage impact assessment is being conducted as part of the EIA. Refer to sections 8.4 and for further information as well as the impact assessment in Section 9 of this report.</p>
1.6	<p>How will this project use and / or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?</p>	<p>Refer to the impact assessment in Section 9 of this report. As a result of the fact that this project entails only a new TSF and pipelines, it is anticipated that this project will not lead to a significant impact or depletion of non-renewable resources.</p>
1.7	<p>How will this project use and / or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and / or impacts on the ecosystem jeopardise the integrity of the resource and / or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?</p>	<p>Refer to the impact assessment in Section 9 of this report.</p> <p>It is anticipated that the project will have a low - moderate impact on the localised ecology, this will be confirmed in the EIA phase.</p>



Ref No.	Question	Answer
1.7.1	Does the proposed project exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)?	The proposed project is only for additional deposition space required for Harmony's Wet Wits operations.
1.7.2	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used?	The proposed project will not, at this stage, involve the use of the natural resources apart from the TSF and associated infrastructure area to be cleared.
1.7.3	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The proposed project is only for additional deposition space required for Harmony's West Wits operations.
1.8	How were a risk-averse and cautious approach applied in terms of ecological impacts:	
1.8.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	The limitations and/or gaps in knowledge are presented in Section 12.
1.8.2	What is the level of risk associated with the limits of current knowledge?	The level of risk is considered low at this stage.
1.8.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	At this stage it is anticipated that this project will not lead to a significant impact on the receiving environment. Refer to the impact assessment in Section 9 of this report.
1.9	How will the ecological impacts resulting from this development impact on people's environmental right in terms following?	
1.9.1	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	The proposed activities are anticipated to have low negative ecological impacts. Refer to the impact assessment in Section 9 in this report.
1.9.2	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	A medium to low impact on third party wellbeing, livelihoods and ecosystem services is currently foreseen. Refer to the impact assessment in Section 9 of this report.



Ref No.	Question	Answer
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	The proposed activities are anticipated to have generally low negative ecological impacts. Refer to the impact assessment in Section 9 in this report.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the “best practicable environmental option” in terms of ecological considerations?	Refer to Section 6 – where details of the alternatives are given and considered.
1.13	Describe the positive and negative cumulative ecological / biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Refer to Section 9 of this report.
2	Promoting justifiable economic and social development	
2.1	What is the socio-economic context of the area, based on, amongst other considerations, the following:	
2.1.1	The IDP (and its sector plans’ vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area	Refer to Section 8.11 of this report for a breakdown of the demographics and social environment in the project area. The Merafong City Local Municipality IDP and West Rand District Municipality IDP identifies Economic infrastructure and development as one of the key mayoral strategic priorities (IDP Merafong Municipality 2023/24 IDP and West Rand Municipality 2024/25 Reviewed IDP).
2.1.2	Spatial priorities and desired spatial patterns (e.g. need for integration of segregated communities, need to upgrade informal settlements, need for densification, etc.),	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Wadela, Fochville and Carletonville.
2.1.3	Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and	Refer to the baseline environment in Section 8 of this report. The TSF is located in a mining area and is surrounded by existing mining infrastructure .
2.1.4	Municipal Economic Development Strategy (“LED Strategy”).	Considering the location and type of the activities, it is not anticipated to significantly promote or facilitate spatial transformation and sustainable urban development.



Ref No.	Question	Answer
2.2	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	Refer to the impact assessment in Section 9 in this report.
2.2.1	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas. In addition, Harmony has various social and LED initiatives required under their Social & Labour Plan (SLP) commitments.
2.3	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	Refer to the public participation process and feedback contained in Appendix C.
2.4	Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	Refer to the impact assessment and mitigation measures in Section 9 of this report. The TSF construction and operation will create employment and ensure Harmony can continue to employ current employees at their West Wits operations.
2.5	In terms of location, describe how the placement of the proposed development will:	
2.5.1	Result in the creation of residential and employment opportunities in close proximity to or integrated with each other.	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Wadela, Fochville and Carletonville
2.5.2	Reduce the need for transport of people and goods.	The activities are not anticipated to have an impact on the transportation of goods and people.
2.5.3	Result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms of public transport),	The activities are not anticipated to have any significant impact on the public transport.
2.5.4	Compliment other uses in the area,	The site for the Deelkraal II TSF is mostly greenfields with a partial brownfields intake. The surrounding area is impacted by existing TSF facilities and associated mining infrastructure.
2.5.5	Be in line with the planning for the area.	Refer to item 2.1.1 of this table (above).
2.5.6	For urban related development, make use of underutilised land available with the urban edge.	Not applicable. The proposed project is not located in an urban area.



Ref No.	Question	Answer
2.5.7	Optimise the use of existing resources and infrastructure,	Refer to Section 3 of this report.
2.5.8	Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	
2.5.9	Discourage “urban sprawl” and contribute to compaction / densification.	Not applicable. The proposed project is not located within an urban area and will not contribute to urban sprawl.
2.5.10	Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,	Refer to items 2.5.7 – 2.5.9 of this table (above).
2.5.11	Encourage environmentally sustainable land development practices and processes	Refer to impact assessment in Section 9 of this report.
2.5.12	Take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	Refer to alternative analysis in Section 6.
2.5.13	The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential).	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Wadela, Fochville and Carletonville. In addition, Harmony has various social and LED initiatives required under their various SLP commitments. Potential number of employment opportunities will be provided in the EIA Phase.
2.5.14	Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	Refer to impact assessment in Section 9 of this report.
2.5.15	In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	Given the scale of the development it is not anticipated that the activities will contribute significantly to settlements or areas in terms of direct socio-economic returns however the development will allow operations at the Harmony’s West Wits operations to continue.
2.6	How was a risk-averse and cautious approach applied in terms of socio-economic impacts:	



Ref No.	Question	Answer
2.6.1	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Refer to Section 12 of this report.
2.6.2	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions.
2.6.3	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions.
2.7	How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:	
2.7.1	Negative impacts: e.g. health (e.g. HIV-AIDS), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Refer to the impact assessment in Section 9 of this report. A health a radiation assessment is being conducted as part of the EIA.
2.7.2	Positive impacts. What measures were taken to enhance positive impacts?	Refer to the impact assessment in Section 9 of this report.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Refer to the impact assessment in Section 9 of this report.
2.9	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Refer to the impact assessment in Section 9 of this report.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	Refer to the impact assessment in Section 9 of this report.



Ref No.	Question	Answer
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	By conducting an EIA Process, the applicant ensures that equitable access has been considered. Refer to the impact assessment in Section 9 of this report.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Refer to the impact assessment in Section 9 of this report. The EMPr which will be included in the EIA report will specify timeframes within which mitigation measures must be implemented.
2.13	What measures were taken to:	
2.13.1	Ensure the participation of all interested and affected parties.	Refer to Section 7 of this report, describing the public participation process undertaken for the proposed project.
2.13.2	Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	Refer to Section 7 of this report, describing the public participation process undertaken for the proposed project. advertisement, notification letter and site notice have been made available in English, Afrikaans and Setswana to assist in understanding of the project. Further public consultation will be held during the review period of the Scoping / EIA reports for the project.
2.13.3	Ensure participation by vulnerable and disadvantaged persons,	
2.13.4	Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	
2.13.5	Ensure openness and transparency, and access to information in terms of the process,	
2.13.6	Ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,	
2.13.7	Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein will be promoted?	
2.14	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the	Refer to Section 7 of this report, describing the public participation process undertaken for the proposed project.



Ref No.	Question	Answer
	segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	
2.15	What measures have been taken to ensure that current and / or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Potential future workers will have to be educated on a regular basis as to the environmental and safety risks that may occur within their work environment. Furthermore, adequate measures will have to be taken to ensure that the appropriate personal protective equipment is issued to workers based on the conditions that they work in and the requirements of their job.
2.16	Describe how the development will impact on job creation in terms of, amongst other aspects:	
2.16.1	The number of temporary versus permanent jobs that will be created.	It is anticipated that the use of local labour will be utilised as far as possible. Labourers will mostly be sourced from surrounding towns and areas such as Wadela, Fochville and Carletonville. Details in terms of job figures and employment opportunities will be made available for the EIA-phase report.
2.16.2	Whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area).	
2.16.3	The distance from where labourers will have to travel.	
2.16.4	The location of jobs opportunities versus the location of impacts.	
2.16.5	The opportunity costs in terms of job creation.	
2.17	What measures were taken to ensure:	
2.17.1	That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	The EIA Process requires governmental departments to communicate regarding any application. In addition, all relevant departments are notified at various phases of the project by the EAP.
2.17.2	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	
2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	Refer to Section 7 of this report, describing the public participation process implemented for the application, as well Section 8, the impact on any national estate.



Ref No.	Question	Answer
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Refer to the impact assessment and mitigation measures in Section 9 of this report. All mitigation measures are considered to be realistic and implementable.
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	At this stage the proposed activities are not anticipated to produce significant pollution, environmental damage or adverse health effects in the long term as long as the proposed mitigation measures are implemented.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Refer to Section 6, description of the process followed to reach the proposed preferred site.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Refer to the impact assessment and mitigation measures in Section 9. Further detail will be provided in the EIA report.



6 PROJECT ALTERNATIVES

As this application relates only to a new TSF and associated pipelines and infrastructure, there are limited feasible and/or reasonable alternatives that can be considered and which are described and motivated below.

6.1 LOCATION ALTERNATIVES

The assessment of location alternatives is limited due to the available open space in close proximity to the mining activities (and especially the gold processing plant). Several alternative disposal options are being assessed as part of a Harmony's trade-off assessment. Two other options to be considered for the high-level trade-off are:

- Old Savuka TSF footprints; and
- Old DF5 footprint



Figure 10: Other site options (dark red polygons) to be considered in trade-off study

Due to limited deposition capacity on these existing footprints, it is unlikely that either of these sites could, on their own, cater for the required tonnages of tailings material, however it is possible that one or both of these sites could be used in conjunction with the proposed Deelkraal II TSF, thereby potentially reducing the footprint of the Deelkraal II TSF. A trade-off study is being undertaken by Harmony in order to determine the feasibility of utilizing these other two existing footprints. If the trade-off study identifies an additional option to license and authorise another deposition site or sites the scope will be amended to include these sites. For now these additional location alternatives are still considered as possible alternative options, however this will be confirmed once the trade-off assessment has been completed. Further details regarding these location alternatives will be provided in the EIA report.

A Concept Study (SGS Bateman, 2024) evaluated different options for the treatment of the Deelkraal and Kusasaletu Tailings Storage Facilities (TSF) at the existing processing plants. The trade-off study shortlisted three options which allow for the present reclamation operations to seamlessly continue and for future operations to be scheduled. The trade-off study considers timelines for the design, environmental approval and construction of the TSFs. This was done to determine the most feasible options to allow for present reclamation



operations to continue and for future reclamation operations to be scheduled. The trade-off study identified three viable options that will need to be taken to feasibility level study.

- The first option considers extending Deelkraal Dormant TSF as a buffer TSF and utilizes DRD TSF for present reclamation operations to follow through. DRD TSF is not owned by Harmony and negotiations will need to be held with DRD.
- The second option considers Blyvoor Gold TSF 6 (cyclone converted) as a buffer TSF and utilizes DRD TSF for present reclamation operations to follow through.
- The third option considers extending Deelkraal Dormant TSF and Blyvoor Gold TSF 6 as buffer TSFs for present reclamation operations.

For all three options, future reclamation operations are catered for by utilizing the Deelkraal II TSF and the Savuka Dormant TSFs as deposition sites. This ensures ongoing operation of the Savuka Reclamation Plant. A detailed design of Savuka Dormant TSF may facilitate an increase in tonnages if constructed in compartments. For the second option, the commissioning of Deelkraal TSF can happen sooner as Deelkraal Dormant TSF will not be used as a buffer TSF.

The viability of each of the options will need to be further evaluated at a feasibility level and further detail on a preferred option will be provided in the EIA report, however the proposed Deelkraal II TSF will still be required, no matter which of the above options is selected. Certain pipeline routes may however fall away depending on which alternative is selected. For now, all of the above reclamation options will be carried forward into the EIA phase however the final option chosen will depend on the outcome of Harmony's own ongoing feasibility assessments. Further detail will be presented in the EIA phase once the feasibility assessments are concluded.

6.2 LAYOUT AND DESIGN ALTERNATIVES

6.2.1 TSF DESIGN

The total volume of material to be deposited on the TSF is based on the forecast gold reserves to be processed at the existing plants. The potential to reduce the footprint of the new TSF would require altering the dimensions of the facility by making it either higher with steeper side slopes or lower with a greater footprint area. Increasing the height would result in greater visual impacts and possibly increasing the secondary impacts such as fugitive dust generation and erosion of the steeper side slopes. This would also lead to increasing the stability risks as well as more complex final closure requirements. Alternatively, reducing the height of the facility would result in a larger footprint however there is insufficient available space to do so in the proposed location. The TSF will be 65m in height based on the current design.

The EIA process being undertaken includes the assessment of potential impacts and the identification of environmental sensitivities within, and in, the vicinity of the proposed project area, thereby allowing for the recommendation of mitigation measures towards the avoidance, minimisation and / or management of the anticipated impacts. The layout will be planned to avoid any no-go areas identified from the various specialist studies, if required, otherwise no additional layout or design alternatives are considered applicable to this application. Various design alternatives have been investigated as part of the TSF design which has already undergone several design iterations based on identified environmental constraints (flood lines, sensitive areas, no-go areas etc). The current design represents Harmony's most recent design however further updates are still expected and an updated design will be presented in the EIA report.

6.2.2 RETURN WATER DAM LOCATION

Various areas were investigated from a feasibility perspective for the location of the new RWD for the Deelkraal II TSF. The location of the return water dam is dependent on various geotechnical factors and is also constrained by area as it needs to be located in the immediate vicinity of the new Deelkraal II TSF. The original proposed location for the RWD was to the immediate south of the Deelkraal II TSF. This has now moved to the north of the TSF (**Figure 1**). The location of the RWD may need to be shifted depending on the geotechnical conditions however the current location to the north of the proposed TSF is the current preferred location based on known geotechnical factors and other engineering constraints. The final proposed location of the RWD (and its



associated pipelines) will be presented in the EAI report once geotechnical investigations have been completed and the location is confirmed.

6.2.3 PIPELINE ROUTES

Two alternative routes are proposed for the pipeline corridor in the vicinity of the proposed Deelkraal II TSF. Both options are presented in the figure below. Both options will be assessed in the EIA report. Pipeline Corridor Alternative 1 follows a northern alignment. Pipeline Corridor Alternative 2 runs to the south and will also be considered in the EIA report. Discussions with the solar developers who are proposing solar PV projects on these same properties are being consulted in order to determine which route might be preferred from a technical feasibility perspective. Corridor 1 is currently preferred from a technical feasibility perspective.

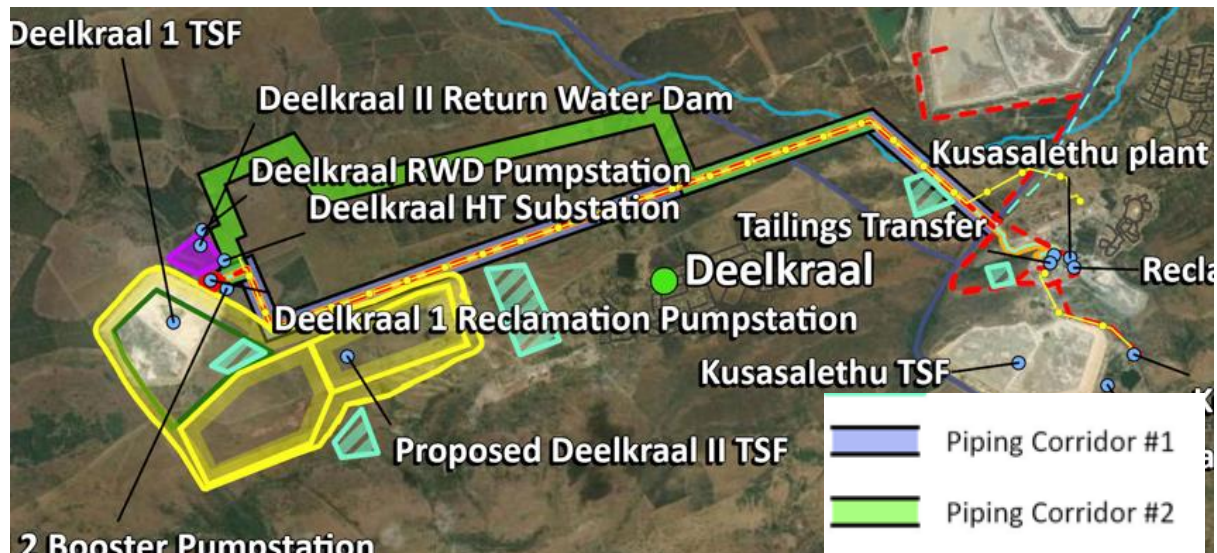


Figure 11: Pipeline alternatives

6.2.4 ADDITIONAL DESIGN ALTERNATIVES

6.2.4.1 UNLINED VS LINED TAILINGS STORAGE FACILITY

Under current environmental legislation in South Africa, tailings are viewed as potentially hazardous waste that needs to be disposed of in compliance with the appropriate minimum requirements. Traditionally, tailings in South Africa have been built on top of the *in-situ* soils. The use of composite liners is relatively new in tailings dam construction in South Africa and brings with it its own set of challenges. The requirement for a barrier system in South Africa regulations was promulgated under the National Environmental Management Act - Regulations 632, 634, 635 and 636. These are currently administered by the Department of Water and Sanitation (DWS). Under these regulations waste, including tailings, is assessed under Waste Acceptance Criteria for Disposal to Landfill, which determines the requirements for disposal of different types of waste. Under these regulations, many mineral residue deposits are found to require a barrier system, which typically includes a geomembrane.

The Department (DWS) no longer condones South Africa's philosophy of the past 20 years, in terms of which dilution of water contamination and dispersion relying on attenuation was regarded as acceptable (Legge, 2019). Protection of water resources, and prevention of contamination in the first place (source) is now being sought in preference to mitigating contamination spread (pathway) and pollution cleanup (receptor). Apart from preventing polluted leachate from seeping into the groundwater, an additional benefit of lining a tailings dam is that more water in the tailings system can be captured and returned to the plant. This is useful in a water-scarce country such as South Africa. Since the tailings industry has not always included barrier systems in design or construction, there are learnings to be acquired, even by seasoned tailings consultants and contractors, on how to work with these systems. A proposed amendment to Regulation 632 (2016) has been drafted whereby there could in future be a relaxation of the regulations on a case-by-case basis, following a risk-based approach.



However, such regulations have yet to be promulgated into law. In the meantime, the current regulations apply to the disposal of tailings in the same way they apply to the disposal of any other waste to landfill.

The alternatives relate to the liner design for the TSF and the RWD. However, the liner requirements are based on the waste classification of the material, geohydrological modelling and risk assessment. Tailings use liners to prevent the release of concentrated mine chemicals into the environment. Many regulatory agencies request lined Tailings Storage Facilities in hopes of better protecting groundwater resources. Liners are not always necessary; however, tailings solution containment is critical to meeting environmental requirements and the necessary assessments and measures must be undertaken to ensure best environmental practices. The necessity of liners for TSF and/or RWD are subject to the type, nature and surrounding geohydrological conditions in consultation with the 2013 regulations published in terms of the National Environmental Management: Waste Act, notably GN R. 634 to GN R. 636 relevant to Waste Classification and Management, National Norms and Standards for the Assessment of Waste for Landfill Disposal and National Norms and Standards for Disposal of Waste to Landfill.

For important reasons, hazardous waste landfills are the most closely regulated and structured landfills. They are specifically designed to hold hazardous wastes in a way that virtually eliminates the chance of it being released into the environment. In addition to these design requirements, hazardous waste landfills are often inspected multiple times a year to make sure that the facility is up to code and the standards are top-notch. Some of the design requirements for hazardous waste landfills include:

- Double liners;
- Double leachate collection and removal systems;
- Leak detection systems;
- Run on, runoff and wind dispersal controls; and
- Construction quality assurance programs.

An inverted barrier system with equivalent performance to a Class C barrier can be motivated for implementation if the TSF needs to be lined. **The Deelkraal II TSF will be a lined facility.** The inverted barrier system substantially reduces the seepage areas as well as the seepage rate by changing the seepage flow from orifice flow to Darcian flow. This is achieved by placing the geomembrane on top of a SANS 10409 (2020) compliant receiving face of reworked foundation soil (consisting of existing tailings) instead of a clay layer and sliming fine tailings over the geomembrane. A Class C performance barrier system has been opted for the RWD. The geomembrane was changed from a general Class C 1.5 mm HDPE to a 2 mm HDPE to improve the liner performance as well as to negate the use of a clay layer below. Seepage losses through a traditional Class C barrier is primarily determined based on the number of holes intersecting wrinkles as reflected in the Casagrande lecture 2012 by RK Rowe. For the inverted barrier, seepage losses change from orifice flow controlled by the Bernoulli equation at wrinkles (with Darcian flow through the area beneath the wrinkle) to Darcian flow through the tailings at the discontinuity in the geomembrane. Furthermore, this barrier system substantially reduces the risk of damage to the liner when placing above liner ballast and gravel by mechanical means and increases stability by eliminating the low strength expansive clay and its interface with the geomembrane in the outer wall zone between the toe wall and starter wall (Eco Elementum, 2025). The advantages and disadvantages of lined, unlined TSFs and unlined TSF with Phytoremediation are indicated in **Table 10.**

Table 10: Advantages and disadvantages Lined, Unlined TSF and Unlined TSF

ADVANTAGE	DISADVANTAGE
Lined TSF	



ADVANTAGE	DISADVANTAGE
A geomembrane liner, such as high-density polyethylene (HDPE), prevents leachate (polluted liquid) from seeping into the groundwater and surrounding soils	Liners need to be properly installed for maximum pollution prevention.
By containing contaminated liquids, liners protect both the environment and local water resources from pollution	Requires artificial drainage systems and rigorous monitoring for stability and performance.
Aligned with the current DWS requirement for the use of liners for the safe disposal of tailings	Prone to damage and localized leakage, necessitating strict quality control during installation.
	The introduction of a liner can alter the interface between the tailings and the underlying materials, requiring new methods to assess and ensure the stability of the facility.
Unlined TSF	
Unlined facilities require less initial investment as they don't involve the cost of lining materials or the increased complexity of a lined system, which can also make them easier to operate and maintain	No pollution prevention. May pose significant environmental risks due to potential seepage of toxic contaminants into groundwater and soil.
The absence of liners and associated complex systems simplifies the design and construction process, making them quicker to build and deploy.	Water use inefficiency - No recycling of water. More water in the tailings system escapes and not returned to the plant for reuse.
	Seepage through unlined facilities can lead to the contamination of aquifers and soil, affecting water sources for communities and ecosystems downstream of the mine site
	Without a liner, there is a greater risk of uncontrolled leakage or, in the worst case, a complete failure of the facility, which could release vast quantities of toxic slurry and debris into the surrounding environment
	Closing and rehabilitating an unlined facility presents significant challenges, as long-term containment of potential contaminants in the natural environment is more difficult to achieve and can be very expensive.

It is expected that a liner such as the inverted barrier system will be suitable to prevent any potential contaminant impact on the groundwater in the immediate area. Based on the above significant benefits as a result of lining the TSF the unlined option will be discarded at scoping.

6.2.4.2 LINED VS UNLINED RETURN WATER DAM

The same general principals noted above will also apply to lining of the RWD. The lining of the RWD would potentially aid in preventing potential contamination of groundwater resources. This will however be further investigated and confirmed during the geohydrological modelling to be undertaken as part of the EIA specialist studies. If the modelling finds no distinct advantage to lining the RWD, the unlined RWD option may still be considered. This will be dependent on the outcomes of the geohydrological modelling to be undertaken in the EIA phase of the project. For now, both lined and unlined RWD options will be carried forward for consideration in the EIA phase.

6.2.4.3 PIPELINE DESIGNS

In order to allow for slurry deposition on the Deelkraal II TSF new residue deposition pipelines will be required. The residue deposition pipelines will have a diameter of more than 360mm with a peak throughput of more than 120 ℓ/s (specific diameters will be provided in the EIA report once further designs have been completed). The



pipelines will be flanged steel pipelines and installed above-ground on pre-cast concrete plinths. Slurry pipelines can be made of many different materials such as carbon steel, alloy steel, hardened steel, stainless steel, abrasion resistant lined pipes, and non-ferrous pipes, HDPE etc. The material of the pipeline is generally selected based on the application, material being pumped, and cost. The assessment of slurry pipelines design alternative on this report is based on relative location to the ground; aboveground and underground. Based on the analysis of the same type of pipelines proposed for the project, the advantages and disadvantages of the pipeline in relation to the ground is provided in **Table 11**.

Table 11: Advantages and disadvantages Pipelines Design

ADVANTAGE	DISADVANTAGE
Above-Ground Pipelines	
Above-ground pipelines are much easier and cheaper to build and install.	Can be easily damaged, requires constant monitoring and maintenance.
Above-ground pipelines are much easier and cheaper to monitor and maintain.	Generally, have a shorter lifespan.
Above-ground pipelines allow for quicker and effective repairs, reducing the amount of pollution	Easily accessible, there is also the concern of vandalism and the chance that damage may lead to leaks and impacts on the environment.
Above-ground pipelines have lesser environmental impacts as there are shallow distal excavations and no deep excavations or blasting requirements.	
Below-Ground Pipelines	
Security: Below-ground pipelines are less likely to be affected by weather phenomenon and/or vandalism.	Pipelines are more difficult and expensive to build and install.
Below-ground pipelines generally require less frequent monitoring and maintenance.	Pipelines are more difficult and expensive to maintain.
The land above the pipeline can be rehabilitated to blend in with the surrounding landscape / land use.	Pipelines have more environmental impacts as there is a need for excavations and/or blasting requirements. Any leak directly contaminates the environment and may be only recognized after a period of time.

Based on the advantages and disadvantages indicated in **Table 11** above, it is the EAP's opinion that above-ground pipelines are the more favourable designs.

6.3 TECHNOLOGY ALTERNATIVES

The only available technology alternatives relate to the liner design for the TSF and the specific deposition method. The liner requirements and ultimate solution is based on the waste classification of the material and geohydrological modelling and risk assessment. No additional technology alternatives are considered applicable. Liner requirements will be discussed in further detail in the EIA phase report.

There are various deposition techniques which are applicable to tailings storage facilities. Once the tailings slurry (dilute or paste consistency) has arrived at the tailings storage area, there are several possible ways it can be deposited. These include the spigotting method, cyclone deposition and the paddocking method. Each alternative is described below:

- **Spigots** are multiple outlets along a delivery pipeline. This technology is only used when it is easily possible to cause a gravitational grading split between the coarse and the tailings' fine fractions.



Figure 12: Example of spigot deposition (source: www.researchgate.net)

- **Paddock deposition** requires construction of small impoundments or containment berms with dried-out tailings borrowed from the previous layer deposited around the perimeter or edge of the paddock. These shallow paddocks are then filled with dilute slurry.



Figure 13: Example of paddock deposition

- In **cyclone deposition** is a cyclone deposition device consisting of conical housing equipped with a feed pipe that enters the cone at its larger diameter closed end. A second pipe enters the cone and intrudes into the body of the cone. The slurry feed enters under pressure and is forced to swirl with a spiral motion towards the smaller end. In the process, centrifugal forces cause the larger particles in the slurry to move down and away from the axis, towards the narrow exit of the cone. The net effect is that the



finer particles and most of the water leave the cyclone through the vortex finder and form the "overflow," while the partially dewatered larger particles leave at the opposite end as the coarser "underflow. The purpose of using a cyclone is to create underflow material that has good geotechnical characteristics, i.e., high permeability, fast consolidation and strength gain rate than the original tailings so that the underflow can be used to form an impoundment wall to the tailings storage facility. Effective operations of a cyclone TSF can also result in high water recoveries.



Figure 14: Example of cyclone deposition

Currently cyclone deposition is the vastly preferred method of deposition for the majority of Harmony's current TSF operations due to the reasons described above. The environmental impacts associated with each deposition method are similar however cyclone deposition has higher water recovery rates and is also preferred from a geotechnical perspective. The Deelkraal II TSF is designed to utilize Cyclone deposition. As such no other deposition methods or technologies will be considered in the EIA phase and Cyclone deposition is nominated as the preferred alternative.

Despite technological advances in mineral processing, mining companies still face challenges in how to best manage tailings materials. In addition, mining of lower grades of ore has resulted in increased water use per unit of production; at certain sites, water availability is the single greatest constraint on mine development. In some cases, alternative tailings disposal (ATD) has been viewed as a 'silver bullet' that will address all tailings management issues, especially water concerns. In addition, in some cases ATD technologies also promise a smaller footprint and reduced environmental impact and risks. Examples include dry stacking, paste backfill, in-pit disposal and reuse of tailings material for road and brick construction. Despite the perceived advantages, there are a number of factors that determine whether an ATD technology including:

- Energy supply: removing water from a slurry requires significant energy, with increased energy, expenditure comes with additional costs;
- Production rates: conventional tailings deposition remains the only proven technology at mines with high production rates;
- Project economics: a reduced footprint and less water used come at the expense of higher initial capital;
- Operational predictability: mines operating under narrow production constraints may be prohibited from employing ATD technologies because of the possibility of operational instability;
- Topography: some ATD technologies lend themselves to flat topographies and are usually not feasible (without embankment support) at sites with even moderately steep terrain; and
- Water: in many cases, the water saved by the ATD technology is only marginally better than conventional disposal methods.



Based on the above listed challenges, Conventional Disposal Methods (specifically Cyclone Deposition) are preferable over the available Alternative Tailings Disposal methods.

6.4 PROCESS AND ACTIVITY ALTERNATIVES

Process or activity alternatives imply the investigation of alternative processes, methods or activities to achieve the same goal for the proposed TSF. The current planned LOM of the West Wits operations exceed the available deposition capacity of these TSFs and the applicant is therefore proposing to construct the proposed West Wits Reclamation and Deposition Project, including the Deelkraal II TSF, to cater for this additional capacity and for future reclamation operations. For this there are no feasible or applicable activity alternatives that have been identified. Additional deposition space will be required for the tailings material.

Process alternatives identified for consideration include **dry stacking** vs **wet stacking** of tailings material. Dry stacking dewater tailings to a solid-like state, increasing safety and stability while reducing water use, but has higher initial costs. Wet stacking involves storing tailings in large ponds, which is less expensive initially but has significant risks of dam failure, water contamination, and requires ongoing water treatment.

Current Harmony operations are already geared to wet slurry operations and deposition and the costs to change from wet to dry stacking lead to dry stacking not being considered a feasible process alternative. The slurry TSF also provides a water buffer storage for winter (as water drains out and is returned) while using a dry filter option would require very large storage of water at plant or elsewhere (pipeline considerations if far from plant) and there is no room around the existing plants for such large storage facilities. Based on the above listed challenges wet stacking is considered the only viable process alternative.

6.5 NO GO ALTERNATIVE

The no go alternative would imply that no TSF is constructed for the safe deposition of new mine tailings from Harmony's West Wits operations. The current planned LOM of the Harmony's West Wits operations exceed the available deposition capacity of these TSFs and the applicant is therefore proposing to construct the proposed Deelkraal II TSF to cater for this additional capacity. The no go option would mean that the new TSF project and associated infrastructure would not proceed and this would therefore negatively affect the future viability of Harmony's West Wits mining operations due to lack of deposition space. This would have a significant financial impact on Harmony as well as a direct negative impact on the workforce on the mine and surrounding businesses and communities that are directly or indirectly linked to the operations.

The Deelkraal II TSF will also cater for reworking of multiple TSFs across the West Wits area which would have a significant positive impact. TSFs will be reworked and processed at Kusasaletu plant. These TSFs will be fully reclaimed and then fully rehabilitated in the future. This will also allow Harmony to manage a single large TSF rather than having to deal with numerous smaller TSF sites, which should also improve the management related to the various environmental and social issues of the existing TSFs in the region. These opportunities will be lost if the project does not proceed. As such, the no go alternative is not considered feasible or reasonable.



7 STAKEHOLDER ENGAGEMENT

The Public Participation Process (PPP) is a requirement of several pieces of South African legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their comments are considered, and a record included in the reports submitted to the Authorities. The process ensures that all stakeholders are provided this opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the proposed project needs to be managed sensitively and according to best practises to ensure and promote:

- Compliance with international best practice options;
- Compliance with national legislation;
- Establishment and management of relationships with key stakeholder groups; and
- Involvement and participation in the environmental study and authorisation/approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Introduce the proposed project;
- Explain the authorisations required;
- Explain the environmental studies already completed and yet to be undertaken (where applicable);
- Solicit and record any issues, concerns, suggestions, and objections to the project;
- Provide opportunity for input and gathering of local knowledge;
- Establish and formalise lines of communication between the I&APs and the project team;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent negative environmental impacts and maximize and/or promote positive environmental impacts associated with the project.

7.1 GENERAL APPROACH TO SCOPING AND PUBLIC PARTICIPATION

The PPP for the proposed project has been undertaken in accordance with the requirements of the MPRDA and NEMA EIA Regulations (2014), and in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project and have their views considered and included as part of project planning.

An initial I&AP database has been compiled based on known key I&AP's, Windeed searches, and stakeholder databases provided by the mine. The I&AP database includes amongst others, landowners, communities, regulatory authorities and other special interest groups. Harmony (the applicant) is the current landowner for all properties on which infrastructure is proposed.

7.1.1 LIST OF PRE-IDENTIFIED ORGANS OF STATE/ KEY STAKEHOLDERS IDENTIFIED AND NOTIFIED

Government Authorities and key stakeholders that were notified of the proposed project and include:

- Gauteng Department of Agriculture and Rural Development (GDARD)
- Gauteng Department of Corporate Governance and Traditional Affairs (CoGTA)



- Gauteng Department of Health
- Gauteng Department of Human Settlements
- Gauteng Department of Infrastructure Development
- Gauteng Department of Mineral Resources and Energy
- Gauteng Department of Roads and Transport
- Merafong City Local Municipality
- Mine Health and Safety Council (MHSC)
- National Energy Regulators of South Africa (NERSA)
- National Department of Agriculture
- National Department of Forestry, Fisheries and Environment (DFFE)
- National Department of Human Settlements
- National Department of Mineral and Petroleum Resources (DMPR)
- National Department of Treasury
- Endangered Wildlife Trust (EWT)
- Federation for a Sustainable Environment
- Gauteng Water Sector Forum
- GroundWork South Africa
- Lawyers for Human Rights
- Mining Affected Communities United in Action (MACUA)
- Mining and Environmental Justice Community Network of South Africa (MEJCONSA)
- Natural Justice
- Wildlife and Environment Society of South Africa (WESSA)
- Wildtrust
- World Wildlife Fund (WWF)
- National Department of Water and Sanitation (DWS)
- Petroleum Agency of South Africa (PASA)
- South African Heritage Resources Agency (SAHRA)
- The Fountain Private Hospital
- West Rand District Municipality
- Pre-identified and registered landowners and surrounding landowners.
- Agri South Africa
- Anglo American
- Atlantic Energy Solar
- Blyvoor Community Forum
- Botanical Society
- Carpe Diem Solar Development
- Centre for Environmental Rights (CER)
- Council for Geoscience



7.1.2 INITIAL NOTIFICATION

The PPP commenced on the 6 February 2026 with an initial notification and call to register. Interested and Affected Parties are welcome to register via email, direct letter, fax or by contacting EIMS telephonically. The initial notification was given in the following manner:

7.1.2.1 REGISTERED LETTERS, FAXES AND EMAILS

Notification letters (English, Afrikaans and Setswana), faxes, and emails were distributed to all pre-identified key I&APs including government organisations, NGOs, relevant municipalities, ward councillors, landowners and other organisations that might be affected.

The notification letters included the following information to I&APs:

- List of anticipated activities to be authorised;
- Scale and extent of activities to be authorised;
- Information on the intended mining operation to enable I&APs to assess/surmise what impact the activities will have on them or on the use of their land;
- The purpose of the proposed project;
- Details of the affected properties (including details of where a locality map could be obtained);
- Details of the relevant NEMA Regulations;
- Initial registration period timeframes; and
- Contact details of the EAP.

7.1.2.2 NEWSPAPER ADVERTISEMENTS / GOVERNMENT GAZETTE

Advertisements (in English and Setswana) describing the proposed project and Environmental Impact Assessment (EIA) process were placed in the Carletonville Herald with circulation in the vicinity of the study area on the 12th of February 2026. The Gazette Notice was placed in the Gauteng Provincial Gazette on the 25th of March 2026. Newspaper adverts included the following information:

- Project name;
- Applicant name;
- Project location;
- Nature of the activity and application; and
- Relevant EIMS contact person for the project.

7.1.2.3 SITE NOTICE PLACEMENT

A1 Correx site notices in English and Afrikaans and Setswana were placed at ten locations within the local project area on the 6 February 2026. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location;
- Map of proposed project area;
- Project description;
- Legislative requirements; and
- Relevant EIMS contact person for the project.



7.1.2.4 POSTER PLACEMENT

A3 posters in English and Afrikaans and Setswana were placed at local public gathering places in the project area namely the Post Office and the Municipal Offices.

The notices and written notification afforded all pre-identified I&APs the opportunity to register for the project as well as to submit their issues/queries/concerns and indicate the contact details of any other potential I&APs that should be contacted. The contact person at EIMS, contact number, email and faxes were stated on the posters. Comments/concerns and queries were encouraged to be submitted in either of the following manners:

- Electronically (fax, email);
- Telephonically; and/or
- Written letters.

7.1.3 AVAILABILITY OF SCOPING REPORT AND PUBLIC MEETING

Notification regarding the availability of this Scoping Report for public review are given in the following manner to all registered I&APs (which includes key stakeholders and landowners):

- Registered letters with details on where the scoping report can be obtained and/or reviewed, public meeting date and time, EIMS contact details as well as the public review comment period;
- Facsimile notifications with information similar to that in the registered letter described above; and/or
- Email notifications with a letter attachment containing the information described above.

The scoping report is being made available for public review for a period of 30 days. A Scoping Phase Public Meeting is proposed to take place during the review period of the scoping report. The purpose of the meeting is to present and discuss the findings of this Scoping Report with Interested and Affected Parties.

Executive summaries of the report in English, Afrikaans and Setswana will be provided on the EIMS website and at the same venues where the report is available for public review.

7.2 PUBLIC PARTICIPATION PROGRESS

Comments raised to date have been addressed in a transparent manner and included in the Public Participation Report (Appendix C). Specialist input into the EIA /EMPr phase will investigate and address any relevant I&AP concerns in more detail.



8 ENVIRONMENTAL ATTRIBUTES AND BASELINE ENVIRONMENT

This section of the Scoping Report provides a description of the environment that may be affected by the proposed project. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described. This information has been sourced from existing information available for the area and baseline information received from certain specialists. The studies however will be further refined in the EIA phase of the project and the full assessments will be appended to that report. The DFFE screening tool was also used to inform this section, and a copy of the screening report is included in Appendix F. Various terminology is used in this section of the report referring to the project location, which are described below:

- **Site:** Refers to the immediate site(s) / footprints and areas where the infrastructure is proposed to be located;
- **Project Area / Study Area / Region:** Refers to both the site and the general regional area and surrounds where the project is located; and
- **Project Area of Influence:** The total area / region where the project's direct and indirect impacts—both positive and negative—are likely to be felt, related to a particular project aspect or impact.

It should be noted that the proposed layout and pipeline routes have been amended since the baseline specialist assessments for the project were concluded, hence the pipeline routes and RWD location in some of the below baseline maps differ slightly from the most recent updated layout and pipeline routes indicated in Figure 1.

8.1 TOPOGRAPHY

The topography changes rapidly over short distances from 1600 metres above sea level (mamsl) at the top of the ridge to 1 560 mamsl at the Varkenslaagte Spruit and 1 420 mamsl in the Loopspruit. Refer to **Figure 15** for a topographical map of the project area.

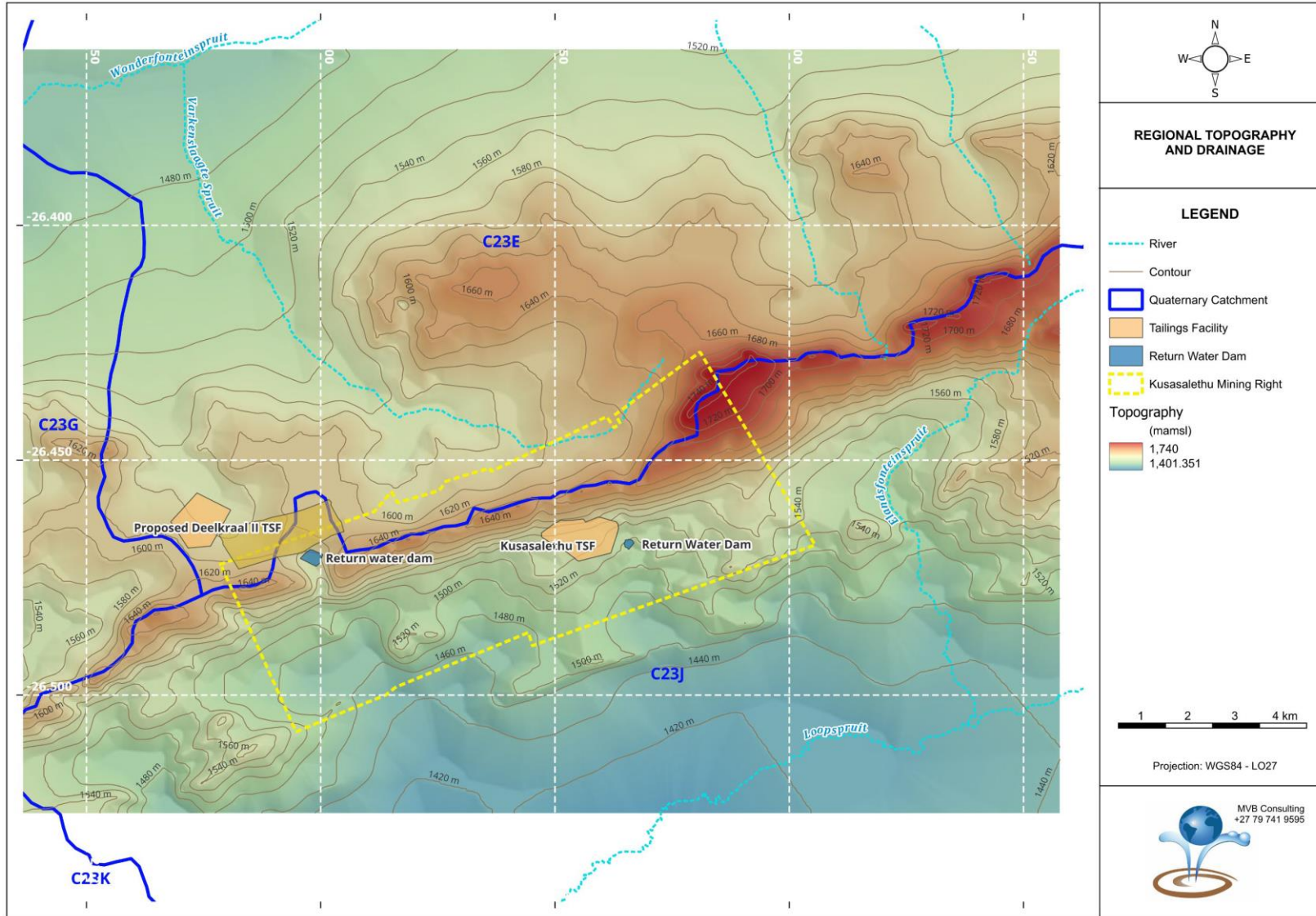


Figure 15: Topographical map of study area



8.2 GEOLOGY

The geology of the region is the controlling agent for aquifer development. The regional surface geology over the study area is presented as **Figure 16** and the general stratigraphy as described as follows:

- Witwatersrand Supergroup.
- Ventersdorp Supergroup.
- Transvaal Supergroup.
- Karoo Supergroup.

8.2.1 WITWATERSRAND SUPERGROUP

The geology of the Witwatersrand Supergroup is well understood and documented as a result of extensive mining and exploratory drilling. Truswell, 1977 describes the geology in the region of the study area.

The development and preservation of the Witwatersrand basin is structurally controlled. The structural patterns control the influx of groundwater into the underground workings and as a result it is important to understand which features act as conduits and which features act as flow barriers. Dykes and sills of at least four different ages have also intruded the Witwatersrand strata. The intrusion of the dykes has often taken place along fault planes. The oldest dykes are usually diabase, representing feeder dykes to the overlying Ventersdorp lavas. There are intrusions of pyroxenite, gabbro and dolerite probably of Bushveld age. A third group belongs to the basic or alkaline dyke swarm related to the Pilanesberg alkaline complex. Finally, the youngest intrusions are of Karoo dolerite.

The Witwatersrand basin is a thick sequence of shale, quartzite and conglomerate. The average dip of the strata is 30° south. There are two main divisions, a lower predominantly argillaceous unit, known as the West Rand Group and an upper unit, composed almost entirely of quartzite and conglomerates, known as the Central Rand Group.

The West Rand Group is divided into three subgroups namely the Hospital Hill, Government Reef and Jeppestown. These rocks comprise mainly shale, but quartzite, banded ironstones, tillite and intercalated lava flows are also present. The rocks were subjected to low - grade metamorphism causing the shale to become more indurated and slaty. The original sandstone was recrystallised to quartzite.

The Central Rand Group is divided into the Johannesburg and Turffontein Subgroups and is composed largely of quartzites, within which there are numerous conglomerate zones. The conglomerate zones may contain any number of conglomerate bands, with individual bands interbedded with quartzite. The upper conglomerates are usually thicker with coarser fragments. An argillaceous zone known as the Booyens Shale (also known as the Kimberley Shale) separates the Johannesburg and Turffontein Subgroups. The economic gold deposits (reefs) are contained within the Central Rand Group.

8.2.2 VENTERSDORP SUPERGROUP

The younger Ventersdorp Supergroup overlies the Witwatersrand rocks. Although acid lavas and sedimentary intercalations occur, the Ventersdorp is composed largely of andesitic lavas and related pyroclastics. The Ventersdorp Supergroup consists of the Platberg Group and the Klipriviersberg Group. The Klipriviersberg Group consists of the Alberton and Westonaria Formations.

The Alberton Formation is composed of green – grey amygdaloidal andesitic lavas, agglomerates and tuffs. The thickness amounts to 1500m. The lack of sediments in this sequence indicates a rapid succession of lava flows, which probably came from fissure eruptions. Material of similar composition forms the oldest dykes that have intruded the Witwatersrand rocks. The abundant agglomerates provide indications of periodic explosive activity. The removal of huge volumes of volcanic material from an underlying magma chamber gave rise to tensional conditions and as a result a number of faulted structures, horst and grabens, were formed.



8.2.3 TRANSVAAL SUPERGROUP

Overlying the Ventersdorp Lavas are the Black Reef quartzite and dolomite of the Transvaal Supergroup. The Black Reef quartzite comprises coarse to gritty quartzite with occasional economically exploitable conglomerates (reefs). The entire area was peneplained in post-Ventersdorp time and it was on this surface that the Transvaal Supergroup was deposited, some 2200 million years ago. The deposition commenced with the Kromdraai Member with the Black Reef at its base. The occurrence of the gold is not as widespread as in the Witwatersrand and mainly restricted to north-south trending channels. The Black Reef is overlain by a dark, siliceous quartzite with occasional grits or small pebble bands. The quartzite grades into black carbonaceous shale. The shale then grades into the overlying dolomite through a transition zone of approximately 10m thick.

Overlying the Kromdraai Member is the dolomite of the Malmani Subgroup of the Chuniespoort Group. The dolomites are present on surface just 500m north of the Deelkraal TSF. About 1300 Ma ago the region was subjected to tension resulting in the formation of a number of large north to north-easterly striking faults. Many of the faults penetrated the full Transvaal sequence as well as the underlying Ventersdorp and Witwatersrand Supergroups. Some of the faults were filled by Pilansberg age dykes, which subdivided the dolomite into watertight groundwater compartments. The Wonderfontein spruit tributary flows across the non-dewatered Bosbok – Turffontein dolomitic groundwater compartment. This is a sensitive aquifer that needs to be protected against impacts from the mines and other contaminant sources.

The dolomites are overlain in the south by the Pretoria Group rocks. The Rooihoogte Formation forms the basal member of the Pretoria Group, consisting of the Bevetts conglomerate, shale and quartzite. The Bevetts conglomerate varies in thickness between 3m and 60m (Parsons and Killick, 1985). Overlying the Bevetts conglomerate is shale and sporadically developed quartzite, referred to as the Pologround quartzite. Where developed the Pologround quartzite is overlain by 150m – 200m of pink to purple shales, forming the basis of the Timeball Hill Formation. The shale is overlain by quartzite, which forms the linear north-easterly trending ridges in the south of the study area.

The Kusasaletu surface lease area is predominantly underlain by the sediments of the Pretoria Group. **Figure 17** shows the near surface relationship between the Pretoria sediments and the Malmani dolomite, particularly as it relates to the localities of the Kusasaletu waste facilities (AGES, 2013).

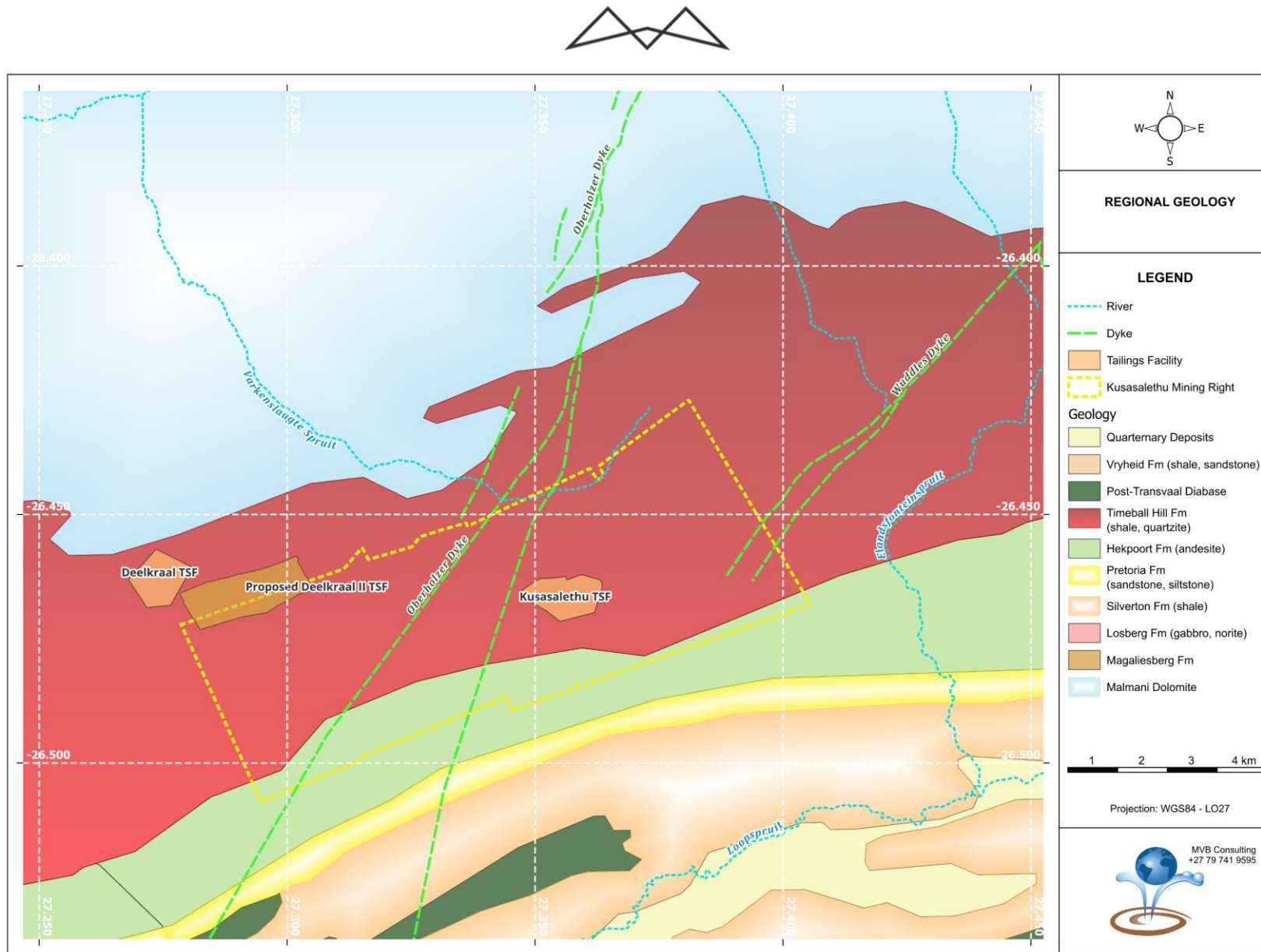


Figure 16: Regional surface geology

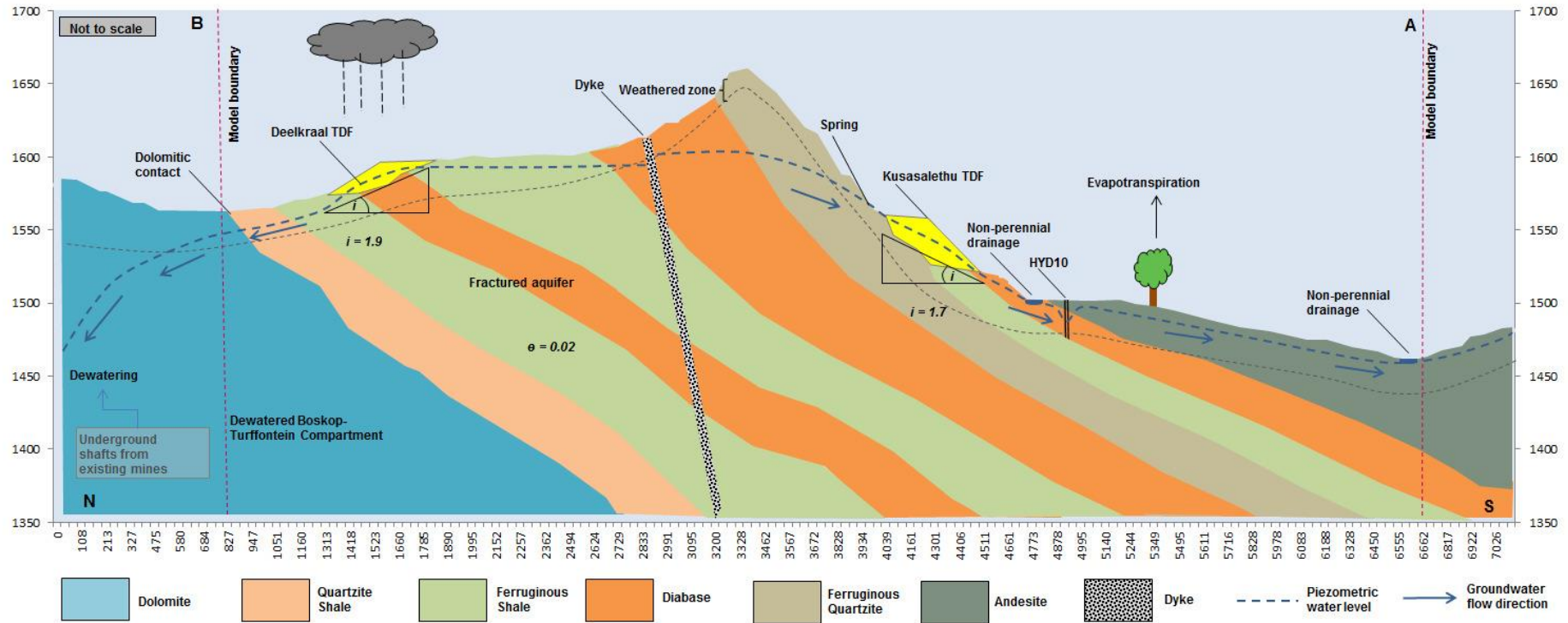


Figure 17: North-south geological section (AGES, 2013)



8.3 CLIMATE AND RAINFALL

The study area near Carletonville is classified as a Cwb climate under the Köppen-Geiger classification system (Peel, 2007), indicating a temperate climate with a Dry Winter. This classification is based on specific temperature and precipitation thresholds. The thermal regime requires the average temperature of the coldest month to exceed 0°C, with all months averaging below 22°C, while maintaining at least four months with an average temperature above 10°C (Peel, 2007).

The climate is a typical Southern African Highveld climate with warm to hot summers and warm sunny winter days with frosty nights. Rainfall occurs predominantly during the summer months because of thunderstorm activity. The mean annual precipitation ranges from 565 mm to 697 mm per annum depending on the location of the weather station. Rainfall data was obtained from several sources, including mine data and data from the South African Weather Service. Climatic information relevant to the site is presented in **Figure 18 - Figure 20** below.

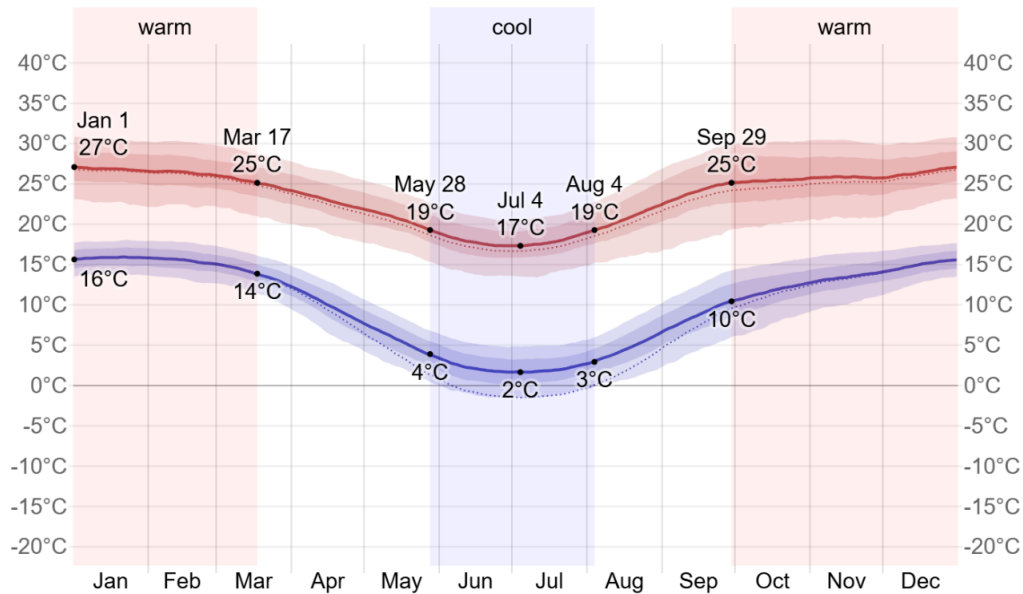


Figure 18: Average high and low temperature in Carletonville (Weather Spark, 2025).

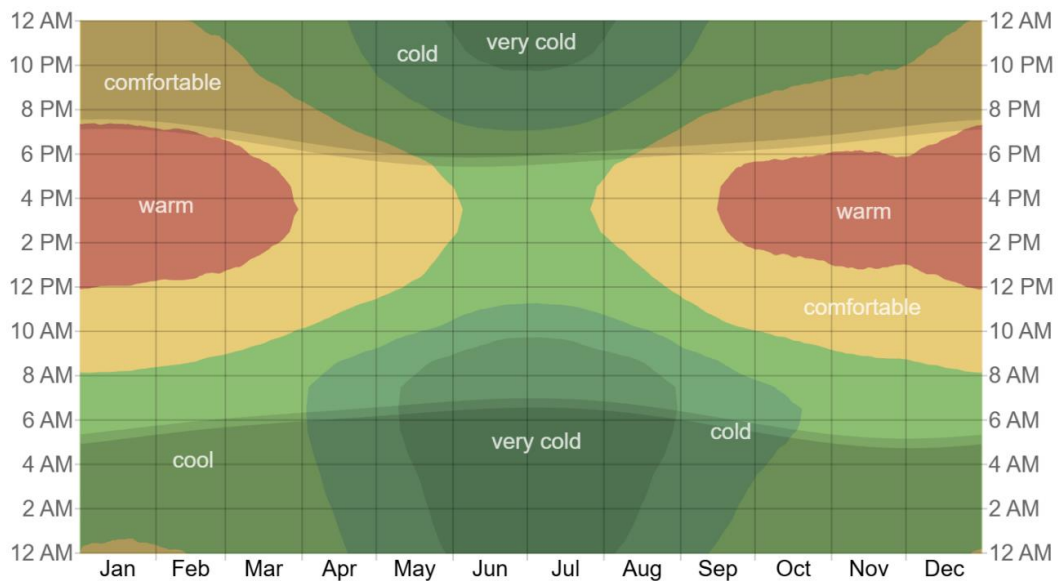


Figure 19: Average Hourly Temperature in Carletonville (Weather Spark, 2025).

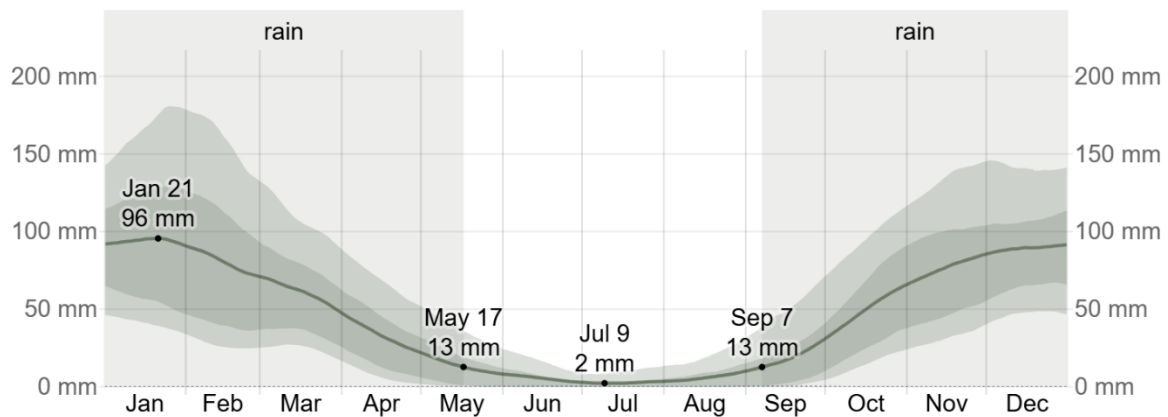


Figure 20: Average Monthly Rainfall in Carletonville (Weather Spark, 2025).

The climate in the project area, characteristic of the Southern African Highveld, exerts a dominant and dual influence on local pedogenesis (soil formation) by controlling the seasonal moisture and temperature regimes. The concentration of 565 mm to 697 mm of mean annual precipitation during the warm, hot summers is the primary driver of potential accelerated chemical weathering and deep soil profile development. The combination of high temperature and high moisture maximises the rate of mineral breakdown, particularly in the iron-rich parent material of the Timeball Hill Formation. This intense summer rainfall also facilitates severe leaching (eluviation), stripping soluble bases and fine clay particles from the upper horizons, leading to nutrient depletion and increased acidity in the topsoil over time (Weil, 2017). Information regarding predicted climate change for the area will be provided in the EIR once the climate change assessment has been completed.

8.4 CULTURAL, HERITAGE AND FOSSIL RESOURCES

Heritage and paleontological baseline information was provided by EIMS and Banzai Environmental respectively and the relevant information from those reports is presented in this section.

8.4.1 ARCHAEOLOGICAL CONTEXT

The Gauteng Province is associated with a long archaeological record that spans across pre-colonial and colonial periods. Most notable is the region's significant role in terms of the development of the mining industry of South Africa. The closest town to the site in question being Carletonville, is specifically important in this regard.

The site, as well as the associated mining operations are ~50kms south of the World Heritage Site, Cradle of Humankind. The Cradle of Humankind is globally recognised for its palaeontological value and contribution to our understandings of Human Evolution. Key fossils found in the area include examples of early hominid species such as Mrs. Ples, Little Foot, and the newly discovered fossils of Homo Naledi. While these fossils have mainly been associated with cave systems, the site's proximity to the heritage site must be acknowledged.

Like other small towns of the Far West Rand of Johannesburg, Carletonville was founded and defined by the growing mining industry of the Gauteng Province. (Van Eeden, 1998). While the town was established and further developed through the mining industry, the area was previously inhabited by groups including the Le Ghoja who were later affected by the events related to Mzilikazi's capture and domination of the area.

Following these early occupations of the region, the region became the settlement of farmers of the Zuid-Afrikaansche Republiek from as early as 1836. The area was later involved in the South African War between 1899-1902. The redevelopment of the town following the war gave rise to its establishment as a key gold mining town of the region. Apart from Carletonville, several other towns were established in the West Rand or West-Wits Line area. From between the 1930s to 1990s, Carletonville continued to develop with different groups settling in the town, stimulating its growing economy and adding new facets to Carletonville's overall cultural heritage. In the 1990s, Carletonville's gold mines contributed as much as 23% towards South Africa's overall gold production (Van Eeden, 1998).



Carletonville since became a melting pot of different cultures, with different people contributing to the continued economic development of the town and associated mining companies. Several church presences were associated with the population of Carletonville. Further, several community groups were formed, adding to the nature of cultural activities of the town as it developed.

8.4.2 POTENTIAL SITE HERITAGE FEATURES

The proposed Deelkraal II TSF area covers an extensive number of buildings and ruins which may be older than 60 years. While these features are not present in the first edition topographic map, they present the potential of the area being rich in heritage associated with the colonial period and early establishment of the mining industry of the area. Using the first edition topographic maps, aerial photography, and current satellite imagery, a total of 17 distinct heritage features were identified which may potentially be impacted by the proposed development. These included modern ruined buildings, farmsteads, demolished sections of mining complexes, grave sites, stone wall structures. The field survey will provide more insight into the potential heritage value of these features.

8.4.3 FINDINGS

Following a desktop assessment, potential heritage features were identified in proximity and intersecting the development footprint. The following is a categorised description of the different potential heritage features identified through the desktop assessment:

- WWR011, WWR013 – Potential grave sites
- WWR001, WWR017 – Abandoned or old sports fields/tracks/stadiums
- WWR008 – Old train track
- WWR010 – Site with unconfirmed heritage significance
- WWR015, WWR015 – Stone Wall Structure sites
- WWR002, WWR003, WWR004, WWR005, WWR006, WWR007, WWR009, WWR010, WWR012, WWR016 – Abandoned buildings, mining, and farming infrastructure.

Figure 21 presents a visual summary of the different findings and their locations. **Table 12** provides a summary of the different features identified, a description of the feature, as well as the coordinates of where the feature are located or associated relative central points. These will be further refined during the EIA phase of the project once detailed investigations have been completed.

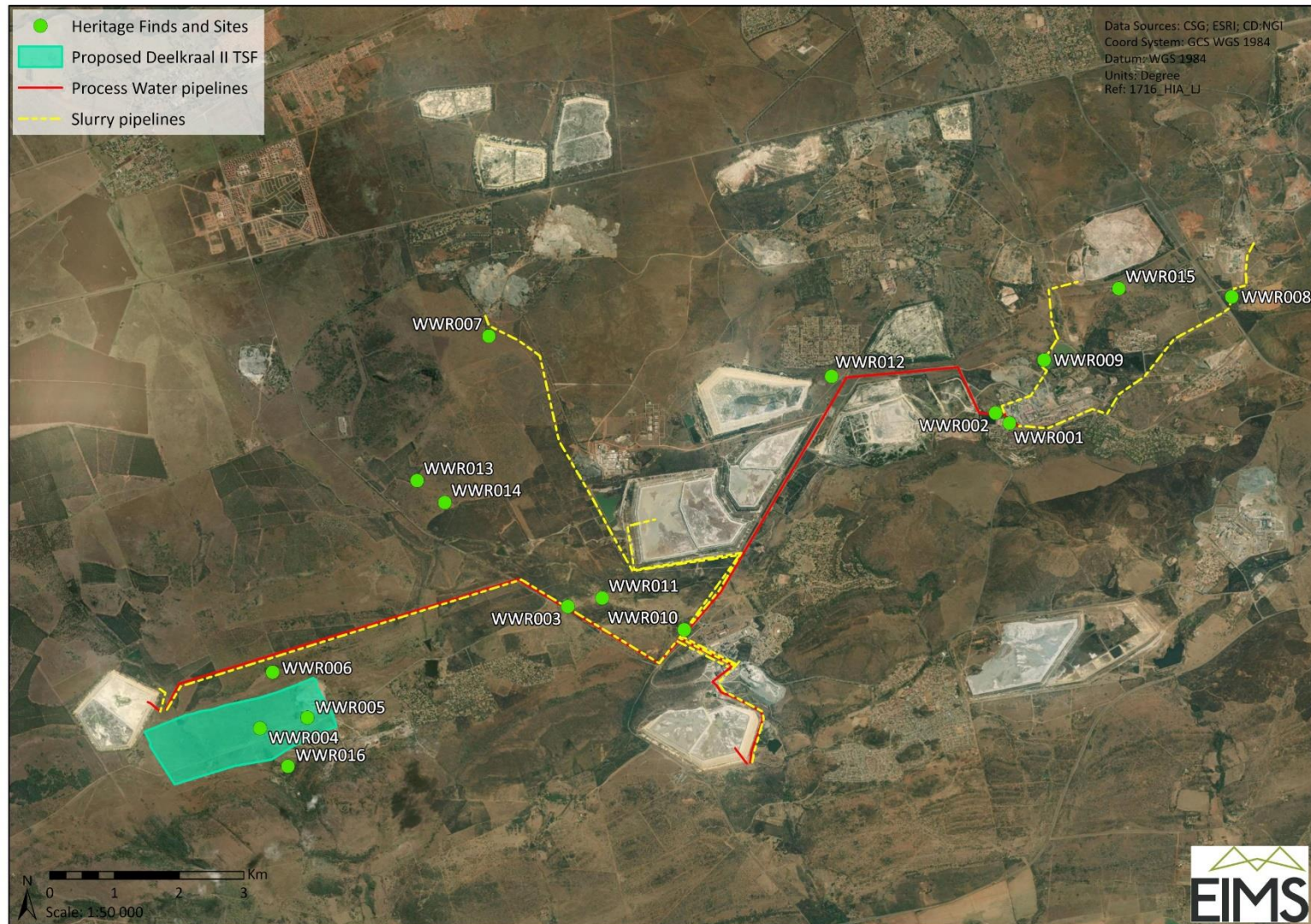


Figure 21: Potential heritage sites of interest to be investigated in detail in the EIA phase



Table 12: Summary of different finds and sites identified.

Feature No.	Description	Rating and Significance	Coordinate
WWR001	Abandoned or old track and stadium – constructed from as early as 1968– feature may be older than 60 years.	Grade III A	26°25'22.75"S 27°23'54.54"E
WWR002	Foundation associated with demolished/decommissioned mining infrastructure – may not be older than 60 years.	TBC	26°25'17.64"S 27°23'47.58"E
WWR003	Farm complex ruins with components potentially older than 60 years.	Grade IV A	26°26'54.37"S 27°20'13.68"E
WWR004	Farm complex ruins with components potentially older than 60 years.	Grade IV A	26°27'55.36"S 27°17'39.70"E
WWR005	Ruin associated with demolished/decommissioned mining infrastructure – may not be older than 60 years.	TBC	26°27'49.96"S 27°18'3.30"E
WWR006	Farm building and associated property. Confirmed older than 60 years.	Grade IV A	26°27'27.28"S 27°17'46.00"E
WWR007	Demolished house and other structures associated with the original Doornfontein Gold Mine – Confirmed older than 60 years.	Grade III A	26°24'39.19"S 27°19'34.11"E
WWR008	Train track plinths identified through satellite imagery. Age of feature not confirmed.	TBC	26°24'19.52"S 27°25'45.72"E
WWR009	Ruin associated with either mining or farming activities – age not confirmed	TBC	26°24'51.11"S 27°24'11.89"E
WWR010	Site with unconfirmed heritage significance – may include buildings and features older than 60 years	TBC	26°27'6.08"S 27°21'11.86"E
WWR011	Potential grave site – site appears on early maps	Grade III A	26°26'50.21"S 27°20'30.75"E
WWR012	Reservoir associated with mining or farming activities – feature may be older than 60 years	Grade IV A	26°24'59.24"S 27°22'25.46"E
WWR013	Confirmed and previously identified grave site – including the graves of 10 or more individual	Grade III A	26°25'51.48"S 27°18'58.23"E
WWR014	Previously identified SWS	Grade III A High	26°26'2.46"S 27°19'12.02"E
WWR015	Previously identified SWS complex – Further from site	Grade III A High	26°22'44.02"S 27°31'37.51"E
WWR016	Farm dams and other structures associated with farming activities – Structures may be older than 60 years	Grade III A High	26°24'15.42"S 27°24'49.16"E
WWR017	Abandoned sports field and Grandstand – constructed between 1977 and 1979 – feature is not older than 60 years but will carry heritage value at a later period.	Grade III A High	26°28'14.44"S 27°17'53.70"E



8.4.4 PALAEOLOGY

The West Wits Reclamation study area, situated near Carletonville in the Gauteng Province, is mapped on the 1:250 000 West Rand 2626 (1986) geological sheet (Council for Geoscience, Pretoria). The local geology comprises sedimentary and volcanic strata of the Pretoria Group, namely the Rooihogte, Timeball Hill (Vt), and Hekpoort Formations (Vh), which form part of the Transvaal Supergroup, as well as post-depositional diabase (di) intrusions. According to the SAHRIS Palaeosensitivity map (**Figure 22** and **Table 13**), the Rooihogte and Timeball Hill Formations are classified as High sensitivity (orange), the Hekpoort Formation has a Moderate sensitivity (green), and the diabase is rated as having Zero palaeontological sensitivity (grey) (Almond et al., 2013; SAHRIS website, **Figure 23**). In alignment with these sensitivities, the Department of Forestry, Fisheries and the Environment (DFFE) screening tool identifies the broader study area as falling within a High (red) palaeontological sensitivity zone (**Figure 23**).

The Rooihogte Formation is the earliest stratigraphic unit in the study area and is part of the Pretoria Group's lowermost succession. It is predominantly composed of reddish-brown to greenish-grey shales, ferruginous mudstones, and subordinate siltstones and sandstones, which were deposited in fluvial and deltaic environments. The preservation of palaeobiological structures, particularly Microbially Induced Sedimentary Structures (MISS) and rare stromatolitic horizons, has been facilitated by the fine-grained nature of these sediments. These structures represent some of the oldest preserved evidence of life on the Kaapvaal Craton (Altermann & Nelson, 1998; Button, 1986).

The Timeball Hill Formation, which is situated above the Rooihogte Formation, is composed of well-bedded shales, mudstones, and characteristic banded iron formations (BIFs). These formations were deposited under low-energy, prodelta to distal marine shelf conditions. The unit is known for its preservation of rare acritarchs, stromatolites, and laminated organic-rich shales, which are microscopic organic-walled microfossils that are considered among the earliest indicators of eukaryotic life (Eriksson & Catuneanu, 2004; Altermann, 2001).

The Hekpoort Formation is primarily composed of subaerial basaltic and andesitic lava flows, with infrequent volcanoclastic interbeds, and it conformably overlies the Timeball Hill Formation. This formation, which dates back to approximately 2.05 billion years ago, documents a substantial volcanic event in the Pretoria Basin. The Hekpoort Formation is primarily unfossiliferous due to its status as an igneous unit. Nevertheless, rare instances of weathered interflow sedimentary horizons may contain microbial textures or MISS, which offer substantial but limited insights into the evolution of the terrestrial biosphere during the Paleoproterozoic (Eriksson et al., 2001). This limited but scientifically pertinent potential is reflected in its Moderate palaeontological sensitivity rating.

The diabase intrusions in the study area are Jurassic in age and generally newer than the sedimentary and volcanic strata they cut. They were emplaced during later tectono-thermal events associated with Gondwana rifting. The sills and dykes formed by these medium-grained, mafic intrusive rocks are exclusively igneous in origin and, as a result, are considered palaeontologically sterile in nature. Furthermore, the placement of diabase may result in the local thermal alteration or obliteration of fossil preservation in the host rocks in the vicinity (Johnson et al., 2006).

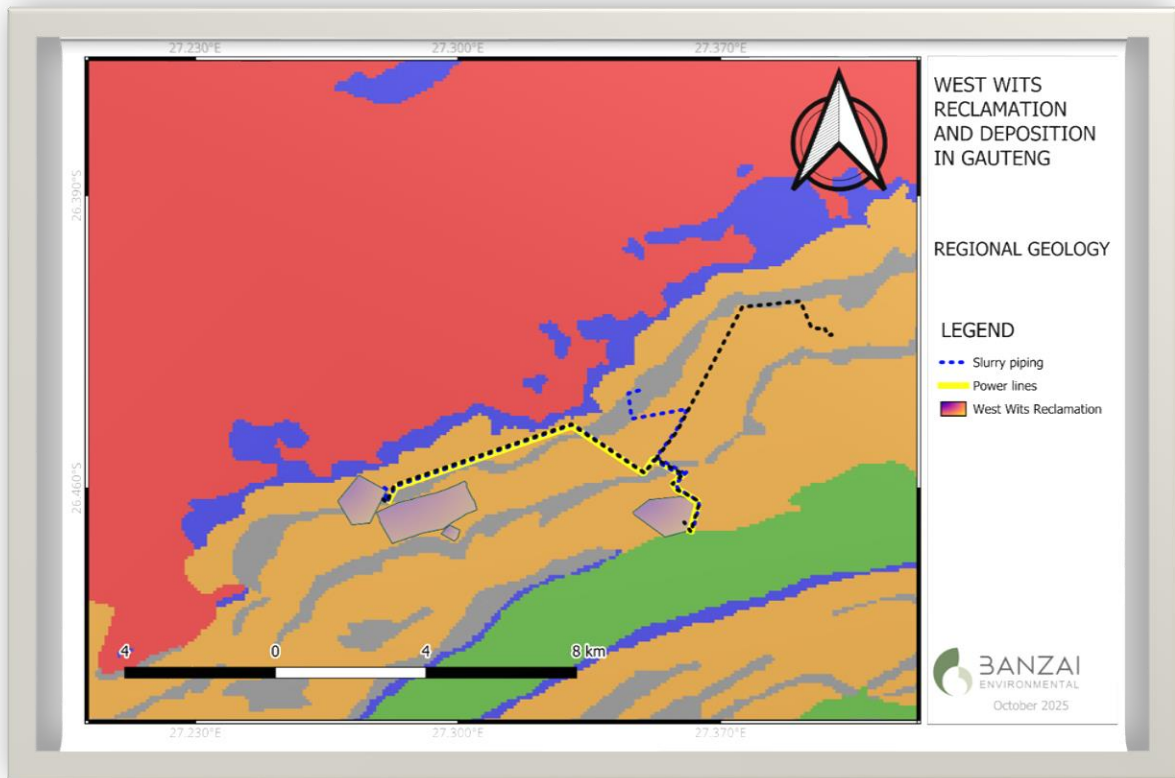


Figure 22: Extract of the SAHRIS PalaeoMap (Council of Geosciences) indicating the High (orange), and Zero (grey) Palaeontological Sensitivity of the proposed study area.

Table 13: Palaeontological Sensitivity according to the SAHRIS PalaeoMap (Almond et al, 2013; SAHRIS website)

Colour	Sensitivity	Required Action
RED	VERY HIGH	Field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	Desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	Desktop study is required
BLUE	LOW	No palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	No palaeontological studies are required
WHITE/CLEAR	UNKNOWN	These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

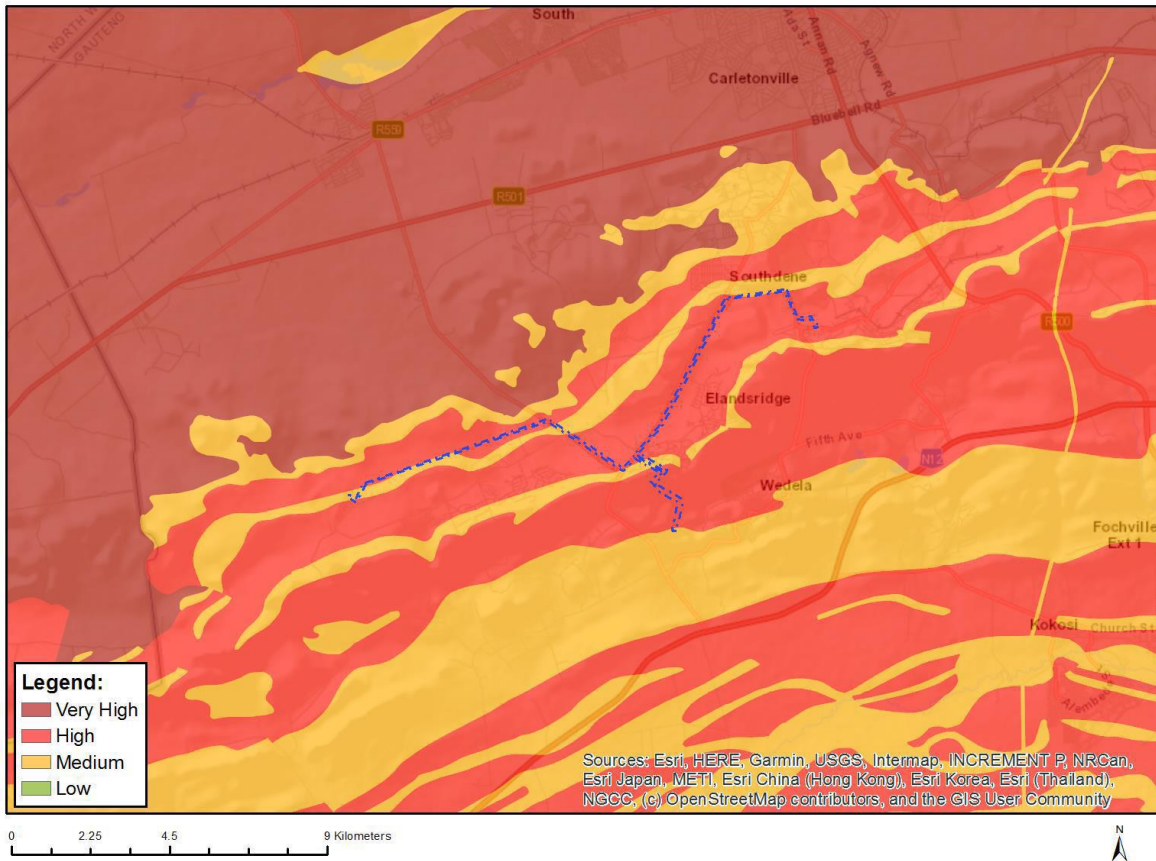


Figure 23: Palaeontological Sensitivity of the study sites in Gauteng Province by the National Environmental Web-based Screening Tool indicates a High (red) and Medium (yellow) Palaeontological Sensitivity.

The SAHRIS PalaeoMap indicates a High (orange) Palaeontological Sensitivity which is in agreement with the DFFE Screening Tool.

8.5 SOILS

Soils and agricultural potential baseline information was provided by EIMS' soil scientist and the relevant information from the soils baseline report is presented below.

8.5.1 SOIL TYPES

The study area is predominantly characterized by land types Fb5 and Fb15. Morphologically, these units are described as shallow, rocky, and often steep environments that are moderately leached, with calcareous deposits (lime) generally restricted to valley features. In terms of pedological distribution, the Glenrosa and Mispah soil-rock complexes are the dominant formations, collectively encompassing approximately 38% of the total area. Secondary to these complexes, a cumulative 35% of the study site is comprised of the Hutton, Oakleaf, Dundee, Arcadia, and Rensburg soil series (Land Type Survey Staff, 1972 – 2006).

The area is characterized primarily by shallow soils overlying hard, fractured, or weathering rock. While calcareous deposits (lime) are generally rare or absent in upland soils, they are frequently observed in lower landscape positions. The pedological profile is dominated by soil-rock complexes, with the Mispah and Glenrosa forms being the most prevalent. Secondary to these complexes, the Hutton, Oakleaf, Dundee, Arcadia, and Rensburg series are common, while the Clovelly, Shortlands, and Avalon forms, along with streambeds, constitute less than 10% of the total surface area (Land Type Survey Staff, 1972 – 2006).

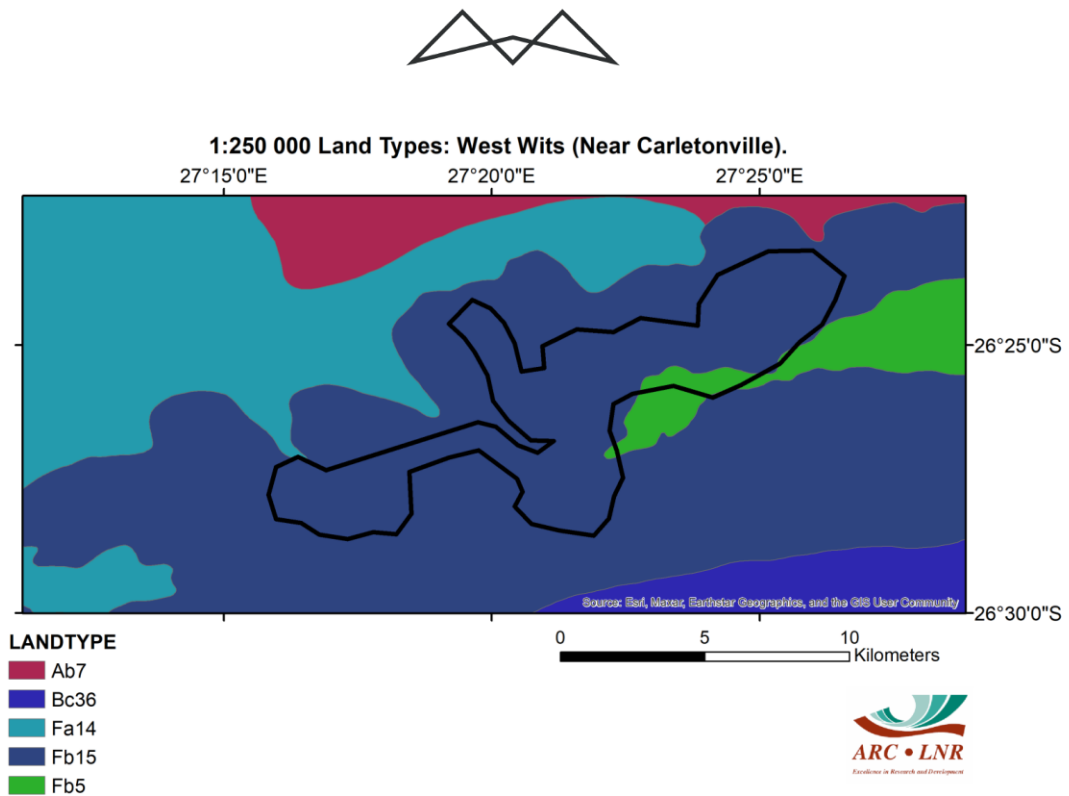


Figure 24: Land types in study area

8.5.2 AGRICULTURE POTENTIAL

A significant portion of the project area comprises mine dumps, excavations, and slimes dams; consequently, these anthropogenic features are excluded from the agricultural potential assessment. The remaining study area is dominated by Lithosols, specifically the Glenrosa and Mispah soil forms. The Glenrosa form is characterized by an orthic A-horizon overlying a lithocutanic B-horizon on hard rock, while the Mispah form consists of an orthic A-horizon directly underlain by rock. Due to effective depth limitations, the agricultural potential of these soils is classified as low. Conversely, soils identified with moderate agricultural potential include the Dundee (Du10), Avalon (Av26), and Shortlands (Sd11) forms (Land Type Survey Staff, 1972 – 2006).

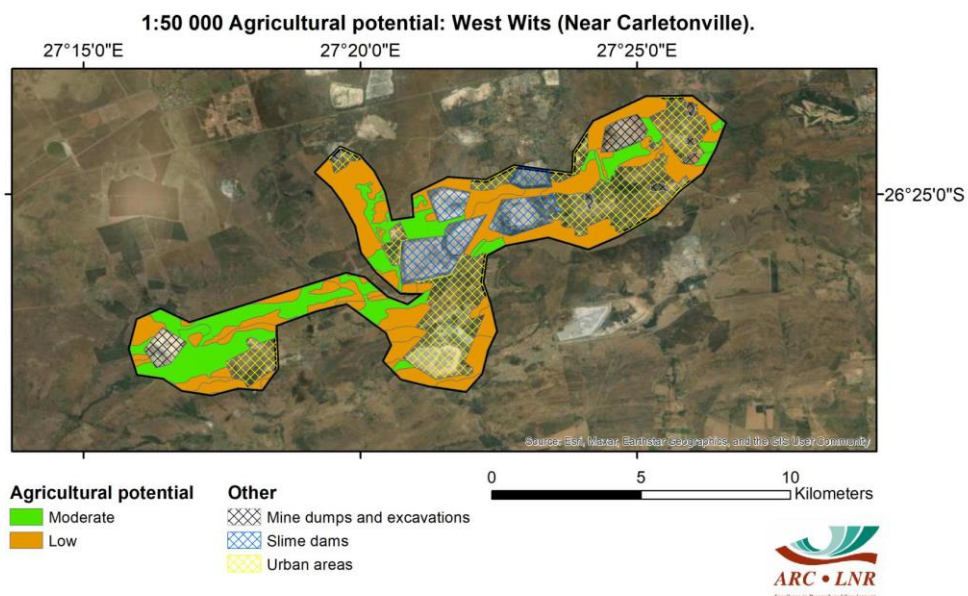


Figure 25: Agriculture Potential map of study area.



8.6 FLORA AND FAUNA

Flora and fauna baseline information was provided by the Biodiversity Company and the relevant information from those reports is presented in this section.

8.6.1 ECOLOGICALLY IMPORTANT INFORMATION AND LANDSCAPE FEATURES

8.6.1.1 ECOSYSTEM THREAT STATUS

The Ecosystem Threat Status is an indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset, the Project Area of Influence (PAOI) overlaps with an LC ecosystem (**Figure 26**).

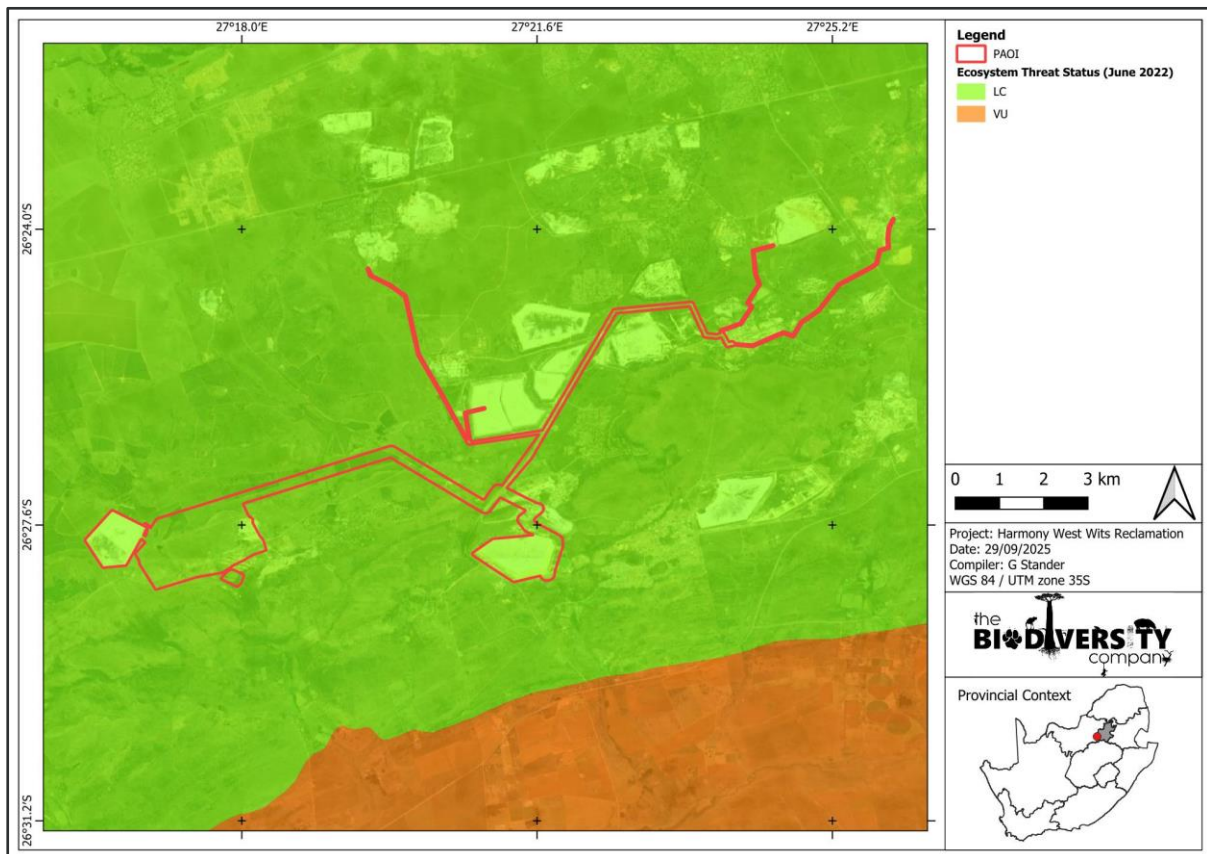


Figure 26: Map illustrating the ecosystem threat status associated with the PAOI.

8.6.1.2 ECOSYSTEM PROTECTION LEVEL

This is an indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. NP, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The PAOI overlaps with a PP ecosystem (**Figure 27**).

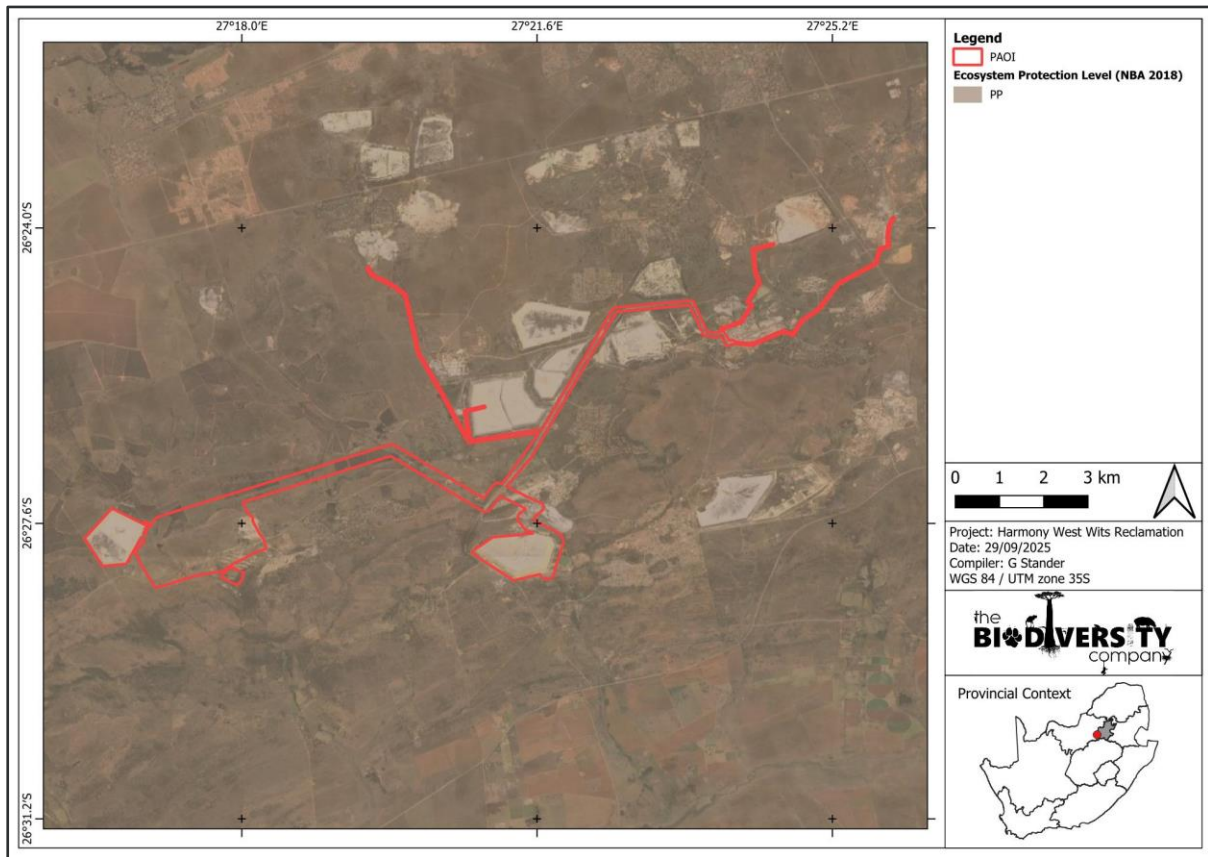


Figure 27: Map illustrating the ecosystem protection level associated with the PAOI.

8.6.1.3 CRITICAL BIODIVERSITY AREAS AND ECOLOGICAL SUPPORT AREAS

The Gauteng Conservation Plan identify areas as either Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA) and Protected Areas (PA). CBAs include natural or near-natural terrestrial and aquatic features that were selected based on an area's biodiversity characteristics, spatial configuration and requirement for meeting both biodiversity pattern and ecological process targets. CBAs include irreplaceable sites where no other options exist for meeting targets for biodiversity features (CBA 1), as well as best-design sites which represent an efficient configuration of sites to meet targets in an ecologically sustainable way that is least conflicting with other land uses and activities (CBA 2). ESAs include natural, near-natural, degraded or heavily modified areas required to be maintained in an ecologically functional state to support CBAs and/or Protected Areas. Protected Areas (PA) are areas which have legal protection under relevant legislation or which are managed with a primary conservation objective. **Figure 28** shows the PAOI superimposed on the Gauteng Conservation Plan dataset. The PAOI overlaps ESAs 1 and 2 and CBAs 1 and 2.

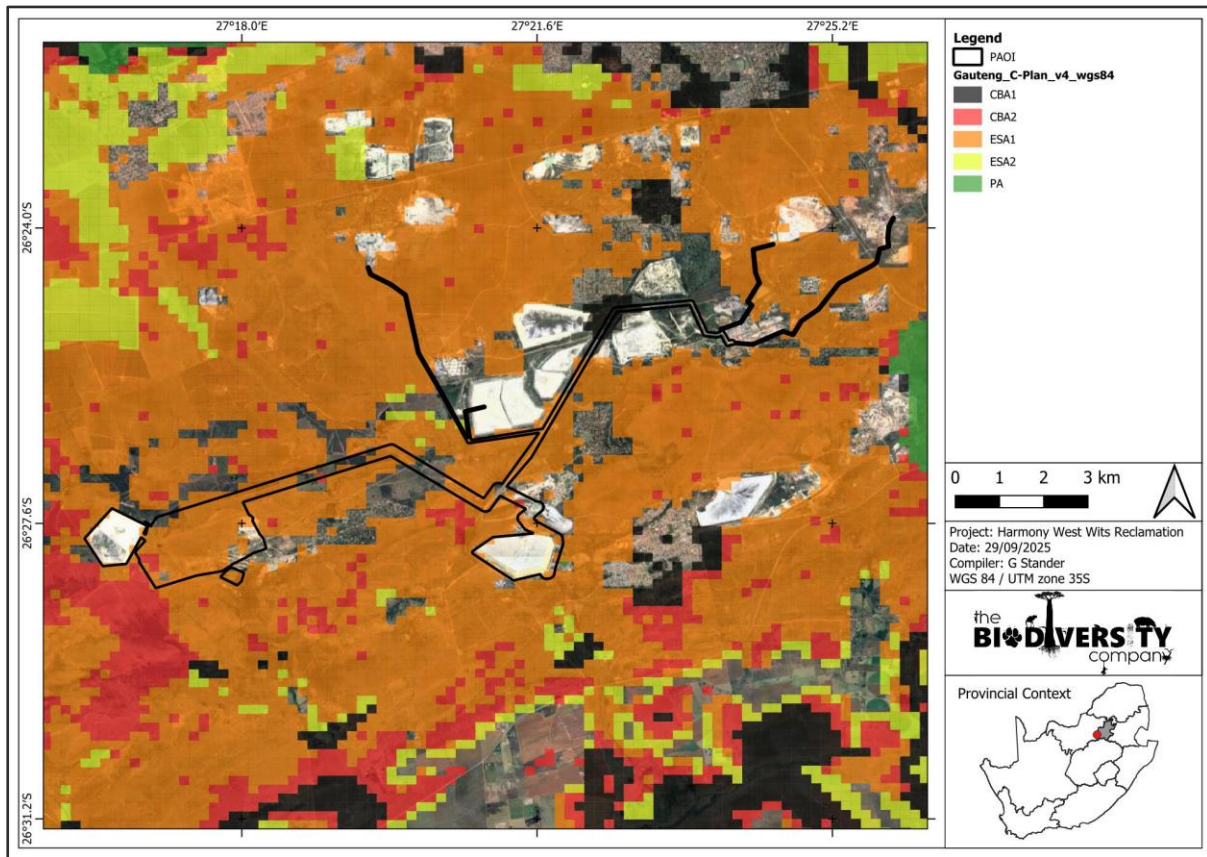


Figure 28: Map illustrating the PAOI in relation to the provincial conservation plan

8.6.1.4 GAUTENG RIDGES

The quartzite ridges of Gauteng are one of the most important natural assets in the northern province of South Africa. This is because these ridges, and the area immediately surrounding the ridges, provide habitat for a wide variety of fauna and flora, some of which are Red List, rare or endemic species or, in the case of certain of the plant species, are found nowhere else in South Africa or the world (GDARD, 2019). The PAOI overlaps with Class 2 and Class 4 Gauteng Ridges (**Figure 29**).

Class 2 ridges are ridges of which more than 5%, but less than 35% of the ridge has been transformed by human activity (GDARD, 2019). Approximately 23% of ridges currently fall within Class 2. Development activities and uses that have a high environmental impact on a Class 2 ridge are not permitted. Low-impact development activities which comprise an ecological footprint of 5% or less of the property may be supported (GDARD, 2019). However, GDARD (2019) also states that low-impact development activities on a ridge will not be supported where it is feasible to undertake the development on a portion of the property abutting the ridge.

Class 4 ridges are ridges that have been transformed as a result of human activity by 65% or more (GDARD, 2019). Approximately 11% of ridges currently fall within Class 4. Further development activities will not be supported in areas of the ridges where the remaining contiguous extent of natural habitat is 4 ha or more (GDARD, 2019).

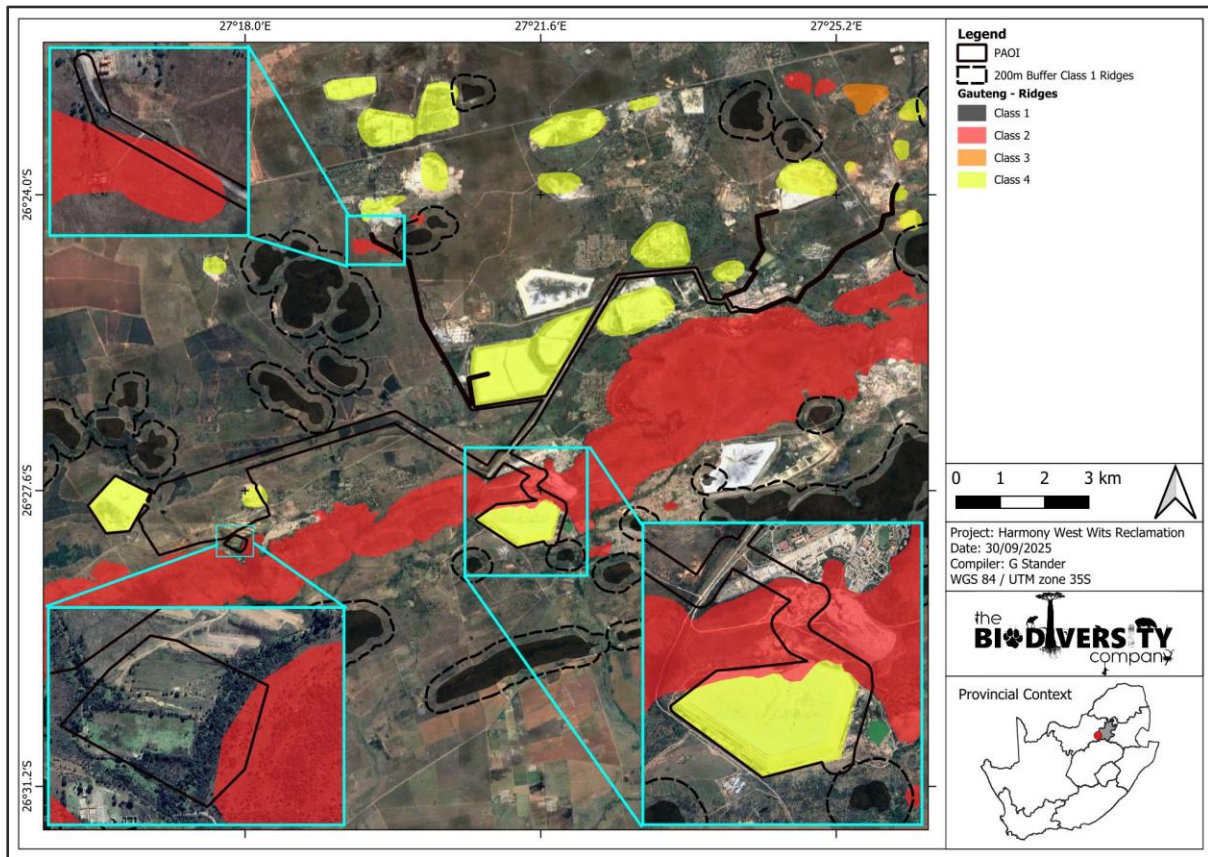


Figure 29: Map illustrating the PAOI in relation to the Gauteng Ridges

8.6.1.5 NATIONAL PROTECTED AREA EXPANSION STRATEGY

National Protected Area Expansion Strategy 2010 (NPAES) were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2010). The PAOI marginally overlaps with NPAES Priority Focus Areas in the west (Figure 30).

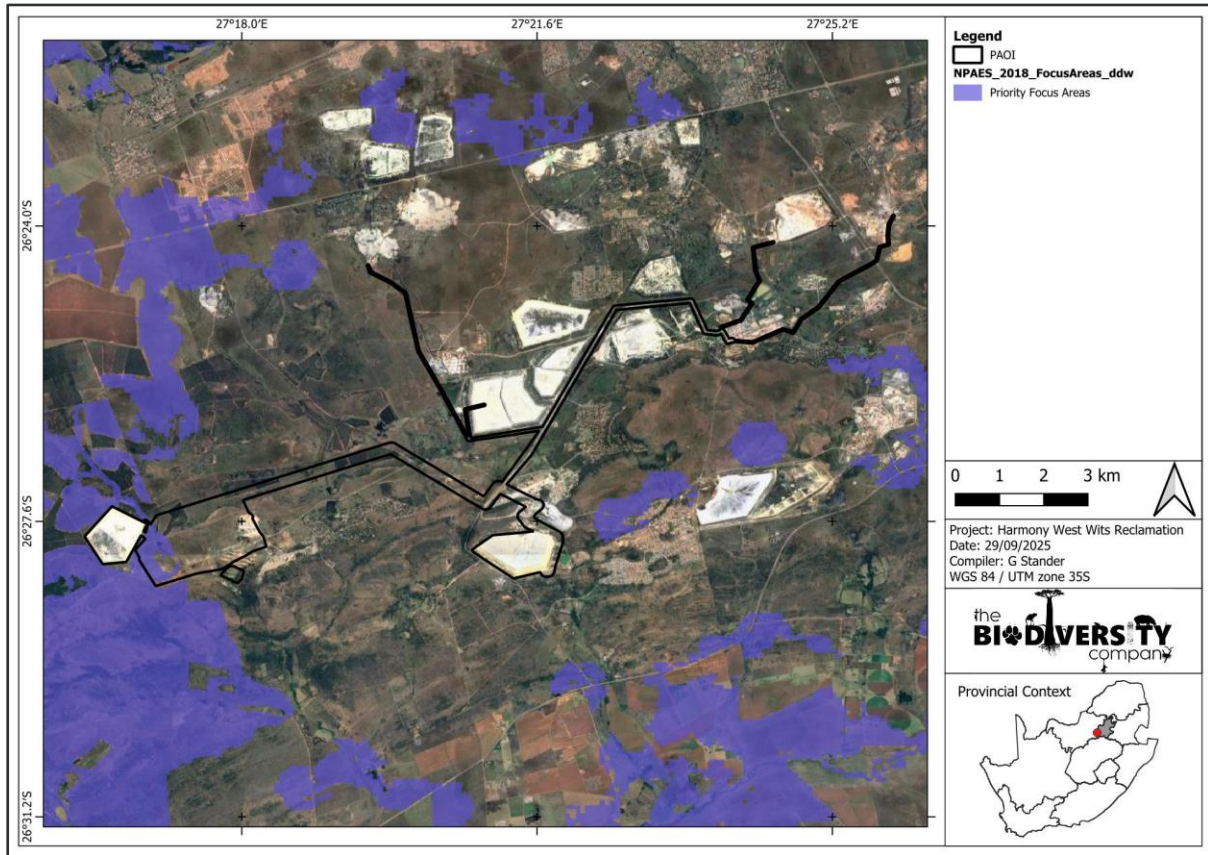


Figure 30: The PAOI in relation to the NPAES dataset

8.6.1.6 MINING AND BIODIVERSITY GUIDELINES

According to the Mining and Biodiversity Guidelines spatial dataset (2013) the PAOI is of high biodiversity importance, correlating to the high risk for mining within the PAOI (Figure 31).

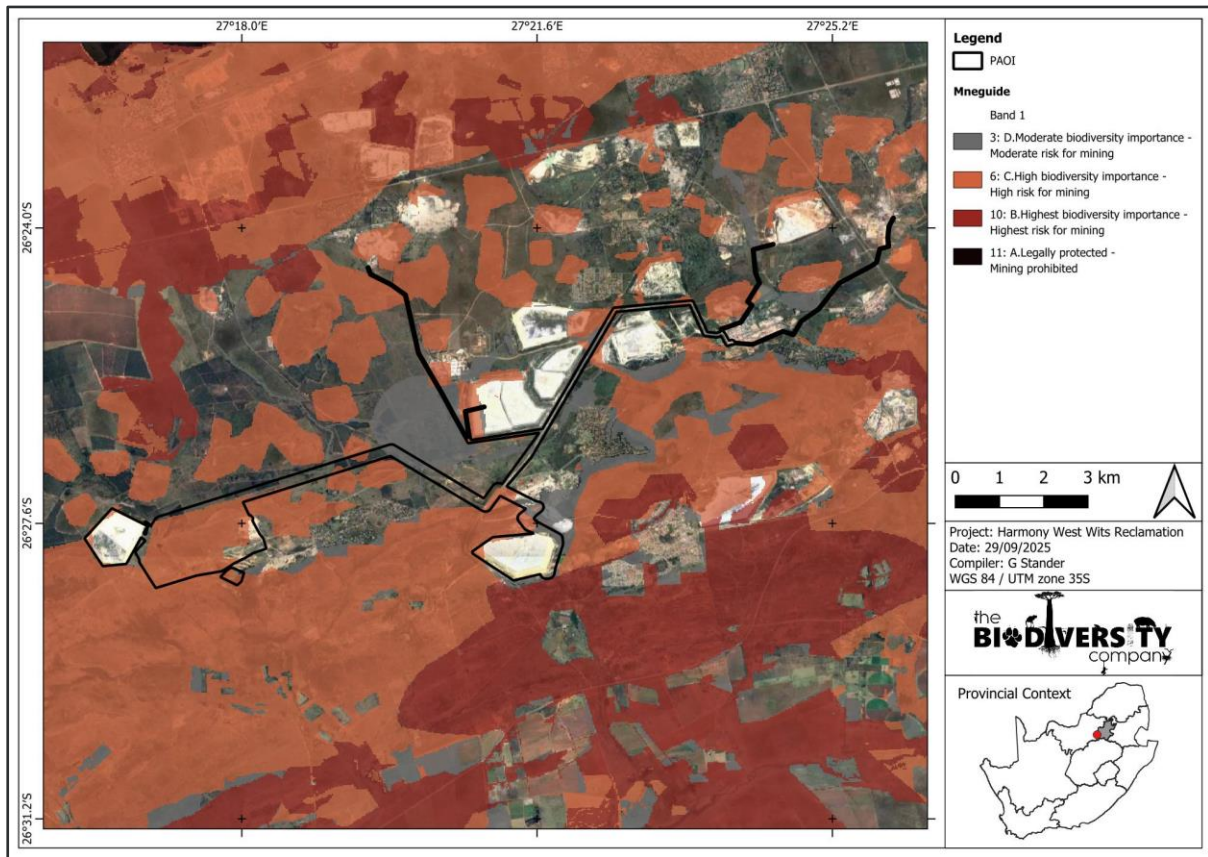


Figure 31: The PAOI in relation to the Mining Biodiversity Guidelines dataset

8.6.1.7 COORDINATED WATERBIRD COUNT (CWAC)

The Animal demographic unit launched the Coordinated Waterbird Counts (CWAC) project in 1992 as part South Africa's commitment to international waterbird conservation. Regular mid-summer and mid-winter censuses are done to determine the various features of water birds including population size, how waterbirds utilise water sources and determining the health of wetlands. For a full description of CWAC please refer to <http://cwac.birdmap.africa/about.php>. Three (3) CWAC sites occur within 10 km from the PAOI (**Figure 32**).

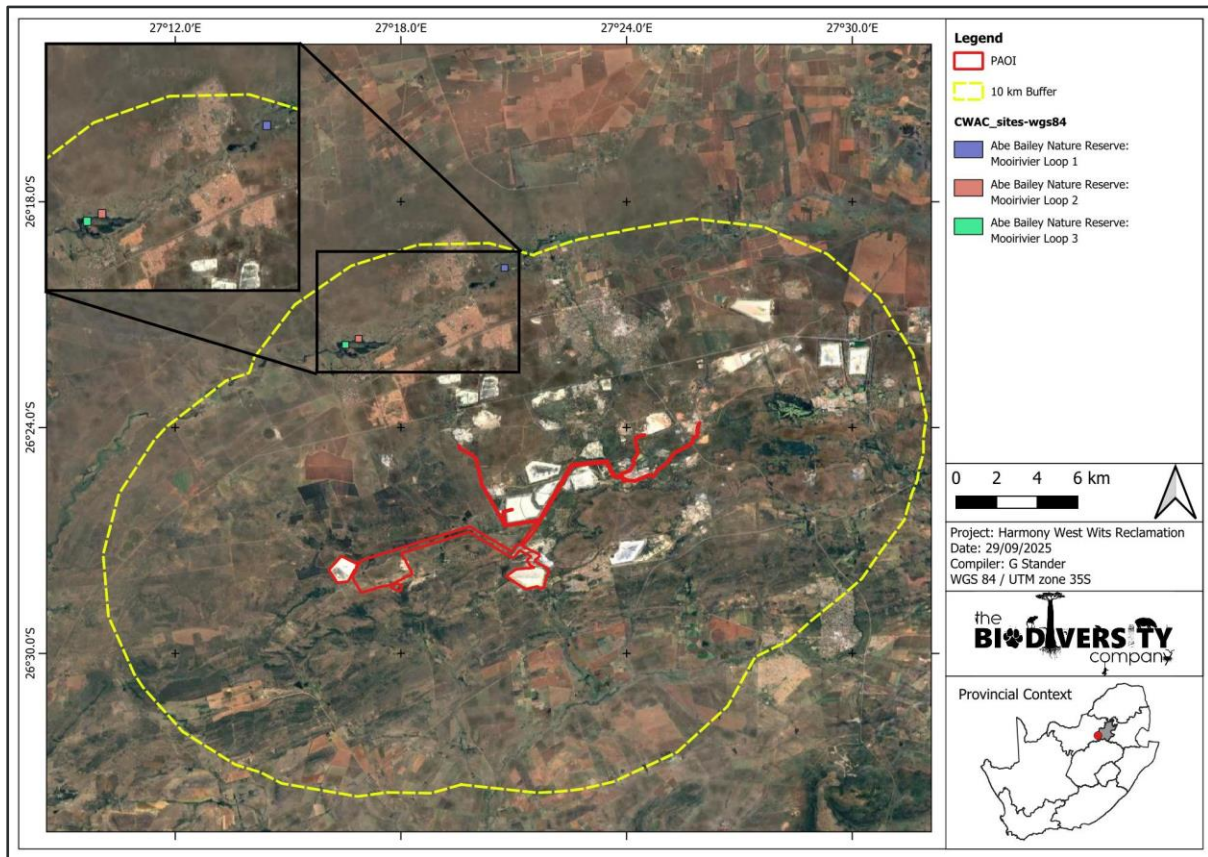


Figure 32: Map illustrating the PAOI in relation to the CWAC dataset

8.6.1.8 STRATEGIC WATER SOURCE AREAS

Strategic Water Source Areas (SWSA) are defined as areas of land that supply a disproportionate quantity of mean annual surface water runoff in relation to their size, and therefore contribute considerably to the overall water supply of the country, as well as national aquatic and terrestrial biodiversity resources. These are considered key ecological infrastructure assets and the effective protection of SWSAs is vital for national security because a lack of water security will compromise national security and human wellbeing on all levels. The PAOI overlaps with the Far West Karst SWSA (Figure 33).

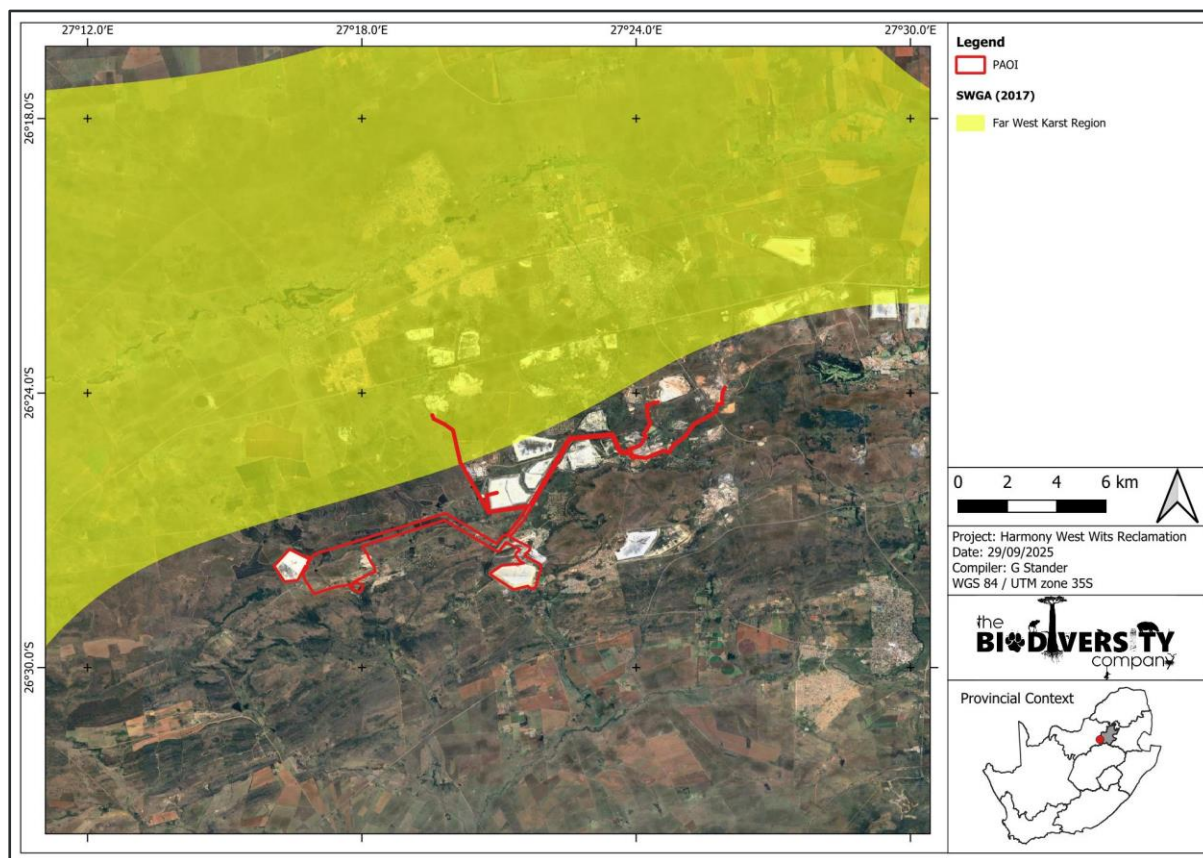


Figure 33: Map illustrating the PAOI in relation to the Groundwater Strategic Water Source Areas dataset

8.6.2 FLORA

The PAOI is situated in the Savanna biome. The savanna vegetation of South Africa represents the southernmost extension of the most widespread biome in Africa (Mucina & Rutherford, 2006). Major macroclimatic traits that characterise the Savanna biome include:

- a) Seasonal precipitation; and
- b) (Sub) tropical thermal regime with no or usually low incidence of frost (Mucina & Rutherford, 2006).

Most savanna vegetation communities are characterised by a herbaceous layer dominated by grasses and a discontinuous to sometimes very open tree layer (Mucina & Rutherford, 2006).

The savanna biome is the largest biome in South Africa, extending throughout the east and north-eastern areas of the country. Savannas are characterised by a dominant grass layers, over-topped by a discontinuous, but distinct woody plant layer. At a structural level, Africa's savannas can be broadly categorised as either fine-leaved (microphyllous) savannas or broad-leaved savannas. Fine-leaved savannas typically occur on nutrient rich soils and are dominated by microphyllous woody plants of the Mimosaceae family (Common genera include Acacia and Albizia) and a generally dense herbaceous layer (Scholes & Walker, 1993).

The PAOI largely overlaps with the Gauteng Shale Mountain Bushveld vegetation type. There is a marginal overlap with the Andesite Mountain Bushveld vegetation type in the west of the PAOI (**Figure 34**).

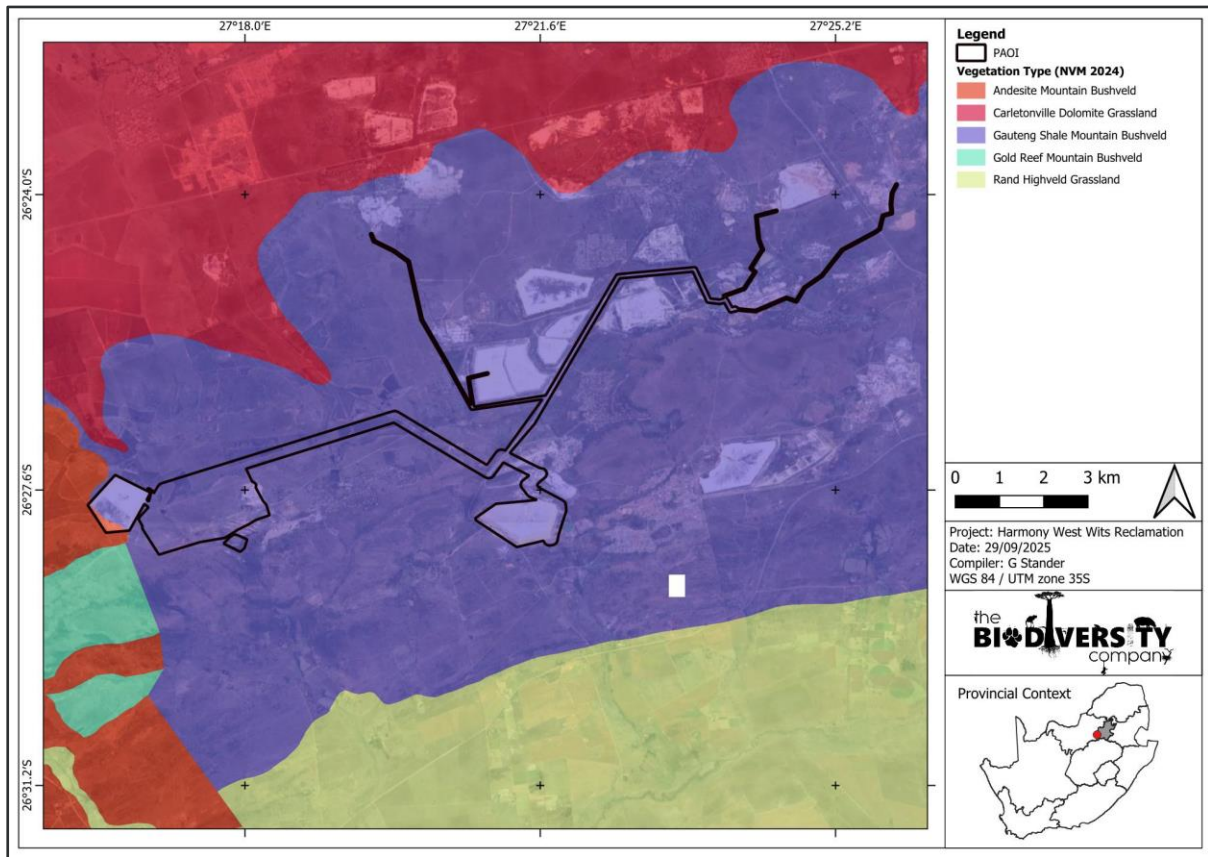


Figure 34: Map illustrating the vegetation types associated with the PAOI.

8.6.2.1 VAAL-VET SANDY GRASSLAND

This vegetation unit occurs mainly on the ridge of the Gatsrand south of Carletonville-Westonaria-Lenasia. It also occurs as a narrow band along the ridge that runs from a point between Tarlton and Magaliesberg in the west, through Sterkfontein, Pelindaba, Atteridgeville to Klapperkop and southeastern Pretoria in the east. The altitude ranges between 1300 to 1 750 m. It consists of low, broken ridges varying in steepness and with high surface rock cover. Vegetation is a short, semi-open thicket dominated by a variety of woody species. The understorey is dominated by a variety of grasses. Some of the ridges form plateaus above the northern slopes that carry scrubby grassland with high surface rock cover.

Important Taxa (d = dominant)

Small Trees: *Senegalia affra* (d), *Dombeya rotundifolia* (d), *Vachellia karroo*, *Celtis africana*, *Combretum molle*, *Cussonia spicata*, *Englerophytum magalismontanum*, *Protea affra*, *Searsia leptodictya*, *Vangueria infausta*, *Zanthoxylum capense*, *Ziziphus mucronata*.

Tall Shrubs: *Asparagus larcinus*, *Canthium gilfillanii*, *Chrysanthemoides monilifera*, *Dichrostachys cinerea*, *Diospyros austro-africana*, *D. lycioides* subsp. *lycioides*, *Ehretia rigida* subsp. *rigida*, *Euclea crispa* subsp. *crispa*, *Grewia occidentalis*, *Gymnosporia polyacantha*, *Olea europaea* subsp. *africana*, *Tephrosia capensis*, *T. longipes*.

Low Shrubs: *Acalypha angustata*, *Asparagus suaveolens*, *Athrixia elata*, *Felicia muricata*, *Indigofera comosa*, *Rhus magalismontana* subsp. *magalismontana*.

Geoxylic Suffrutex: *Elephantorrhiza elephantina*.

Succulent Shrub: *Kalanchoe rotundifolia*.

Woody Climber: *Ancylobotrys capensis*.



Graminoids: *Hyparrhenia dregeana* (d), *Cymbopogon caesius*, *C. pospischilii*, *Digitaria eriantha* subsp. *eriantha*, *Eragrostis curvula*.

Herbs: *Dicoma zeyheri*, *Helichrysum nudifolium*, *H. rugulosum*, *Hermannia lancifolia*, *Hibiscus pusillus*, *Selaginella dregei*, *Senecio venosus*, *Vernonia natalensis*, *V. oligocephala*.

Geophytic Herbs: *Cheilanthes hirta*, *Pellaea calomelanos*, *Scadoxus puniceus*.

Conservation Status: This vegetation type is classified as Least Concern (RLE, 2022) The national target for conservation protection for this vegetation type is 24%. Less than 1% is statutorily conserved, for example, the Skanskop and Hartbeesthoek Nature Reserves, Magaliesberg Nature Area and Groenkloof National Park. Additionally, over 1% conserved in other reserves including the John Nash Nature Reserve, Cheetah Park and Hartbeesthoek Radio Astronomy Observatory. About 21% transformed mainly by urban and built-up areas, mines and quarries, cultivation and plantations. Wattles a common invasive plant in places.

8.6.2.2 ANDESITE MOUNTAIN BUSHVELD

The Andesite Mountain Bushveld vegetation type occurs in several separate patches across Gauteng, North-west, Mpumalanga and the Free State Provinces (Mucina & Rutherford, 2006). Several separate occurrences of which the main are: the Bronberg Ridge in eastern Pretoria extending to Welbekend; from Hartebeesthoek in the west along the valley between the two parallel ranges of hills to Atteridgeville; hills in southern Johannesburg; several hills encompassing Nigel, Willemsdal, Coalbrook and Suikerbosrand (in part); and the outer ring of ridges of the Vredefort Dome and some hills to the northwest around Potchefstroom. This vegetation type occurs at an altitude of about 1 350–1 800m. This vegetation type is characterized by dense, medium-tall thorny bushveld with a well-developed grass layer on hill slopes and some valleys with undulating landscape.

Important Plant Taxa (d = dominant)

Small Trees: *Senegalia affra* (d), *Vachellia karroo* (d), *Celtis africana*, *Protea affra*, *Zanthoxylum capense*, *Ziziphus mucronata*.

Tall Shrubs: *Asparagus laricinus* (d), *Euclea crispa* subsp. *crispa* (d), *Rhus pyroides* var. *pyroides* (d), *Diospyros lycioides* subsp. *lycioides*, *Gymnosporia polyacantha*, *Lippia javanica*, *Rhamnus prinoides*.

Low Shrubs: *Asparagus suaveolens* (d), *Rhus rigida* var. *margaretae*, *Teucrium trifidum*.

Soft Shrub: *Isoglossa grantii*.

Woody Climber: *Rhoicissus tridentata*.

Graminoids: *Eragrostis curvula* (d), *Hyparrhenia hirta* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Cymbopogon pospischilii*, *Digitaria eriantha* subsp. *eriantha*, *Elionurus muticus*, *Eragrostis racemosa*, *E. superba*, *Panicum maximum*.

Succulent Herb: *Aloe greatheadii* var. *davyana*; and

Herbs: *Commelina africana*, *Vernonia galpinii*, *V. oligocephala*.

Conservation Status of the Vegetation Type : This vegetation type is classified as Least Concern (RLE, 2022). The national target for conservation protection is 24%. About 7% are statutorily conserved mainly in the Suikerbosrand Nature Reserve and Magaliesberg Nature Area. An additional 1–2% conserved in other reserves mainly in the Hartbeesthoek Radio Astronomy Observatory. Some 15% have already transformed, mainly by cultivation and some urban and built-up areas.

8.6.2.3 FLORA DESCRIPTION

The GBIF (Global Biodiversity Information Facility - www.gbif.org) database indicates that 356 species of plants are expected to occur within the PAOI and surrounding area. The full list of species will be provided in the final



report. The GBIF database lists four (4) sensitive species that could occur within the PAOI. The DFFE screening tool lists two (2) sensitive species which could occur within the PAOI (five in total) (Table 14).

Please note that the Screening Tool report includes lists of bird, mammal, reptile, amphibian, butterfly, and plant species of conservation concern known or expected to occur on the proposed development footprint. Some of these SCC are sensitive to illegal harvesting. Such species have had their names obscured and are listed as sensitive plant unique number / sensitive animal unique number. As per the best practise guideline that accompanies the protocol and screening tool, please, the name of the sensitive species may not appear in the final EIA report nor any of the specialist reports released into the public domain. It should be referred to as sensitive plant or sensitive animal and its threat status may be included, e.g. critically endangered sensitive plant or endangered sensitive animal.

Table 14: Threatened flora species that are expected to occur within the PAOI; VU = Vulnerable; LC = Least Concern; CR = Critically Endangered; EN = Endangered; NE = Not Evaluated.

Family Name	Scientific Name	Regional (SANBI)	Global (IUCN)	Screening Tool Sensitivity	Habitat	Likelihood of Occurrence	Reason
Aizoaceae	<i>Khadia beswickii</i>	VU	CR	Medium	Open shallow soil over rocks in grassland.	Medium	Suitable habitat in PAOI
Aizoaceae	<i>Delosperma purpureum</i>	EN	Not listed		South-facing slopes, in shallow soils among crystalline or conglomerate quartzitic rocks, in sun or in partial shade, rarely in shade, in grassland with some trees	Medium	Suitable habitat in PAOI
Bignoniaceae	<i>Podranea ricasoliana</i>	VU	Not listed		Coastal forest margins on shales.	Low	No suitable habitat in PAOI. A garden escapee which is outside of the natural distribution range.
Podocarpaceae	<i>Podocarpus henkelii</i>	LC	EN		Forest	Low	Limited to no suitable habitat in PAOI
	Sensitive species 1248	VU	Not listed	Medium		Medium	Suitable habitat in PAOI

8.6.3 FAUNA

8.6.3.1 AMPHIBIANS

No amphibian species are listed by the Global Biodiversity Information Facility (GBIF - www.gbif.org) database and no amphibian SCCs are expected to occur within the PAOI according to the DFFE screening tool. Common amphibian species are however expected to occur within the PAOI based on suitable habitat from a Desktop perspective.



8.6.3.2 REPTILES

Based on the GBIF (www.gbif.org) database, 7 reptile species are expected to occur within the area, none of which are classified as SCC. No SCCs are listed by the DFFE screening tool.

8.6.3.3 MAMMALS

Based on the GBIF (www.gbif.org) database, 9 mammal species could be expected to occur within the area of which 1 is an SCC. Two (2) additional species (three in total) is listed as sensitive according to the DFFE screening tool (Table 15).

Table 15: Threatened mammal species that are expected to occur within the PAOI; NT = Near threatened; VU = Vulnerable; LC = Least Concern.

Family Name	Scientific Name	Common Name	Regional (SANBI)	Global (IUCN)	Screening Tool Sensitivity	Habitat	Likelihood of Occurrence	Reason
Hyaenidae	<i>Parahyaena brunnea</i>	Brown Hyena	NT	NT		Occurs in dry areas, generally with annual rainfall less than 100 mm, particularly along the coast, semi-desert, open scrub and open woodland savanna. Known to persist outside of formally protected areas.	Medium	Known to persist outside of formally protected areas. Suitable habitat in PAOI.
Soricidae	<i>Crocidura maquassiensis</i>	Makwassie Musk Shrew	VU	LC	Medium	Found in rocky, mountain and grassland habitat.	Medium	May tolerate a wide range of habitats. Suitable habitat in PAOI
Mustelidae	<i>Hydrictis maculicollis</i>	Spotted-necked Otter	VU	NT	Medium	Inhabits freshwater habitats where water is un-silted, unpolluted, and rich in small to medium sized fishes	Medium	Wetlands and rivers occur within PAOI. Suitable habitat in PAOI.

8.6.3.4 AVIFAUNA

SABAP2 data indicate that 348 avifauna species are expected for the PAOI and surrounding areas. The Avifauna list was generated from the SABAP2. Of these 348 avifauna species, 40 are considered SCC (Table 16). The likelihood of occurrence within the PAOI is included here. The DFFE screening tool lists two (2) high-sensitivity



species and four (4) medium-sensitivity species (41 in total). The likelihood of occurrence of these species will be determined following the site visit.

Table 16: Threatened avifauna species that are expected to occur within the PAOI; LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered

Common Name	Scientific Name	Regional	Global	Screening Tool	Likelihood of Occurrence
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	VU	LC		Low
Red-billed Teal	<i>Anas erythrorhyncha</i>	NT	LC		High
Yellow-billed Duck	<i>Anas undulata</i>	NT	LC		High
African Darter	<i>Anhinga rufa</i>	NT	LC		High
Blue Crane	<i>Anthropoides paradiseus</i>	VU	VU		Low
Verreaux's Eagle	<i>Aquila verreauxii</i>	VU	LC		High
Great Egret	<i>Ardea alba</i>	NT	LC		High
Marsh Owl	<i>Asio capensis</i>	NT	LC		High
Curlew Sandpiper	<i>Calidris ferruginea</i>	VU	VU		Medium
Kittlitz's Plover	<i>Charadrius pecuarius</i>	NT	LC		High
Black Stork	<i>Ciconia nigra</i>	EN	LC		Low
Pallid Harrier	<i>Circus macrourus</i>	NA	NT		Medium
Black Harrier	<i>Circus maurus</i>	EN	EN		Low
African Marsh Harrier	<i>Circus ranivorus</i>	VU	LC	High/Medium	High
European Roller	<i>Coracias garrulus</i>	NT	LC		Medium
Fulvous Whistling Duck	<i>Dendrocygna bicolor</i>	NT	LC		High
Black-winged Kite	<i>Elanus caeruleus</i>	NT	LC		High
White-bellied Bustard	<i>Eupodotis senegalensis</i>	VU	LC	Medium	Medium
Lanner Falcon	<i>Falco biarmicus</i>	NT	LC		Medium
Lesser Kestrel	<i>Falco naumanni</i>	VU	LC		Medium
Red-footed Falcon	<i>Falco tinnunculus</i>	VU	VU		Low
Black-winged Pratincole	<i>Glareola nordmanni</i>	LC	NT		Low
White-backed Vulture	<i>Gyps africanus</i>	CR	CR		Low
Cape Vulture	<i>Gyps coprotheres</i>	VU	VU		High
Caspian Tern	<i>Hydropogon caspia</i>	VU	LC	High/Medium	Medium
Lesser Jacana	<i>Microparra capensis</i>	NA	LC		Low
Melodious Lark	<i>Mirafra cheniana</i>	NT	LC		Medium
Sentinel Rock Thrush	<i>Monticola explorator</i>	LC	NT		Low
Yellow-billed Stork	<i>Mycteria ibis</i>	VU	LC		High
Southern Pochard	<i>Netta erythrophthalma</i>	NT	LC		High
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	NT	LC		High
Maccoa Duck	<i>Oxyura maccoa</i>	VU	EN		Medium
Lesser Flamingo	<i>Phoeniconaias minor</i>	VU	NT		High
Greater Flamingo	<i>Phoenicopterus roseus</i>	NT	LC		High
Great Crested Grebe	<i>Podiceps cristatus</i>	VU	LC		High
Secretarybird	<i>Sagittarius serpentarius</i>	VU	EN		Medium
Knob-billed Duck	<i>Sarkidiornis melanotos</i>	NT	LC		Medium
Hamerkop	<i>Scopus umbretta</i>	NT	LC		High
Cape Shoveler	<i>Spatula smithii</i>	NT	LC		High



Common Name	Scientific Name	Regional	Global	Screening Tool	Likelihood of Occurrence
White-backed Duck	<i>Thalassornis leuconotus</i>	NT	LC		High
African Grass Owl	<i>Tyto capensis</i>	VU	LC	Medium	Low

8.6.3.5 INSECTS AND INVERTEBRATES

The DFFE screening tool lists 2 insect SCCs and 1 invertebrate SCC for the PAOI (**Table 17**).

Table 17: Threatened insect and invertebrate species that are expected to occur within the PAOI NT = Near threatened; VU = Vulnerable; LC = Least Concern.

Family Name	Scientific Name	Common Name	Regional (SANBI)	Global (IUCN)	Screening Tool Sensitivity	Habitat	Likelihood of Occurrence	Reason
Insect								
Lycaenidae	<i>Lepidochrysops praeterita</i>	Highveld Blue	EN	EN	Medium	Confined to grassy, rocky, typically south-facing slopes, where its host plant (<i>Ocimum obovatum</i>) and, presumably, its host ant occur.	Medium	Known to inhabit areas with dense human habitation and intensive land use. Suitable habitat in PAOI
Lycaenidae	<i>Lepidochrysops procera</i>	Grassveld Nimble Blue	Rare	LC	Medium	Rocky areas in grassland (and grassy areas in savanna), where its larval host plant, <i>Ocimum obovatum</i> , occurs.	Medium	Suitable habitat in PAOI
Invertebrate								
Tettigoniidae	<i>Clonia uvarovi</i>	Uvarov's Clonia	VU	VU	Medium	Woodland savannah.	Medium	Suitable habitat in PAOI

8.6.3.6 BIRDS AND BATS

SABAP2 data indicate that 348 avifauna species are expected for the PAOI and surrounding areas. The Avifauna list was generated from the SABAP2 dataset. Of these 348 avifauna species, 40 are considered SCC (**Table 18**). The likelihood of occurrence within the PAOI is included here. The DFFE screening tool lists two (2) high-sensitivity species and four (4) medium-sensitivity species (41 in total). The likelihood of occurrence of these species will be determined following the site visit.



Table 18: Threatened avifauna species that are expected to occur within the PAOI; LC = Least Concern, NT = Near Threatened, VU = Vulnerable, EN = Endangered, CR = Critically Endangered

Common Name	Scientific Name	Regional	Global	Screening Tool	Likelihood of Occurrence
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	VU	LC		Low
Red-billed Teal	<i>Anas erythrorhyncha</i>	NT	LC		High
Yellow-billed Duck	<i>Anas undulata</i>	NT	LC		High
African Darter	<i>Anhinga rufa</i>	NT	LC		High
Blue Crane	<i>Anthropoides paradiseus</i>	VU	VU		Low
Verreaux's Eagle	<i>Aquila verreauxii</i>	VU	LC		High
Great Egret	<i>Ardea alba</i>	NT	LC		High
Marsh Owl	<i>Asio capensis</i>	NT	LC		High
Curlew Sandpiper	<i>Calidris ferruginea</i>	VU	VU		Medium
Kittlitz's Plover	<i>Charadrius pecuarius</i>	NT	LC		High
Black Stork	<i>Ciconia nigra</i>	EN	LC		Low
Pallid Harrier	<i>Circus macrourus</i>	NA	NT		Medium
Black Harrier	<i>Circus maurus</i>	EN	EN		Low
African Marsh Harrier	<i>Circus ranivorus</i>	VU	LC	High/Medium	High
European Roller	<i>Coracias garrulus</i>	NT	LC		Medium
Fulvous Whistling Duck	<i>Dendrocygna bicolor</i>	NT	LC		High
Black-winged Kite	<i>Elanus caeruleus</i>	NT	LC		High
White-bellied Bustard	<i>Eupodotis senegalensis</i>	VU	LC	Medium	Medium
Lanner Falcon	<i>Falco biarmicus</i>	NT	LC		Medium
Lesser Kestrel	<i>Falco naumanni</i>	VU	LC		Medium
Red-footed Falcon	<i>Falco vespertinus</i>	VU	VU		Low
Black-winged Pratincole	<i>Glareola nordmanni</i>	LC	NT		Low
White-backed Vulture	<i>Gyps africanus</i>	CR	CR		Low
Cape Vulture	<i>Gyps coprotheres</i>	VU	VU		High
Caspian Tern	<i>Hydropogone caspia</i>	VU	LC	High/Medium	Medium
Lesser Jacana	<i>Microparra capensis</i>	NA	LC		Low
Melodious Lark	<i>Mirafra cheniana</i>	NT	LC		Medium
Sentinel Rock Thrush	<i>Monticola explorator</i>	LC	NT		Low
Yellow-billed Stork	<i>Mycteria ibis</i>	VU	LC		High
Southern Pochard	<i>Netta erythrophthalma</i>	NT	LC		High
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	NT	LC		High
Maccoa Duck	<i>Oxyura maccoa</i>	VU	EN		Medium
Lesser Flamingo	<i>Phoeniconaias minor</i>	VU	NT		High
Greater Flamingo	<i>Phoenicopterus roseus</i>	NT	LC		High
Great Crested Grebe	<i>Podiceps cristatus</i>	VU	LC		High
Secretarybird	<i>Sagittarius serpentarius</i>	VU	EN		Medium
Knob-billed Duck	<i>Sarkidiornis melanotos</i>	NT	LC		Medium
Hamerkop	<i>Scopus umbretta</i>	NT	LC		High
Cape Shoveler	<i>Spatula smithii</i>	NT	LC		High
White-backed Duck	<i>Thalassornis leuconotus</i>	NT	LC		High
African Grass Owl	<i>Tyto capensis</i>	VU	LC	Medium	Low



8.6.3.7 INSECTS AND INVERTEBRATES

The DFFE screening tool lists 2 insect SCCs and 1 invertebrate SCC for the PAOI (**Table 19**).

Table 19: Threatened insect and invertebrate species that are expected to occur within the PAOI NT = Near threatened; VU = Vulnerable; LC = Least Concern.

Family Name	Scientific Name	Common Name	Regional (SANBI)	Global (IUCN)	Screening Tool Sensitivity	Habitat	Likelihood of Occurrence	Reason
Insect								
Lycaenidae	<i>Lepidochrysops praeterita</i>	Highveld Blue	EN	EN	Medium	Confined to grassy, rocky, typically south-facing slopes, where its host plant (<i>Ocimum obovatum</i>) and, presumably, its host ant occur.	Medium	Known to inhabit areas with dense human habitation and intensive land use. Suitable habitat in PAOI
Lycaenidae	<i>Lepidochrysops procera</i>	Grassveld Nimble Blue	Rare	LC	Medium	Rocky areas in grassland (and grassy areas in savanna), where its larval host plant, <i>Ocimum obovatum</i> , occurs.	Medium	Suitable habitat in PAOI
Invertebrate								
Tettigoniidae	<i>Clonia uvarovi</i>	Uvarov's Clonia	VU	VU	Medium	Woodland savannah.	Medium	Suitable habitat in PAOI

8.7 SURFACE WATER AND WETLANDS

Baseline information was sourced from Hydrologic (Hydrology Specialist) and The Biodiversity Company (Wetland specialist) in order to complete this section of the report. **Figure 37** illustrates the hydrological setting of the site. The Mooirivierloop is a perennial river situated north-east of the study area in quaternary catchment C23E which approximates 850 km² in area. The Loopspruit River is also a perennial river, it is situated to the south of the study area in quaternary catchment C23J which approximates 890 km² in area. The contributing catchment of the Loopspruit River was derived from the 30m DSM.

The site is positioned primarily within quaternary catchments C23E and C23J however, the area of hydrological relevance encroaches on catchment C23G. The nearest rivers are the Mooirivierloop River to the north-east of the site, and the Loopspruit River situated to the south. According to the NGI's 1:50,000 topographical map data; water drains from the site to both rivers through channels and non-perennial rivers. The NGI's 1:50,000 topographical map data illustrates numerous non-perennial river systems to the north and south, both of which converge to the southwest of the site into the Mooirivier.



The northern system is associated with multiple vleis along the Mooirivierloop channel to the north and dams both north and south of the site. There are upstream furrows directing runoff from part of the greater Mponeng Operation (south of the Old North Complex TSF) and along the Mponeng TSF trenches draining to the non-perennial rivers to the west. The southern system is characterised by two larger dams, one of which is listed as the proposed return water dam for the Mponeng TSF. There are two dams to the west, one that connects to the Mooirivierloop network and is the proposed alternative location for the Return Water Dam to the south of the proposed Deelkraal TSF. This proposed return water dam sits at the headwaters of the non-perennial tributary connecting to the Loopspruit river.

With respect to wetlands, detailed delineation of wetlands has not yet been undertaken. Desktop baseline information was available and is presented below.

The South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was released with the NBA 2018. Ecosystem threat status (ETS) of river and wetland ecosystem types is based on the extent to which each river ecosystem type has been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT, with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer et al., 2019; Skowno et al., 2019). The PAOI and the 500 m Freshwater regulated area overlap with the SAIIAE wetland and river systems, as well as the CR wetlands (**Figure 35**).

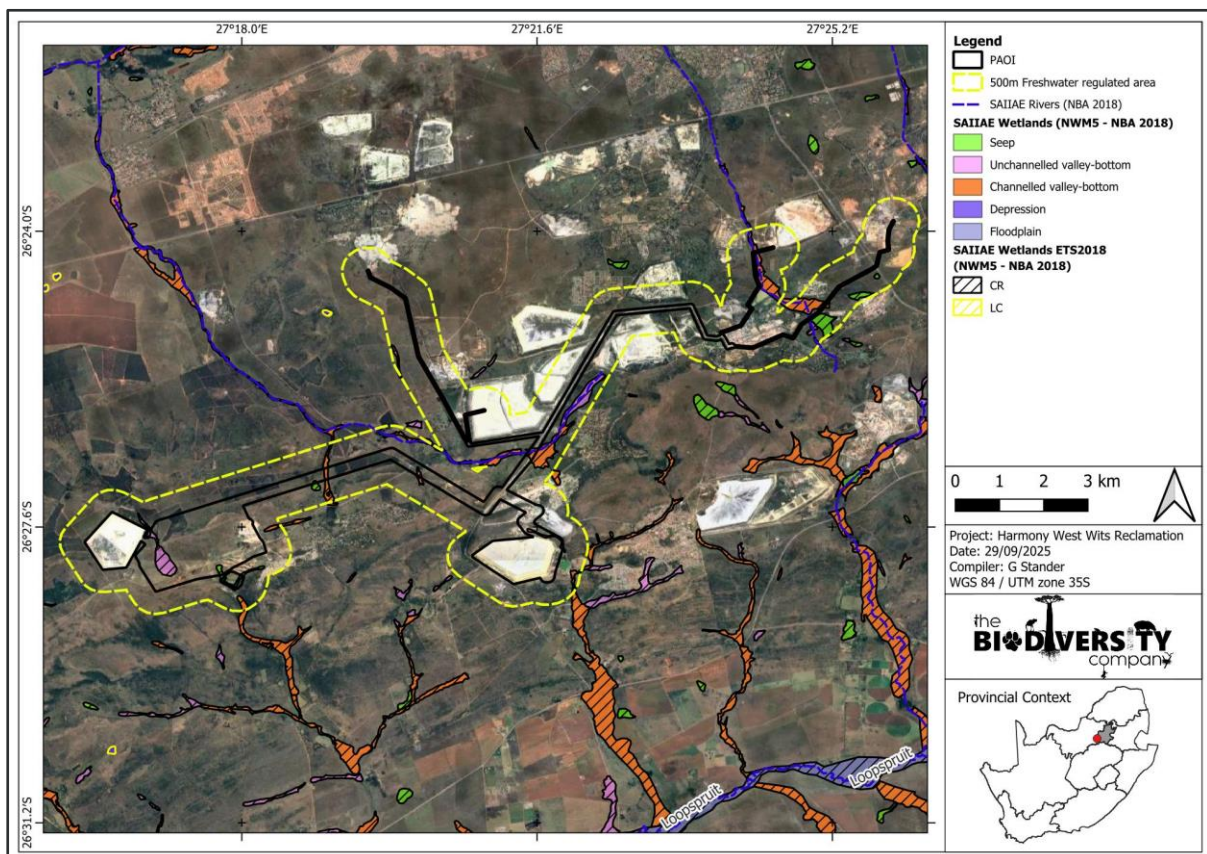


Figure 35: Map illustrating the PAOI in relation to the South African Inventory of Inland Aquatic Ecosystems

To better conserve aquatic ecosystems, South Africa has categorised its river systems according to set ecological criteria (i.e., ecosystem representation, water yield, connectivity, unique features, and threatened taxa) to identify Freshwater Ecosystem Priority Areas (FEPAs) (Driver et al., 2011). The FEPAs are intended to be conservation support tools and are envisioned to guide the effective implementation of measures to achieve the National Environment Management Biodiversity Act's (NEM:BA) biodiversity goals (Nel et al., 2011).

Figure 36 shows that the PAOI and 500 m Freshwater regulated area overlaps with non-priority NFEPA wetlands and Class D: Largely modified NFEPA rivers.

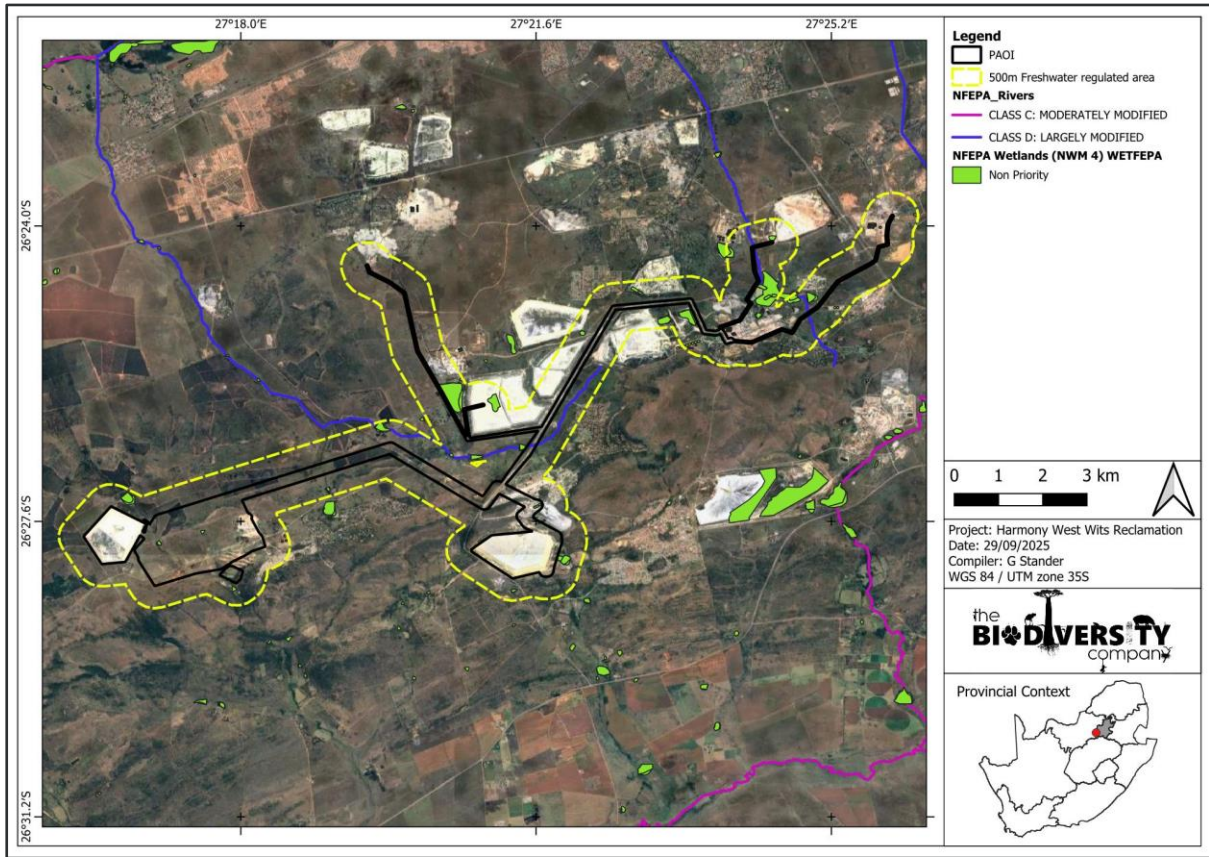


Figure 36: Map illustrating the PAOI in relation to the National Freshwater Ecosystem Priority Areas

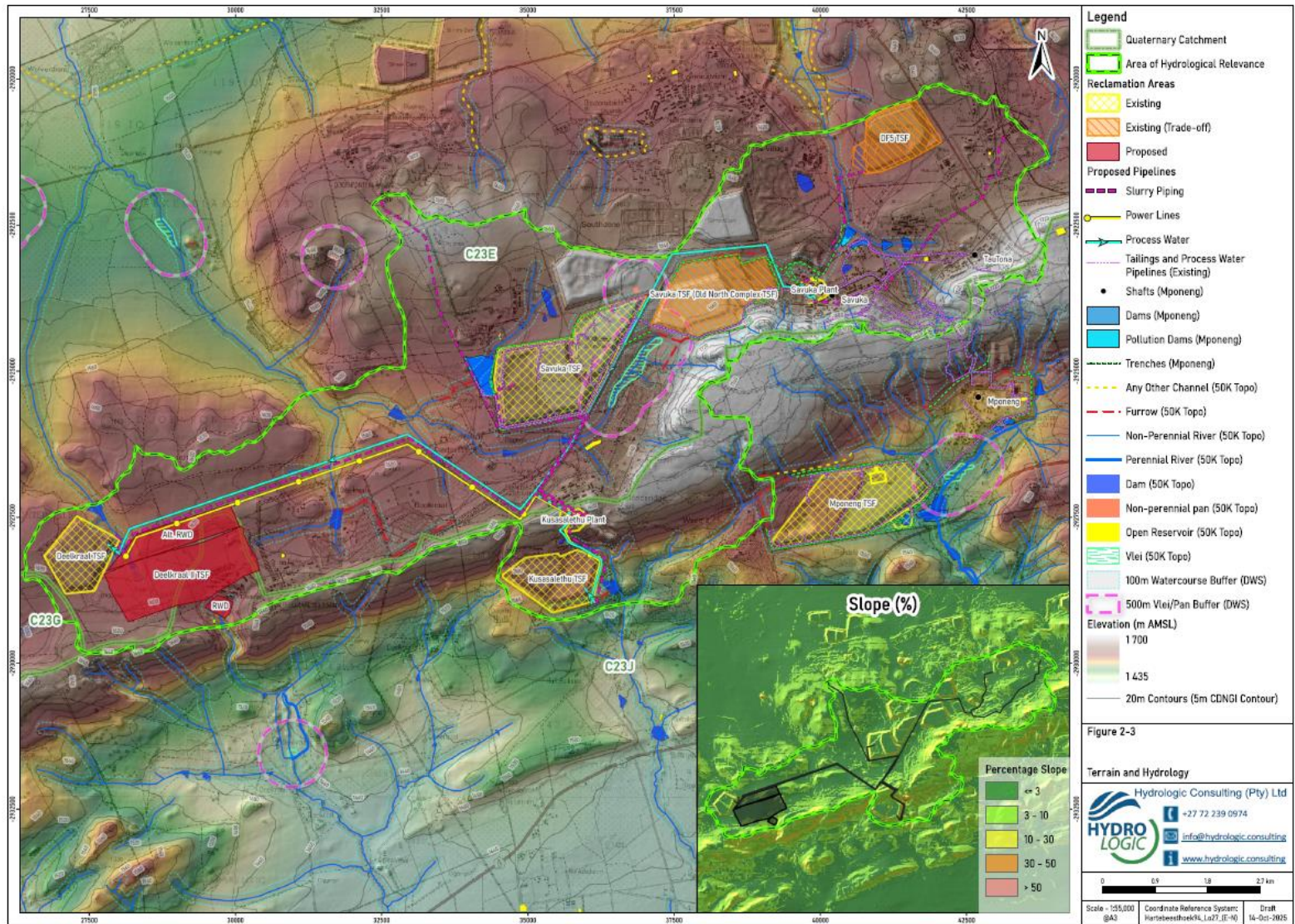


Figure 37: Terrain and Hydrology



8.8 GROUNDWATER

Groundwater baseline information was provided by Marius van Biljon (geohydrologist) and the relevant information is presented in this section. A key aspect of any groundwater assessment is a thorough understanding of the groundwater resource. The groundwater resource is described according to the following criteria:

- Aquifer boundaries;
- Aquifer type;
- Aquifer parameters;
- Hydrochemistry;
- Aquifer recharge; and
- Aquifer classification.

8.8.1 HYDROCENSUS AND BOREHOLE INFORMATION

Auctus Consulting (Van Biljon, 2011) conducted a hydrocensus within a 2km radius of the Kusasaletu and Deelkraal TSF's in 2011. Several privately owned boreholes were identified in the southern catchment (C23J), but no privately owned boreholes were found in the northern catchment (C23E).

The hydrocensus points in relation to the Kusasaletu TSF are shown in **Figure 38** and the hydrocensus information is summarised in **Table 20**. Although the hydrocensus was conducted in 2011 the mine has continued to monitor these boreholes. The hydrocensus boreholes are sampled bi-annually. The average 2024 groundwater chemistry is presented in **Table 21** (Groundwater Complete, 2025).

The following is concluded in terms of the hydrocensus groundwater quality:

- Ten of the original hydrocensus boreholes are still actively monitored.
- Monitoring information shows that overall good groundwater quality conditions prevailed if compared with drinking water standards (SANS 241:2015).
- In terms of the WUL standards, groundwater qualities are mostly compliant.
- Most of the macro cations and anions occurred in higher concentrations in groundwater from the hydrocensus boreholes, which may be a result of aquifer heterogeneity and natural occurring interaction between the aquifer host rock/s and groundwater, or low-level impacts from the mining areas since the boreholes are located in the general downgradient groundwater flow directions.
- Groundwater is dominated by magnesium on the cation side, while bicarbonate alkalinity, sulphate and chloride dominate the anion content.
- Unacceptably high levels of bacteriological contamination were encountered in monitoring boreholes HYD2, HYD3, HYD11, HYD12, HYD13 and HYD14, rendering the groundwater unsafe for human consumption.



Table 20: Hydrocensus boreholes

BH ID	Longitude	Latitude	Z	SWL (mbc)	BH Depth (m)	BH Use	Volume Abstracted (Lit/day)	Comments	Current Monitoring
HYD1	27.37586	-26.491	1453	No access	Unknown	Domestic	Unknown	Electric pump	Yes
HYD2	27.36794	-26.4834	1462	5.46	18	Domestic	2500	Electric pump.	Yes
HYD3	27.36665	-26.4807	1473	3.92	50	Domestic / Livestock	5000	Electric pump.	Yes
HYD4	27.3649	-26.4809	1481	9.92	48.15	Not used	0	Open BH.	Blocked
HYD5	27.36752	-26.4844	1477	5.21	39.52	Not used	0	Open BH.	Demolished
HYD6	27.36194	-26.4809	1489	19.69	Unknown	Not used	0	Electric pump, broken.	Damaged
HYD7	27.36213	-26.4802	1488	18.85	Unknown	Not used	0	Windmill, broken.	Yes
HYD8	27.36399	-26.4777	1490	11.57	Unknown	Not used	0	Electric pump, broken.	Yes
HYD9	27.36358	-26.4815	1479	17.29	40.93	Not used	0	Open BH.	Blocked
HYD10	27.36283	-26.4819	1479	18.62	Unknown	Domestic / Livestock	Unknown	Electric pump.	Demolished
HYD11	27.33925	-26.476	1515	No access	70	Domestic / Livestock	5000	Mono pump	Yes
HYD12	27.33791	-26.4753	1504	1.68	28.71	Not used	0	Open BH.	Yes
HYD13	27.33738	-26.4748	1507	17.28	30	Domestic / Livestock	5000	Electric pump	Yes
HYD14	27.34026	-26.4743	1524	9.97	17.84	Not used	0	Windmill, broken.	Yes



Table 21: Hydrocensus groundwater chemistry (Groundwater Complete, 2025)

BH	pH	EC mS/m	TDS mg/l	Ca mg/l	Mg mg/l	Na mg/l	K mg/l	MALK CaCO3/l	Cl mg/l	SO4 mg/l	NO3 mg/l	F mg/l	Al mg/l	Fe mg/l	Mn mg/l
HYD1	7.9	75.3	554.0	65.3	37.1	52.1	0.7	240.4	65.8	69.8	0.9	<0.466	<0.002	<0.009	0.016
HYD2	7.6	71.8	522.0	71.1	41.0	16.7	1.0	111.8	59.3	157.9	5.1	0.427	<0.002	<0.009	0.008
HYD3	8.2	76.0	646.0	81.3	49.8	28.0	0.4	160.7	83.4	174.0	1.9	<0.466	<0.002	<0.009	0.001
HYD7	7.9	53.4	420.0	49.3	32.2	26.5	1.5	168.8	47.9	56.3	1.1	<0.466	<0.002	<0.009	<0.001
HYD8	8.2	82.1	594.0	88.2	49.8	27.3	0.9	289.6	48.2	81.7	3.6	<0.466	<0.002	<0.009	<0.001
HYD11	7.1	38.0	300.0	31.3	14.3	19.7	1.6	34.2	79.1	33.1	<0.194	0.446	0.213	<0.009	<0.001
HYD12	6.6	23.1	158.0	15.4	13.9	7.4	0.3	26.1	54.2	0.2	0.5	0.252	<0.002	<0.009	0.282
HYD13	6.5	3.8	18.0	3.5	2.3	1.1	0.1	16.6	0.7	<0.452	0.5	<0.466	0.004	<0.009	0.007
HYD14	8.0	45.2	298.0	66.9	14.4	11.3	0.9	161.5	30.7	27.6	0.5	0.285	<0.002	<0.009	0.057
BH	NH4 mg/l	Thard mg/l	B mg/l	Ba mg/l	Cd mg/l	Co mg/l	Cr mg/l	Cu mg/l	Ni mg/l	Pb mg/l	U mg/l	V mg/l	Zn mg/l	T.coli/ 100ml	E.coli/ 100ml
HYD1	0.036	315.9	0.047	0.035	<0.002	<0.003	<0.007	<0.005	<0.005	<0.009	<0.015	0.045	<0.005	3	0
HYD2	<0.008	346.1	<0.013	<0.002	<0.002	0.016	<0.007	0.020	<0.005	<0.009	<0.015	<0.002	0.024	47000	11000
HYD3	0.071	408.0	<0.013	0.004	<0.002	0.018	<0.007	<0.005	<0.005	<0.009	<0.015	0.002	0.028	13	0
HYD7	0.169	255.8	<0.013	<0.002	<0.002	<0.003	<0.007	0.012	<0.005	<0.009	<0.015	0.025	<0.005	0	0
HYD8	0.028	425.5	-	-	<0.002	<0.003	<0.007	<0.005	<0.005	<0.009	<0.015	-	0.039	0	0
HYD11	0.099	137.3	<0.013	0.064	<0.002	<0.003	<0.007	<0.005	<0.005	<0.009	<0.015	0.020	<0.005	370	170
HYD12	0.015	95.7	<0.013	0.004	<0.002	<0.003	<0.007	<0.005	<0.005	<0.009	<0.015	0.021	0.013	61	8
HYD13	0.025	18.2	<0.013	<0.002	<0.002	<0.003	<0.007	<0.005	<0.005	<0.009	<0.015	0.004	0.014	1	1
HYD14	0.067	226.6	<0.013	0.010	<0.002	<0.003	<0.007	<0.005	<0.005	<0.009	<0.015	0.022	0.003	244	9

- Red – Value exceeds SANS 241 drinking water limit.
- Maximum Total Coliform (*T. coli*) count allowed in drinking water is 10 per 100 ml (SANS 241:2015).
- No *E. coli* should be present in drinking water (SANS 241:2015).



The mine has an extensive groundwater monitoring network and no additional boreholes were drilled during this investigation. The mine monitoring borehole localities are summarised in **Table 22** and shown in **Figure 39** and **Figure 40**. The localities for the boreholes were carefully selected to monitor the seepage from the waste facilities.

Table 22: Mine monitoring boreholes

Monitoring Point	Longitude	Latitude
Deelkraal TSF, RWD and WRD		
DKTSF(S)	27.27727	-26.4585
DKTSF(D)	27.27716	-26.4585
DKRWD(S)	27.27411	-26.4545
DKRWD(D)	27.27449	-26.4544
DKWRD(S)	27.30397	-26.4600
DKWRD(D)	27.30398	-26.4600
DK BH 2(S)	27.27344	-26.47165
DK BH 2(D)	27.27343	-26.47162
DK BH 4(S)	27.26806	-26.46283
DK BH 4(D)	27.26798	-26.46287
BH4	27.27662	-26.4552
BH5	27.30096	-26.46557
Kusasaletu TSF, RWD and WRD		
MBH14	27.36583	-26.4653
MBH15	27.36688	-26.4706
MBH16	27.36178	-26.4715
MBH17	27.35275	-26.4698
BH6	27.35982	-26.4599
BH7	27.36519	-26.4625
BH 8(S)	27.3664	-26.4756
BH 8(D)	27.3664	-26.4765
BH9	27.348	-26.467

Note: (S) denotes a shallow borehole monitoring the weathered aquifer
(D) denotes a deep borehole monitoring the fractured aquifer

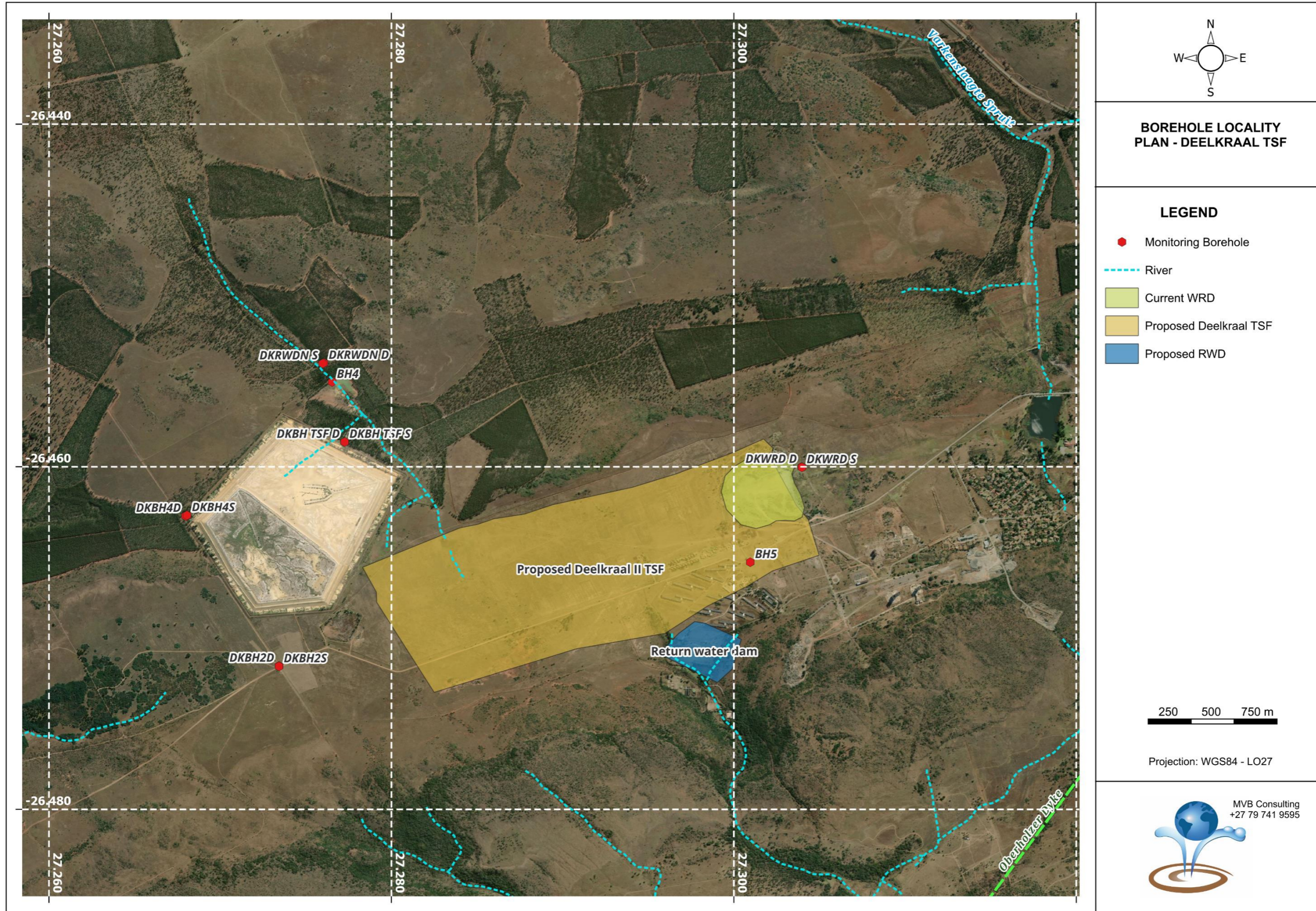


Figure 39: Deelkraal TSF monitoring boreholes



Figure 40: Kusasaletu Boreholes



8.8.2 AQUIFER TYPE

The geology of the region, apart from the Transvaal dolomite, is known to contain significant aquifers. Most groundwater occurrences are restricted to the upper weathered formations and fractures. These formations are not considered to contain economic and sustainable aquifers, but localised high yielding boreholes may, however, exist where significant fractures are intersected. Malmani dolomite is located north of the Kusasaletu mining area, these dolomites are known to contain significant groundwater. There are three distinct aquifers in the study area:

- **Weathered Aquifer:** The first is a shallow weathered aquifer, mainly restricted to the weathered shale and quartzite of the Witwatersrand rocks. The base of the aquifer is the impermeable quartzite and shale formations, whereas the top of the aquifer would be the surface topography. The groundwater table is affected by seasonal and atmospheric variations and generally mimics the topography. These aquifers are classified as semi-confined. The most consistent water strike is located at the fresh bedrock / weathering interface. Groundwater elevations vary between 0.5m and 14m below surface.
- **Fractured Aquifer:** The second is the deeper fractured rock aquifer. The deeper, fresh shale/quartzite aquifer where fracture flow dominates. Groundwater migration within the upper portion of the aquifer appears to be governed by jointing while major faults and intrusions form the significant conduits at depth. The depth to groundwater in this aquifer ranges from artesian to 38m below the surface. The two aquifers (weathered and fractured) are mostly hydraulically connected but confining layers such as clay and shale often separate the two. In the latter instance the fractured aquifer is classified as confined.
- **Dolomitic Karst Aquifer:** Carbonate rocks are practically impermeable and therefore devoid of any effective primary porosity. During its geological history, however, the dolomite is subjected to karstification and erosion. During this dissolution processes, the carbonate is removed from the dolomite and residual products such as silica, iron and manganese oxides and hydroxides (wad) are left behind. The residual mass spongy, compressible, of low density and has a high void volume. Fissures and caves also develop. Fault zones are preferential zones of weathering and are transformed into ground water conduits. The potential for large-scale ground water exploitation depends solely on the extent to which the dolomite has been leached by percolating rainfall and groundwater drainage, as well as the degree to which it has been transformed into aquifers capable of yielding significant quantities of water and sustaining high abstraction capacities.

The dolomite aquifer is unlikely to be impacted on by the activities at Kusasaletu, but it is near the Deelkraal TSF. The weathered and fractured aquifers are present beneath the entire Kusasaletu infrastructure, although the weathered aquifer may not always be well developed.

8.8.3 AQUIFER PARAMETERS

Important aquifer parameters are obtained from borehole or test pumping and include Hydraulic Conductivity (K), Transmissivity (T) and Storativity (S). These parameters are defined as follows (Krusemann and De Ridder, 1991):

- **Hydraulic Conductivity (K):** This is the volume of water that will move through a porous medium in unit time under a unit hydraulic gradient through a unit area measured at right angles to the direction of flow. It is normally expressed in metres per day (m/day).
- **Transmissivity (T):** This is the rate of flow under a unit hydraulic gradient through a cross-section of unit width over the full, saturated thickness of the aquifer. Transmissivity is the product of the average hydraulic conductivity and the saturated thickness of the aquifer. Transmissivity is expressed in metres squared per day (m²/day).
- **Storativity (S):** The storativity of a saturated confined aquifer is the volume of water released from storage per unit surface area of the aquifer per unit decline in the component of hydraulic head normal to that surface. Storativity is a dimensionless quantity.



The calculated aquifer on previous investigations are presented in **Table 23**.

Table 23: Summarised aquifer parameters obtained from pump tests

Borehole	Transmissivity (m ² /d)			Hydraulic Conductivity (m/d)		
	Constant Rate	Recovery	Average	Constant Rate	Recovery	Average
Kusasaletu TSF Boreholes						
BH6	7.94 x 10 ⁻¹	3.46 x 10 ⁻¹	5.70 x 10⁻¹	2.83 x 10 ⁻²	1.24 x 10 ⁻²	2 x 10⁻²
BH7	9.93 X 10 ⁻¹	1.99 x 100	1.49 x 100	4.15 X 10 ⁻²	8.35 x 10 ⁻²	6 x 10⁻²
BH8D	4.32 x 10 ⁻¹	1.33 x 10 ⁻¹	2.80 x 10⁻¹	1.56 x 10 ⁻²	4.78 x 10 ⁻³	1 x 10⁻²
BH8S	1.77 x 100	5.63 x 10 ⁻¹	1.17 x 100	1.15 x 10 ⁻¹	3.67 x 10 ⁻²	9 x 10⁻²
BH9	7.18 x 10 ⁻¹	5.02 x 10 ⁻¹	6.10 x 10⁻¹	2.42 x 10 ⁻²	1.69 x 10 ⁻²	2 x 10⁻²
MBH14	9.93 x 10 ⁻¹	1.01 x 10 ⁻¹	5.50 x 10⁻¹	5.02 x 10 ⁻²	5.12 x 10 ⁻³	3 x 10⁻²
Deelkraal TSF Boreholes						
KBH1	2.8 x 10 ⁻¹	1.49 x 10 ⁻¹	2.15 x 10⁻¹	7.99 x 10 ⁻³	4.24 x 10 ⁻³	6.12 x 10⁻³
DKBH 1S	Pumped dry	1.79 x 10 ⁻¹	1.79 x 10⁻¹	Pumped dry	1.89 x 10 ⁻²	1.89 x 10⁻²
DKBH 1D	4.42 x 100	2.95 x 100	3.69 x 100	1.47 x 10 ⁻¹	9.84 x 10 ⁻²	1.23 x 10⁻¹
DKBH 2S	Pumped dry	8.71 x 10 ⁻¹	8.71 x 10⁻¹	Pumped dry	1.45 x 10 ⁻¹	1.45 x 10⁻¹

Note: (S) denotes a shallow borehole monitoring the weathered aquifer, (D) denotes a deep borehole monitoring the fractured aquifer

The calculated parameters for the weathered and fractured aquifers are indicative of poorly developed aquifers that underlie the study area. These aquifers do not constitute economically sustainable and exploitable hydrological units. It is, however, important to note that individual fractures may yield higher volumes of water and flow rates may be faster within these features as seen in borehole DKBH1D.

8.8.4 GROUNDWATER GRADIENTS AND FLOW

Figure 41 depicts the groundwater level elevations which, as expected, mimic the surface contours. Groundwater flow is perpendicular to the groundwater contours and flows predominantly towards the south.

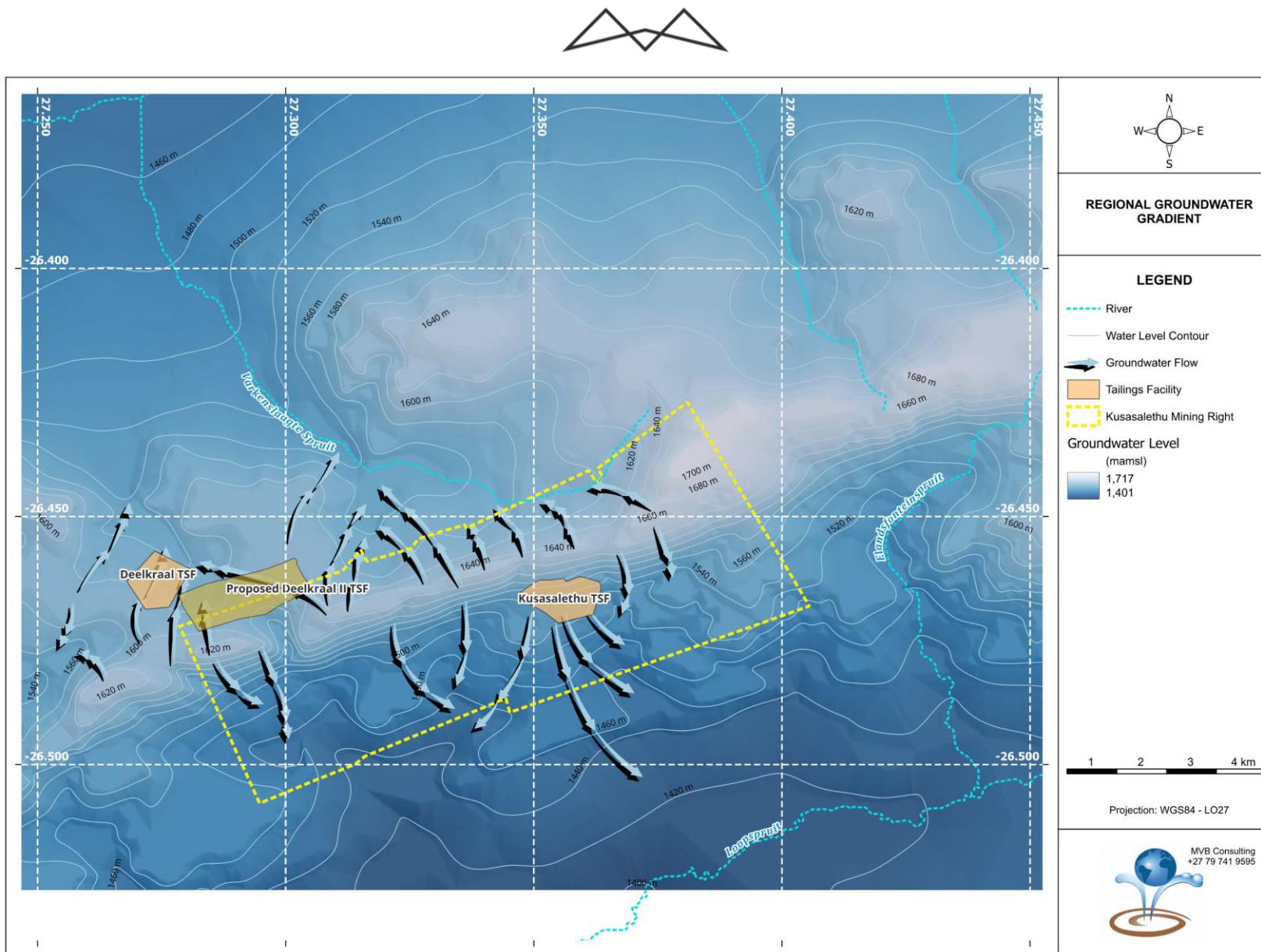


Figure 41: Regional groundwater gradient



8.8.5 GROUNDWATER QUALITY

Aquatico Scientific (Pty) Ltd routinely monitors the groundwater quality in the vicinity of the Kusasaletu and Deelkraal TSF's. The latest available data (September 2025) was made available and is used to assess the current impacts from the TSF's.

The groundwater quality is compared against the specified qualities in the Kusasaletu and Deelkraal Water Use License (WUL). The SANS 241 (2015) Drinking Water Guidelines is also included for comparative purposes. The SANS 241 Drinking Water Specification is the definitive reference on acceptable limits for drinking water quality parameters in South Africa and provides guideline levels for a range of water quality characteristics. The SANS 241 (2015) Drinking-Water Specification effectively summarises the suitability of water for drinking water purposes for lifetime consumption.

The chemistry of the groundwater is presented in **Table 24** (Catchment C23E – Deelkraal TSF) and **Table 25** (Catchment C23J – Kusasaletu TSF). Values exceeding the WUL limits are highlighted in pink. The distribution of the sulphate (SO₄) concentrations provides an aerial view of the impacted areas, which is as expected downgradient from the TSF's (**Figure 42** and **Figure 43**).



Table 24: Groundwater chemistry (Deelkraal TSF)

Parameters	Units	Guidelines			Sampled Boreholes			
		WUL	SANS 241	DK BH TSF S	DK BH TSF D	DKRWDN S	DKWRD S	KL BH
pH @ 25°C	pH	5-9.7	≥5 to ≤9.7	8.29	7.14	6.24	8.53	6.06
Electrical conductivity (EC) @ 25°C	mS/m	<200	≤170	257	516	26	37	5
Total Dissolved solids @ 180°C	mg/l	<1200	≤1200	1 806	5 000	164	346	40
Turbidity	NTU	-	≤5	106.00	84.40	11.00	8.23	2.18
Total Alkalinity	mg CaCO ₃ /l	-	-	718	589	55	55	18
Calcium (Ca)	mg/l	<200	-	108.00	474.00	17.60	35.80	2.68
Magnesium (Mg)	mg/l	<100	-	207.00	605.00	8.22	18.20	2.54
Sodium (Na)	mg/l	<200	≤200	71.90	185.00	18.20	12.80	3.67
Potassium (K)	mg/l	-	-	28.60	16.10	3.45	3.29	1.12
Chloride (Cl)	mg/l	<300	≤300	80.30	158.00	21.10	22.60	3.37
Sulphate (SO ₄)	mg/l	<600	≤500	554.00	3 101.00	51.20	91.80	1.22
Fluoride (F)	mg/l	<1	≤1.5	1.650	<0.263	<0.263	<0.263	0.474
Nitrate (NO ₃) as N	mg/l	<10	≤11	<0.194	0.261	0.202	0.242	0.368
Nitrite (NO ₂) as N	mg/l	-	≤0.9	<0.065	<0.065	<0.065	<0.065	<0.065
Ammonium (NH ₄) as N	mg/l	-	≤1.5	1.180	0.291	0.057	0.544	0.078
Aluminium (Al)	mg/l	<0.5	≤0.3	0.074	0.084	0.010	0.016	<0.002
Iron (Fe)	mg/l	<3	≤2	0.090	<0.004	0.071	<0.004	<0.004
Manganese (Mn)	mg/l	<0.5	≤0.4	7.400	44.800	2.320	0.076	0.021
Chromium (Cr)	mg/l	-	≤0.05	<0.003	<0.003	<0.003	<0.003	<0.003



Parameters	Units	Guidelines			Sampled Boreholes			
		WUL	SANS 241	DK BH TSF S	DK BH TSF D	DKRWDN S	DKWRD S	KL BH
Copper (Cu)	mg/l	-	≤2	<0.002	<0.002	<0.002	<0.002	<0.002
Cadmium (Cd)	mg/l	-	≤0.003	<0.002	0.002	<0.002	<0.002	<0.002
Lead (Pb)	mg/l	-	≤0.01	<0.004	<0.004	<0.004	<0.004	<0.004
Nickel (Ni)	mg/l	-	≤0.07	<0.002	0.002	0.010	<0.002	<0.002
Cobalt (Co)	mg/l	-	-	0.020	<0.003	0.017	<0.003	<0.003
Zinc (Zn)	mg/l	-	≤5	0.003	0.009	<0.002	<0.002	<0.002
Dissolved Uranium (U)	mg/l	<0.03	≤0.03	<0.015	<0.015	<0.015	<0.015	<0.015
Free Cyanide (CN)	mg/l	-	≤0.2	<0.008	<0.008	<0.008	<0.008	<0.008
Cyanide WAD	mg/l	-	-	<0.003	<0.003	<0.003	<0.003	<0.003
Total Cyanide (CN)	mg/l	-	-	<0.005	<0.005	<0.005	<0.005	<0.005
Total coliform	CFU/100ml	-	≤10	102 000	190	0	18	4
E.coli	CFU/100ml	-	0	0	0	0	0	0



Table 25: Groundwater quality in catchment C23J (Kusasaletu TSF)

Parameters	Units	Guidelines		Sampled Boreholes							
		WUL	SANS 241	MBH14	MBH15	MBH16	MBH17	BH6	BH8 (Deep)	BH8 (Shallow)	BH9
pH @ 25°C	pH	5-9.7	≥5 to ≤9.7	6.83	7.23	7.30	5.32	5.26	6.47	7.82	5.62
Electrical conductivity (EC) @ 25°C	mS/m	<200	≤170	134	123	244	70	120	308	214	297
Total Dissolved solids @ 180°C	mg/l	<1200	≤1200	974	1 038	2 230	642	908	2 672	1 854	2 286
Turbidity	NTU	-	≤5	35.40	7.84	4.52	1.00	0.96	2.95	0.32	3.86
Total Alkalinity	mg CaCO ₃ /l	-	-	103	73	53	30	8	77	125	26
Calcium (Ca)	mg/l	<200	-	157.00	175.00	286.00	40.20	110.00	425.00	269.00	188.00
Magnesium (Mg)	mg/l	<100	-	30.70	47.70	150.00	56.00	11.40	236.00	157.00	75.30
Sodium (Na)	mg/l	<200	≤200	108.00	31.40	122.00	22.20	137.00	83.10	55.60	359.00
Potassium (K)	mg/l	-	-	9.79	13.60	7.67	3.26	22.10	8.37	8.91	12.90
Chloride (Cl)	mg/l	<300	≤300	112	99	211	14	137	314	188	292
Sulphate (SO ₄)	mg/l	<600	≤500	447	470	1 152	303	335	1 491	888	1 091
Fluoride (F)	mg/l	<1	≤1.5	<0.263	<0.263	<0.263	<0.263	<0.263	<0.263	0.593	0.367
Nitrate (NO ₃) as N	mg/l	<10	≤11	0.391	1.570	1.930	3.940	14.400	0.515	0.657	<0.194
Nitrite (NO ₂) as N	mg/l	-	≤0.9	<0.065	<0.065	<0.065	2.980	<0.065	<0.065	<0.065	<0.065
Ammonium (NH ₄) as N	mg/l	-	≤1.5	0.560	0.056	0.063	6.390	0.254	0.100	0.065	17.300
Aluminium (Al)	mg/l	<0.5	≤0.3	0.026	0.028	0.030	0.309	0.478	0.062	0.042	0.082
Iron (Fe)	mg/l	<3	≤2	0.183	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Manganese (Mn)	mg/l	<0.5	≤0.4	1.600	0.069	3.320	1.160	0.266	0.101	0.091	42.600



Parameters	Units	Guidelines			Sampled Boreholes						
		WUL	SANS 241	MBH14	MBH15	MBH16	MBH17	BH6	BH8 (Deep)	BH8 (Shallow)	BH9
Chromium (Cr)	mg/l	-	≤0.05	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Copper (Cu)	mg/l	-	≤2	<0.002	<0.002	<0.002	0.013	<0.002	<0.002	<0.002	<0.002
Cadmium (Cd)	mg/l	-	≤0.003	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002
Lead (Pb)	mg/l	-	≤0.01	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004
Nickel (Ni)	mg/l	-	≤0.07	<0.002	<0.002	0.064	0.192	0.008	0.005	<0.002	0.050
Cobalt (Co)	mg/l	-	-	0.016	<0.003	0.061	0.093	0.072	0.106	0.058	0.530
Zinc (Zn)	mg/l	-	≤5	<0.002	<0.002	0.016	0.295	0.015	0.007	0.006	0.130
Dissolved Uranium (U)	mg/l	<0.03	≤0.03	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015
Free Cyanide (CN)	mg/l	-	≤0.2	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008	<0.008
Cyanide WAD	mg/l	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003
Total Cyanide (CN)	mg/l	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total coliform	CFU/100ml	-	≤10	720	630	99	1	6	300	107	0
E.coli	CFU/100ml	-	0	240	200	11	0	0	10	0	0

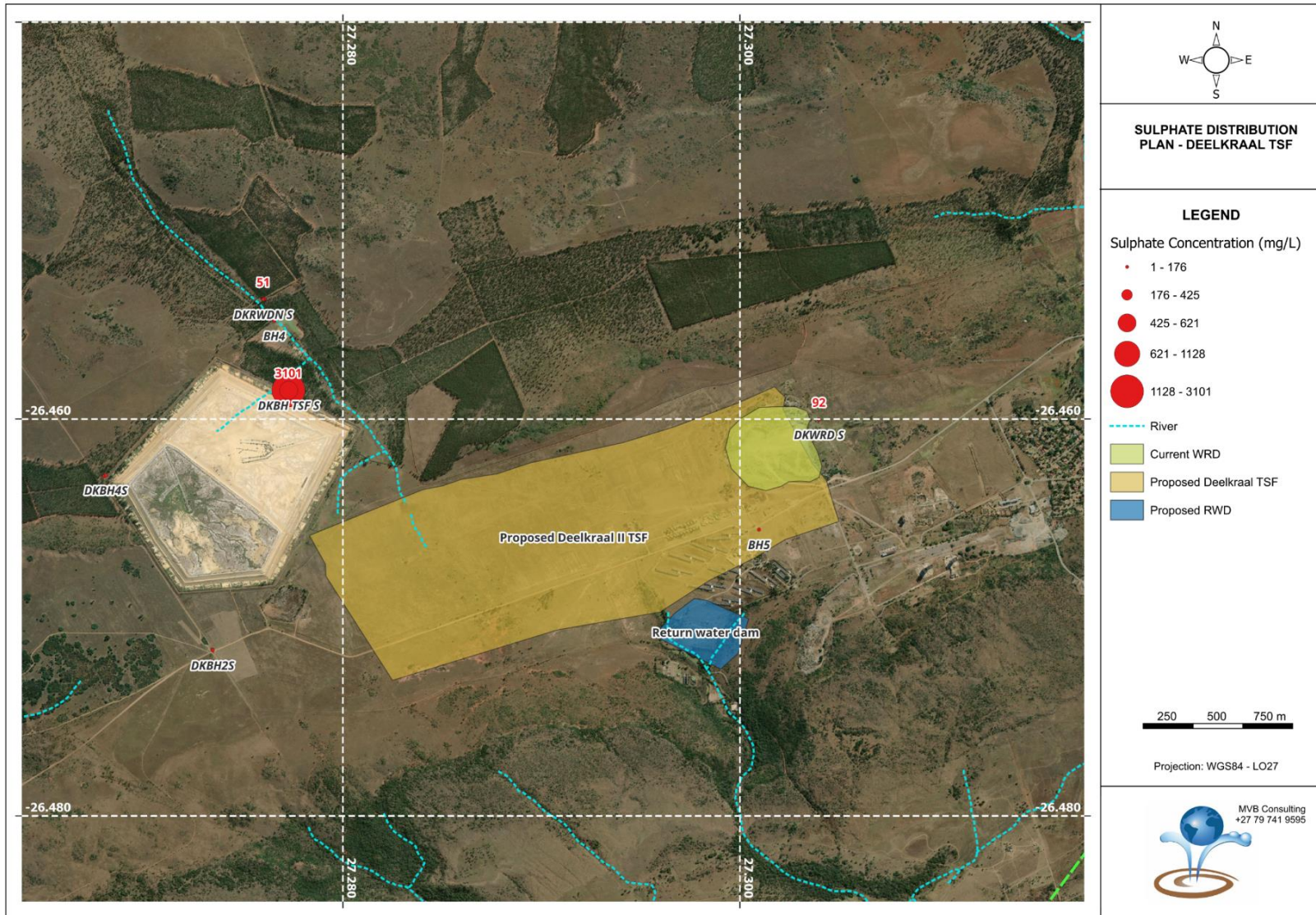


Figure 42: Sulphate concentration distribution in the Deelkraal TSF boreholes



Figure 43: Sulphate concentration distribution in the Kusasaletu TSF boreholes



8.8.6 AQUIFER CLASSIFICATION

An aquifer classification system provides a framework and objective basis for identifying and setting appropriate levels of groundwater resource protection. This would facilitate the adoption of a policy of differentiated groundwater protection.

Other uses could include:

- Defining levels of investigation required for decision making.
- Setting of monitoring requirements.
- Allocation of manpower resources for contamination control functions.

The aquifer classification system used to classify the aquifers is the proposed National Aquifer Classification System of Parsons (1995). This system has a certain amount of flexibility and can be linked to second classifications such as a vulnerability or usage classification. Parsons suggests that aquifer classification forms a very useful planning tool that can be used to guide the management of groundwater issues. He also suggests that some level of flexibility should be incorporated when using such a classification system.

The South African Aquifer System Management Classification is presented by five major classes:

- Sole Source Aquifer System.
- Major Aquifer System.
- Minor Aquifer System.
- Non-Aquifer System.
- Special Aquifer System.

The following definitions apply to the aquifer classification system:

- Sole source aquifer system: "An aquifer that is used to supply 50 % or more of domestic water for a given area, and for which there are no reasonable alternative sources should the aquifer become depleted or impacted upon. Aquifer yields and natural water quality are immaterial".
- Major aquifer system: "Highly permeable formations, usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public supply and other purposes. Water quality is generally very good".
- Minor aquifer system: "These can be fractured or potentially fractured rocks that do not have a high primary permeability, or other formations of variable permeability. Aquifer extent may be limited and water quality variable. Although this aquifer seldom produces large quantities of water, they are both important for local supplies and in supplying base flow for rivers".
- Non-aquifer system: "These are formations with negligible permeability that are generally regarded as not containing groundwater in exploitable quantities. Water quality may also be such that it renders the aquifer unusable. However, groundwater flow through such rocks does occur, although imperceptible, and needs to be considered when assessing risk associated with persistent pollutants".
- Special aquifer system: "An aquifer designated as such by the Minister of Water Affairs, after due process".

A second variable classification is needed for sound decision making, as the ability of an aquifer to yield water to a particular user is not adequately stated. In this case it was decided to use the vulnerability of the aquifer to contamination as a second parameter (**Table 26**). A weighting and rating approach is then used to decide on the appropriate level of groundwater protection (**Table 27**).



Table 26: Ratings for the aquifer quality management classification system

Class	Points	Class	Points
Sole Source Aquifer System	6	High	3
Major Aquifer System	4	Medium	2
Minor Aquifer System	2	Low	1
Non-Aquifer System	0		
Special Aquifer System	0-6		

Table 27: Appropriate level of groundwater protection required

GQM Index	Level of Protection
<1	Limited Protection
1 – 3	Low Level Protection
3 – 6	Medium Level Protection
6 – 10	High Level Protection
>10	Strictly Non-degradation

After rating the aquifer system management and the aquifer vulnerability, the points are multiplied to obtain a Groundwater Quality Management (GQM) index.

Based on the above, the aquifers in the study area are classified as follows:

Description	Aquifer	Vulnerability	Rating	Protection
Weathered Aquifer	Minor (2)	1	2	Low
Fractured Aquifer	Minor (2)	1	2	Low

8.8.7 OVERALL SITE HYDROGEOLOGY

Groundwater occurrences in the study area are predominantly restricted to the following types of terrains.

- Weathered and fractured rock aquifer in the Transvaal Formations.
- Dolomitic and Karst Aquifers.

Although the dolomite aquifer is the most prominent aquifer in the region, it does not play any role in the activities at the Deelkraal and Kusasaletu TSF's. The dolomite is ±100 - 400m below surface at the two TSF sites. Evidence has shown that there is no connectivity between the weathered / fractured aquifer and the underlying dolomite aquifer. Even in compartments where the dolomite aquifer is dewatered the groundwater levels in the weathered / fractured aquifer remains unaffected.

Groundwater occurs in the near-surface geology in the weathered and fractured sedimentary deposits (quartzite and shale) of the Transvaal strata. The lava of the Hekpoort Formation has similar weathering characteristics to that of the shale and is therefore deemed as the same aquifer. These formations are not considered to contain economic and sustainable aquifers, but localised high yielding boreholes may, however, exist where significant fractures are intersected.

Groundwater recharge in the fractured aquifer is estimated at 22 mm / annum with water occurring in the shallow weathered zone and water bearing fractures only. This is equal to approximately 3.7% of mean annual precipitation. The average rainfall in the area is approximately 600 mm / annum.



In most geological terrains, the groundwater mimics the topography and at the tailings facilities there is a good correlation between the topography and the groundwater level, which suggests that groundwater flow will follow the topographical gradient. The groundwater flow at the Deelkraal TSF is to the north and at the Kusasaletu TSF it is to the south-west and south-east.

There are some private groundwater users in the vicinity of the Kusasaletu TSF, but the mine has included these boreholes in their monitoring programme. Aquatico Scientific (Pty) Ltd routinely monitors the groundwater quality in the mine monitoring boreholes at Kusasaletu and Deelkraal TSF's. The latest available data (September 2025) was made available and is used to assess the current impacts from the TSF's.

The following is concluded in terms of the groundwater quality at the Deelkraal TSF:

- The general physical water quality of the C23E (Deelkraal TSF) groundwater monitoring localities can be described as neutral and alkaline (DKWRD S), non-saline (DKRWDN S, DKWRD S and KL BH), very saline (DK BH TSF S) to extremely saline (DK BH TSF D).
- None of the monitoring boreholes recorded dissolved U or CN (all analysed forms) concentrations above the detection limit. Exceeding variable concentrations (including values) were observed in terms of pH, Electrical conductivity, calcium, magnesium, sodium, Total Alkalinity, chloride, fluoride and sulphate were recorded at majority of the C23E boreholes.
- The biggest impact is directly to the north of the TSF, which corresponds with the groundwater flow direction. Very high sulphate concentration in borehole DK BH TSF D is indicative of seepage from the TSF.
- High bacterial counts in terms of E. coli and (or) Total coliforms were recorded at some of the groundwater localities.

The general physical water quality of the C23J (Kusasaletu TSF) groundwater monitoring localities of this section can be described as neutral to acidic (MBH17, BH6 & BH9), saline (MBH14, MBH17 & BH6), very saline (MBH15, MBH16, BH8 (Shallow) & BH9) and extremely saline (BH8 (Deep)). None of the monitored localities for this section recorded CN or dissolved U concentrations above detection limit. Exceeding SANS Electrical conductivity values and concentrations of calcium, magnesium, sodium, chloride and sulphate were detected at all the sampling localities.

8.9 AIR QUALITY

The information in this section was provided by Airshed Planning Professionals (Air Quality Specialist). The wind field is dominated by winds from the northerly sector. The strongest winds (>6 m/s) occurred mostly from the north-northeasterly sector. Calm conditions occurred 3.5% of the time, with the average wind speed over the period of 3.63 m/s. Both daytime and night-time show dominant northerly wind fields, with calm conditions 4.4% during the day, and 2.52% during the night (**Figure 44** and **Figure 45**).

Dust fallout sampling has been undertaken around the Kusasaletu operations since January 2019 by Aquatico Scientific and includes a network comprising of 7 single Dustfall Monitoring Units (DMU) in accordance with ASTM D1739 (1970). Five (5) of these DMUs are screened against the NDCR non-residential limit of 1 200 mg/m²/day, with the remaining two (2) units regarded as residential (screened against the NDCR residential limit of 600 mg/m²/day). Existing Sources of pollution

The current air quality in the study area is mostly influenced by mining, deposition and reclamation activities at Deelkraal, Kusasaletu and Savuka and other companies' mining operations, as well as farming activities, domestic fires, vehicle exhaust emissions and dust entrained by vehicles. These emission sources vary from activities that generate relatively coarse airborne particulates (such as farmland preparation, dust from paved and unpaved roads, and the mine sites) to fine PM such as that emitted by vehicle exhausts, diesel power generators and processing operations.

Domestic households are known to have the potential to be one the most significant sources that contribute to poor air quality within residential areas. Individual households are low volume emitters, but their cumulative



impact is significant. It is likely that households within the local communities or settlements utilize coal, paraffin and/or wood for cooking and/or space heating (mainly during winter) purposes. Pollutants arising from the combustion of wood include respirable particulates, CO and SO₂ with trace amounts of polycyclic aromatic hydrocarbons (PAHs), in particular benzo(a)pyrene and formaldehyde. Particulate emissions from wood burning have been found to contain about 50% elemental carbon and about 50% condensed hydrocarbons.

Biomass burning includes the burning of evergreen and deciduous forests, woodlands, grasslands, and agricultural lands. Within the project vicinity, crop-residue burning and wildfires (locally known as veld fires) may represent significant sources of combustion-related emissions. The frequency of wildfires in the grasslands varies between annual and triennial. Biomass burning is an incomplete combustion process (Cachier, 1992), with carbon monoxide, methane and nitrogen dioxide gases being emitted. Approximately 40% of the nitrogen in biomass is emitted as nitrogen, 10% is left in the ashes, and it may be assumed that 20% of the nitrogen is emitted as higher molecular weight nitrogen compounds (Held, et al., 1996). The visibility of the smoke plumes is attributed to the aerosol (particulate matter) content.

Emissions from unpaved roads constitute a major source of emissions to the atmosphere in the South African context. When a vehicle travels on an unpaved road the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong turbulent air shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed. Dust emissions from unpaved roads vary in relation to the vehicle traffic and the silt loading on the roads. Unpaved roads in the region are mainly haul and access roads. Emissions from paved roads are significantly less than those originating from unpaved roads, however they do contribute to the particulate load of the atmosphere. Particulate emissions occur whenever vehicles travel over a paved surface. The fugitive dust emissions are due to the re-suspension of loose material on the road surface.

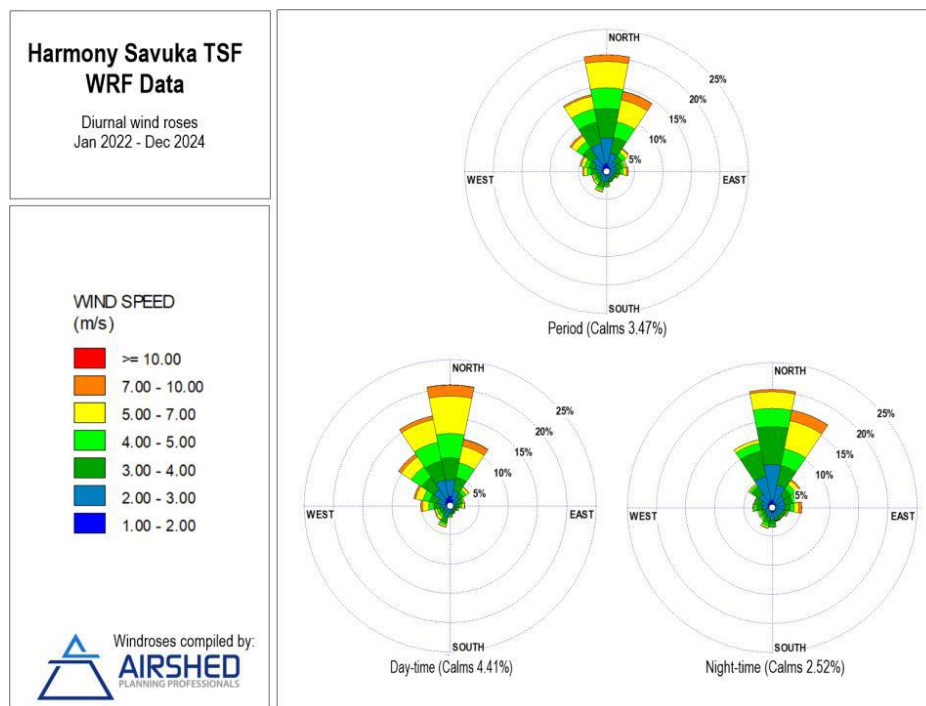


Figure 44: Period, day- and night-time wind roses (WRF data, January 2022 to December 2024)).

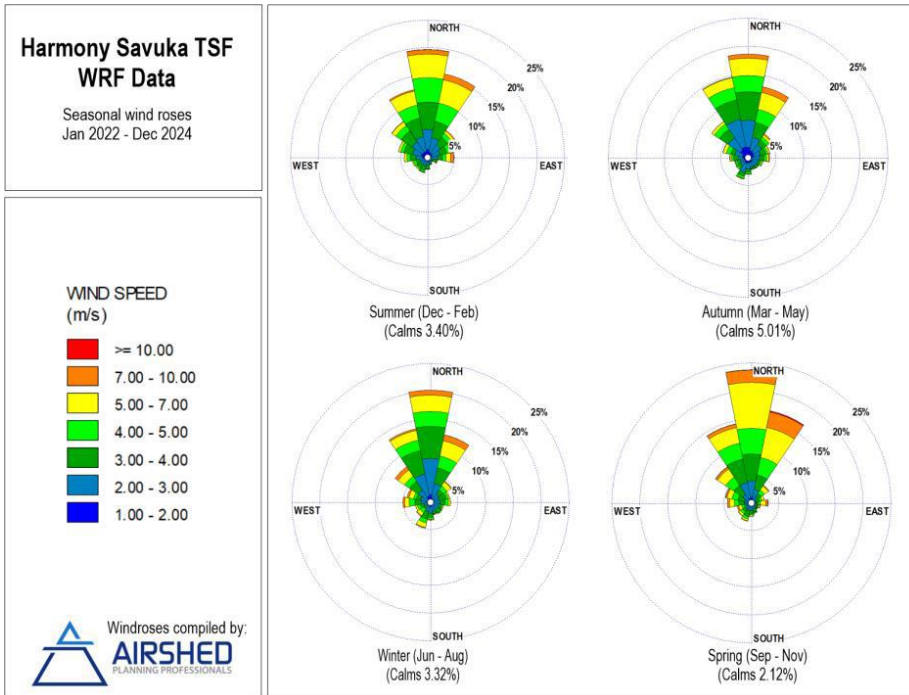


Figure 45: Seasonal wind roses (WRF data, January 2022 to December 2024)).

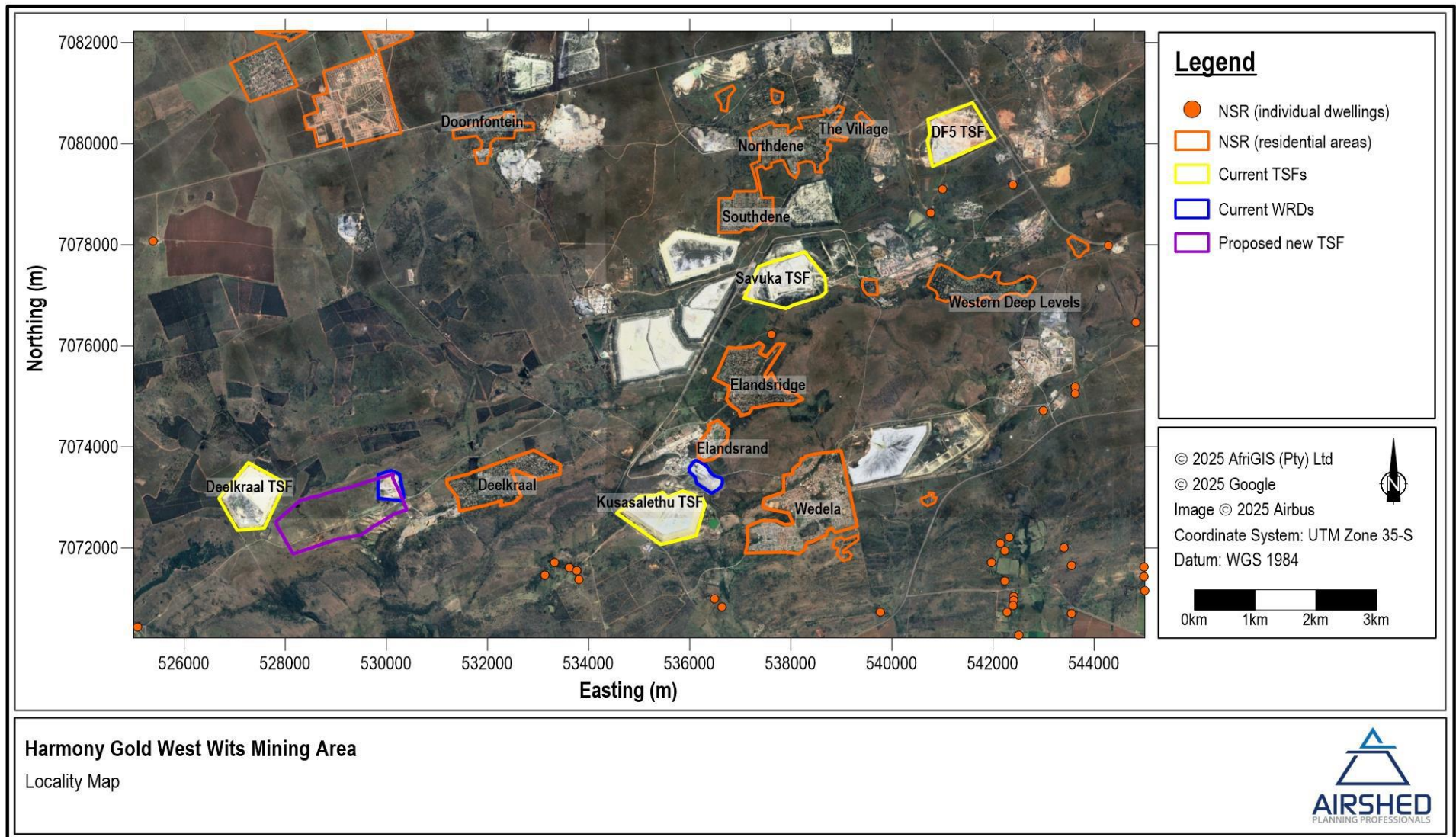


Figure 46: Location of sensitive receptors relative to the Project Area of Influence.



8.10 VISUAL RECEPTORS AND LANDSCAPE CHARACTER

The study area comprises a combination of landscape character types including open grassland with some pans, agricultural lands, urbanisation and settlements, and mining and associated infrastructure. Initial Zones of Theoretical Visibility analysis overlaid onto landcover are presented in **Figure 47**.

The settlement areas indicated in yellow and the adjacent roads are likely to be the most sensitive to changes in view associated with the TSF. Having said that, there are numerous TSF facilities in the area that are highly visible. The majority of settlement areas are unlikely to be affected.

There are also two protected areas approximately 20km to the south-east that could be partly affected. However, at this distance, whilst it may be visible, it is highly unlikely that the facility will be distinguishable from the surrounding landscape.

The TSF will grow to its ultimate height over time and so it is unlikely that the facility will be visible to areas surrounding the mine for some years. There are historical TSFs that have established mature vegetation on their slopes that, even at approximately 1-2km, visually blend into surrounding natural slopes. From within the adjacent mining villages vegetation is sufficiently dense to mostly screen all views of surroundings.

There is an attractive dam area approximately 1.5km to the east of the TSF site. There are braai areas and informal paths in this area. This area is obviously looked after which contrasts with the adjacent open areas that are affected by informal dumping.

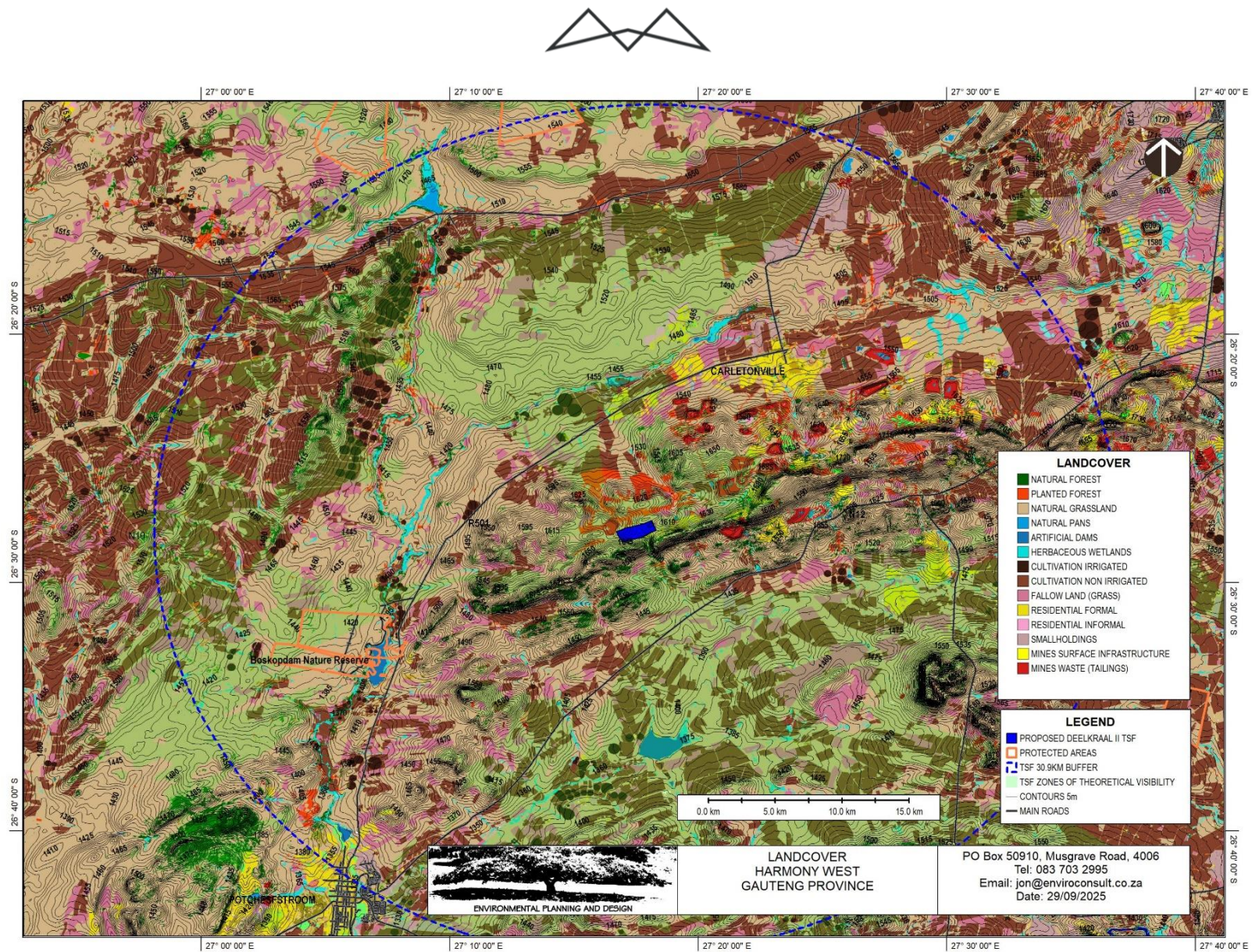


Figure 47: Initial Zones of Theoretical Visibility analysis overlaid onto landcover



8.11 SOCIO-ECONOMIC

The socio-economic baseline conditions relevant to the Project area was provided by Equispectives (Social Specialist). The baseline socio-economic information was updated in 2022 through the 2022 South African Census (<https://census.statssa.gov.za/#/province/7/2>). The Draft Integrated Development Plan (IDP) for Merafong City 2025-26 best describes the socio-economic conditions for the Municipality (<https://merafong.gov.za/wp-content/uploads/2025/04/Draft-IDP-Document-March-2025-2026.pdf>).

8.11.1 MUNICIPAL PROFILE

According to the Draft Integrated Development Plan (IDP) for Merafong City 2025-26, Merafong City Local Municipality (MCLM) is a Category B municipality with an Executive Mayor Governance system. A Category B municipality, also known as a local municipality, is a type of local government in South Africa that shares executive and legislative authority with a Category C (district) municipality. These municipalities are the primary providers of local services, such as refuse removal, sewage, and water supply, operating within a broader district municipality framework for more regional functions like bulk water infrastructure and integrated development planning.

The Speaker is the Chairperson of Council and is responsible for overseeing the functioning of Council and its committees. The office of the Speaker is further responsible for the establishment and functioning of ward committees. The Chief Whip is responsible for ensuring compliance to the code of conduct by Councillors. MCLM covers an area of 1631.7km² and it comprises of twenty-eight (28) wards in terms of Section 18 (3) of the local government: Municipal Structures Act, 1998 (Act 117 of 1998) which constitutes 28 Ward Councillors and 24 Proportional Representative Councillors. MCLM is situated in the South-western part of Gauteng Province and form a part of West Rand District Municipality which consists of four local municipalities namely: Mogale City, Rand West Municipality and Merafong City. MCLM incorporates the following areas:

- Carletonville;
- Khutsong;
- Fochville;
- Kokosi;
- Greenspark;
- Welverdiend;
- Wedela;
- Blybank; and
- Mining Towns.

8.11.2 DEMOGRAPHIC AND SOCIO-ECONOMIC CHARACTERISTICS

Population statistics are normally collected by way of a Census, however because Censuses are usually a huge logistical exercise, many Countries conduct a Census once every 5 to ten years. Between Censuses administrative data is collected by various agencies about population, events such as births, deaths and cross-border migration and these agencies are allowed to produce and use this data. It has been about 12 years since the 2011 Census has taken place, therefore the available data has become old and unreliable. In 2016 Statistics South Africa conducted a Community Survey to supplement the 2011 Census and the municipality has in the past used those figures complemented by data released by other sources such as Quantec Survey of 2017. The most recent Census was undertaken in 2022 and some of the results have been released by Statistics South Africa.

8.11.2.1 POPULATION DYNAMICS

The West Rand population increased by 21,6% from 821 191 in 2011 to 998 466 in 2022 whereas Merafong population increased by 14,2% from 2011 to 2022 rising from 197 520 to 225 476. The West Rand is the least populated District in Gauteng with 0,9 million (988 466) people while Merafong City is the least populated



Municipality in West Rand with 225 476 people. The research also shows that in most Wards, the majority of the population belongs to the Black population group. In Ward 12 more than half of the population belonged to the White population group, while in Ward 14 just over a third of the population belonged to the White population group. Ward 12 includes Deelkraal as well as Welverdiend (which is located outside the 5 km radius). Ward 14 includes West Wits Village, a portion of Fochville, the Numba Wani Residence and the Mohaleshoek Informal Settlement. At 85,5% the Black African population group constitutes the largest proportion of West Rand’s population, followed by White (10,3%) and Coloured (2,8%). At 89,4% the Black African population group constitutes the largest proportion of Merafong’s population, followed by White (8,8%) and Coloured (1,3%). Refer to **Figure 48** for the population by race dynamics.

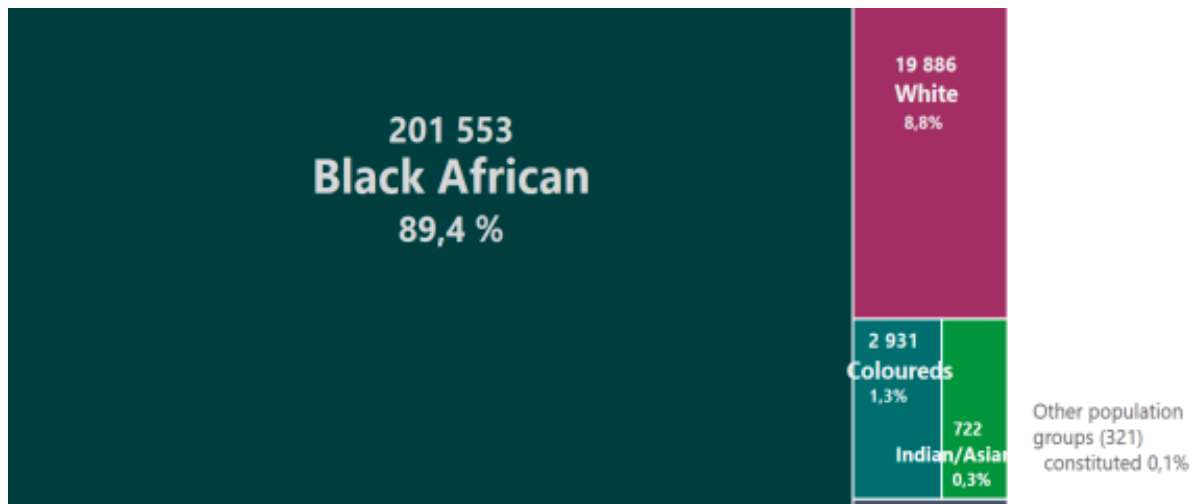


Figure 48: Merafong population groups (Statssa, Census 2022)

8.11.2.2 HOUSING DYNAMICS

Gauteng Households increased from 2,1 million in 1996 to 5,3 million in 2022. There were about 357 thousand households in West Rand 2022 with 77 599 thousand households located within Merafong City in 2022. The number of households in Merafong City increased by 16.5% from 66 624 in 2011. West Rand’s average household size slightly decreased from 3,1 in 2011 to 2,8 in 2022 while the average household size in Merafong City also decreased slightly by 0.1 between 2011 and 2022. Households that resided in formal dwellings increased by 13,6 percentage points from 74,9% in 1996 to 88,5% in 2022 in Gauteng. There were more households that resided in formal dwellings in Merafong City in 2022 as compared to other municipalities in West Rand. Households that resided in formal dwellings increased from 60,4% in 1996 to 91,6% in 2022 in Merafong City.

8.11.2.3 SOCIO-ECONOMIC CONDITIONS

Gauteng is the economic hub of the country, with over 35% of the economic activity taking place in the province. However, Gauteng continues to bear the brunt of high poverty, inequality, and unemployment levels. At the centre of the development of the Growing Gauteng Together 2030 (GGT2030) strategy, which is the provincial expression of the National Development Plan (NDP), the provincial government aims to address the challenges noted above. The GGT2030 goal is to reduce poverty to about 16 per cent of the total population by 2030 from 25.3 per cent in 2019. The plan also aims to reduce income inequality levels (as measured by the Gini coefficient) to 62 per cent in Gauteng. Since the dawn of democracy, significant progress has been made to reduce the high levels of poverty and inequality. However, the deterioration in economic performance in recent years due to domestic and external factors has regressed some of the progress made, with levels of inequality being more prevalent within population groups.

Table 28 shows different measures of poverty for the West Rand district and the local regions. In 2020, over 50 per cent of the districts were living below the UBPL. With economic activity in negative territory in the district before the pandemic and the unemployment rate at its highest level, these did not favour the initiatives targeted



at reducing poverty in the district. The Upper-Bound Poverty Line (UBPL) was the highest in Rand West City at 54.2% in 2020, followed by Merafong City at 53.1%. Refer to Table 28 for the poverty and inequality trends.

Table 28: Selected Poverty Indicators (source: Draft IDP Merafong City 2025-26)

Regions	2010	2012	2014	2016	2018	2020
Food Poverty Line (ZAR 624)						
West Rand	16,7%	14,8%	16,0%	19,2%	21,0%	24,3%
Mogale City	16,9%	14,6%	15,7%	18,7%	20,6%	24,0%
Merafong City	15,0%	14,0%	15,2%	18,6%	20,3%	23,2%
Rand West City	17,6%	15,6%	16,9%	20,2%	22,0%	25,3%
Lower Poverty Line (ZAR 890)						
West Rand	28,6%	26,4%	28,1%	31,5%	33,9%	37,6%
Mogale City	28,8%	26,1%	27,6%	30,7%	33,1%	36,9%
Merafong City	26,4%	25,3%	27,1%	31,1%	33,5%	36,9%
Rand West City	30,0%	27,6%	29,4%	32,9%	35,2%	38,9%
Upper Poverty Line (ZAR1 335)						
West Rand	45,0%	42,7%	44,0%	46,6%	49,0%	52,7%
Mogale City	44,5%	41,7%	42,9%	45,2%	47,6%	51,4%
Merafong City	43,8%	42,7%	44,0%	47,2%	49,5%	53,1%
Rand West City	46,7%	44,1%	45,5%	48,3%	50,6%	54,2%
Poverty Gap Rate						
West Rand	31,4%	30,4%	30,4%	30,7%	31,1%	31,8%
Mogale City	31,4%	30,4%	30,5%	30,8%	31,1%	31,8%
Merafong City	31,5%	30,4%	30,5%	30,9%	31,2%	32,0%
Rand West City	31,2%	30,2%	30,3%	30,6%	31,0%	31,7%

Based on the income inequality as measured by the Gini coefficient for the West Rand district and its local regions, over the period of 2012 to 2020, not much change or movement happened in all the regions, as the increases in later years were marginal. However, the numbers have maintained a level just above 0.6. Much of the inequality is in Mogale City, the region with relatively high activity in the whole district. The Gini coefficient in the region increased from 0.642 in 2012 to 0.644 in 2020.

The better-than-expected recovery in the first half of 2021 improved business activity in municipalities, amid a strong rebound in global demand and higher commodity prices. Going forward, the recovery in economic activity is dependent on various factors, including effective vaccination rollout and sustained provision of energy to all the sectors of the economy. Similarly, in the West Rand, like other regions, economic output has declined for several years, with negative growth rates going back to the start of the review period. The decline in the mining activity of the district over the years has resulted in reduced total output. Mining accounted for 31% of the West Rand's economic output in 1996; it shrunk to an estimated 19.5% by 2021. However, the sector still accounts for the second highest share of economic activity in the region (refer to **Figure 49**).

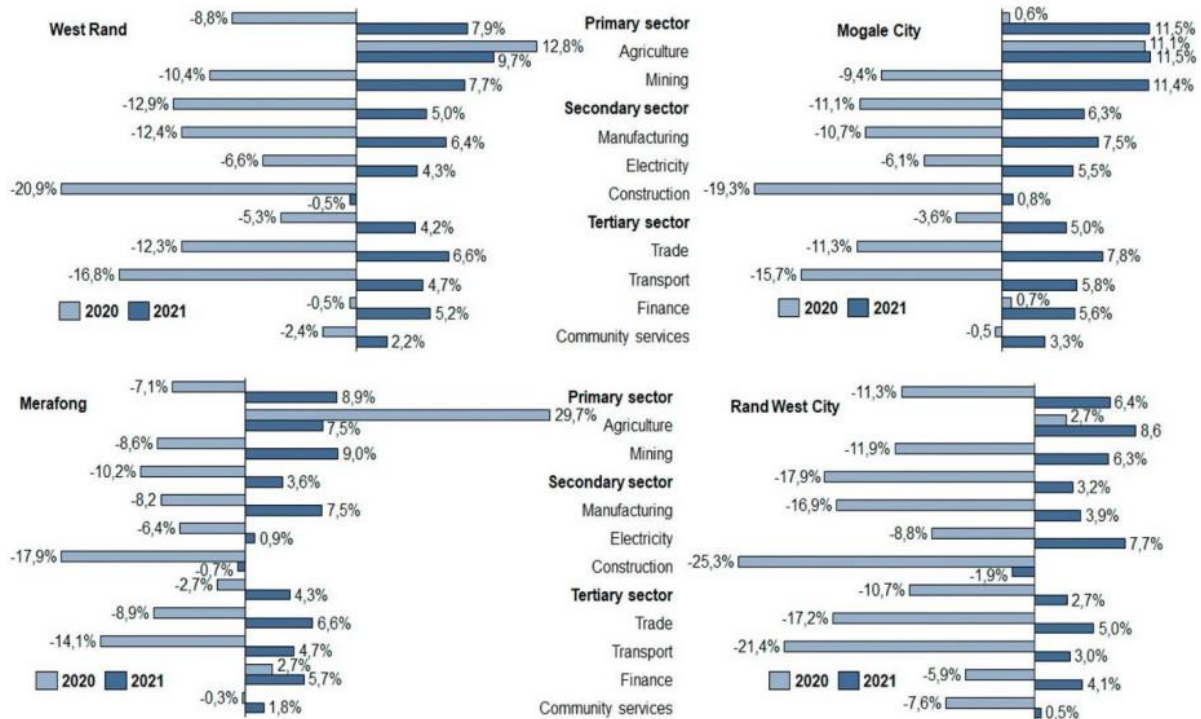


Figure 49: Sector Output Growth (IHS Markit, 2022; Draft IDP Merafong City 2025-26)

The district has also seen the highest contractions in the construction sector, recording a decline of 20.9 per cent in 2020 before a relative improvement however, still negative at 0.5 per cent. In Mogale City, construction decreased by 19.3 per cent, while it declined by 25.2 per cent in Rand West city and by 17.9 per cent in Merafong in the same period. The restriction of mobility of people and the halt of existing and planned projects affected the sector across regions. The agriculture sector has recorded growth for 2020 and is expected to record positive growth for 2021. Mining activity in the district region grew by 7.7 per cent, following a decrease of 10.4 per cent in 2020.

8.11.2.4 SERVICE DELIVERY

All Municipalities in West Rand had more than 90% of households having access to electricity for lighting in 2022. Merafong City had an increase from 82,8% in 2011 to 98,1% in 2022. West Rand District had the third highest (76,7%) proportion of households with access to piped water inside dwelling. Merafong City had the highest (81,9%) proportion of households with access to piped water inside the dwelling. While households using flush toilets only increased by 4,3 percentage points between 2011 and 2022 in Gauteng, households using flush toilets increased by 10 percentage points between 2011 and 2022 in West Rand. Households in Merafong City (94,1%) had the highest access to flush toilets than other municipalities. Approximately 84,3% of households in West Rand had their refuse removed by a local authority once a week. Refuse removal by local authority at least once a week increased from 77,7% in 1996 to 84,3% in 2022 in West Rand. Merafong City had the lowest percentage (81,9%) of refuse removal by local authority at least once a week as compared to other municipalities. Households with no access to internet declined by 40 percentage points, from 53,6% in 2011 to only 13,6% in 2022 in Gauteng Province.



9 ENVIRONMENTAL IMPACT ASSESSMENT

9.1 IMPACT ASSESSMENT METHODOLOGY

The impact significance rating methodology, as provided by EIMS, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. This determines the environmental risk. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S). The impact assessment will be applied to all identified alternatives. Where possible, mitigation measures will be recommended for impacts identified.

9.1.1 DETERMINATION OF ENVIRONMENTAL RISK

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER). The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E + D + M + R) * N}{4}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in **Table 29** below.

Table 29: Criteria for Determining Impact Consequence.

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. Highly localised, limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property or site boundary, or the area within a few hundred meters of the site)
	3	Local (i.e. beyond the site boundary within the Local administrative boundary (e.g. Local Municipality) or within consistent local geographical features, or the area within 5 km of the site)
	4	Regional (i.e. Far beyond the site boundary, beyond the Local administrative boundaries within the Regional administrative boundaries (e.g. District Municipality), or extends into different distinct geographical features, or extends between 5 and 50 km from the site).
	5	Provincial / National / International (i.e. extends into numerous distinct geographical features, or extends beyond 50 km from the site).
Duration	1	Immediate (<1 year, quickly reversible)
	2	Short term (1-5 years, less than project lifespan)
	3	Medium term (6-15 years)
	4	Long term (15-65 years, the impact will cease after the operational life span of the project)



	5	Permanent (>65 years, no mitigation measure of natural process will reduce the impact after construction/ operation/ decommissioning).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected, or affected environmental components are already degraded)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; moderate improvement for +ve impacts; or where change affects area of potential conservation or other value, or use of resources).
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease; high improvement for +ve impacts; or where change affects high conservation value areas or species of conservation concern)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts; or disturbance to pristine areas of critical conservation value or critically endangered species)
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring very high time and cost.
	5	Irreversible Impact.

Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per **Table 30**.

Table 30: Probability Scoring.

Probability	1	Improbable (Rare, the event may occur only in exceptional circumstances, the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <5% chance).
	2	Low probability (Unlikely, impact could occur but not realistically expected; >5% and <20% chance).
	3	Medium probability (Possible, the impact may occur; >20% and <50% chance).
	4	High probability (Likely, it is most probable that the impact will occur- > 50 and <90% chance).
	5	Definite (Almost certain, the impact is expected to, or will, occur, >90% chance).

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

$$ER= C \times P$$



Table 31: Determination of Environmental Risk.

Consequence	5- Very High ³	5	10	15	20	25
	4- High	4	8	12	16	20
	3- Medium	3	6	9	12	15
	2- Low	2	4	6	8	10
	1- Very low	1	2	3	4	5
		1- Improbable	2- Low	3- Medium/ Possible	4- High/ Probable	5- Highly likely/ Definite
Probability						

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in **Table 32**.

Table 32: Significance Classes.

S Score	Description
≤4.25	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).
>4.25, ≤8.5	Low-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>8.5, ≤13.75	High-Medium (i.e. where the impact could have a significant environmental risk/ reward).
>13.75	High (i.e. where the impact will have a significant environmental risk/ reward).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

9.1.2 IMPACT PRIORITISATION

Further to the assessment criteria presented in the section above, it is necessary to assess each potentially significant impact in terms of:

1. Cumulative impacts; and
2. The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

³ In the event that an impact or risk has very high or catastrophic consequences, but the likelihood/ probability is low, then the resultant significance would be Low-medium. This does in certain instances detract from the relative important of this impact or risk and must consequently be flagged for further specific consideration, management, mitigation, or contingency planning.



Table 33: Criteria for Determining Prioritisation.

Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable Loss of Resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in **Table 33**. The impact priority is therefore determined as follows:

$$\text{Priority} = \text{CI} + \text{LR}$$

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 1.5 (Refer to **Table 34**).

Table 34: Determination of Prioritisation Factor.

Priority	Prioritisation Factor
2	1
3	1.125
4	1.25
5	1.375
6	1.5

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).



Table 35: Final Environmental Significance Rating.

Significance Rating	Description
<-25	Very High (Impacts in this class are extremely significant and pose a very high environmental risk. In certain instances these may represent a fatal flaw. They are likely to have a major influence on the decision and may be difficult or impossible to mitigate. Offset's may be necessary.
<-13.75 to -25	High negative (These impacts are significant and must be carefully considered in the decision-making process. They have a high environmental risk or impact and require extensive mitigation measures).
-8.5 to -13.75	Medium-High negative (i.e. Impacts in this class are more substantial and could have a significant environmental risk. They may influence the decision to develop in the area and require more robust mitigation measures).
<-4.25 to <-8.5	Medium- Low negative (i.e. These impacts are slightly more significant than low impacts but still do not pose a major environmental risk. They might require some mitigation measures but are generally manageable).
-1 to -4.25	Low negative (i.e. Impacts in this class are minor and unlikely to have a significant environmental risk. They do not influence the decision to develop in the area and are typically easily mitigated).
0	No impact
1 to 4.25	Low positive
>4.25 to <8.5	Medium-Low positive
8.5 to 13.75	Medium-High positive
>13.75	High positive

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

9.2 IMPACTS IDENTIFIED

This Section presents the potential impacts that have been identified during the scoping phase assessment. It should be noted that this report will be made available to I&AP's for review and comment and their comments and concerns will be addressed in the final Scoping report submitted to the CA for adjudication. The results of the public consultation will be used to update the identified potential impacts which will be further refined during the course of the EIA assessment and consultation process.

Potential environmental impacts identified during the scoping process will be revised in the EIA Phase. These potential impacts identified by the EAP and the appointed specialists will take into consideration of other potential impacts identified by the public. **Table 36** provides the list of preliminary potential impacts identified. Without proper mitigation measures (preliminary proposed measures which will be further refined in EIA phase once detailed assessments are included) and continual environmental management, most of the identified impacts may potentially become cumulative, affecting areas outside of their originally identified zone of impact. The potential cumulative impacts have been identified, evaluated, and mitigation measures suggested which will be updated during the detailed EIA level investigation.



When considering cumulative impacts, it is important to bear in mind the scale at which different impacts occur. There is potential for a cumulative effect at a broad scale, such as regional deterioration of air quality, as well as finer scale effects occurring in the area surrounding the activity. The main impacts which have a cumulative effect on a regional scale are related to the transportation vectors that they act upon. For example, air movement patterns result in localised air quality impacts having a cumulative effect on air quality in the region. Similarly, water acts as a vector for distribution of impacts such as contamination across a much wider area than the localised extent of the impacts source. At a finer scale, there are also impacts that have the potential to result in a cumulative effect, although due to the smaller scale at which these operate, the significance of the cumulative impact is lower in the broader context.



Table 36: Identified potential environmental impacts

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
Site preparation (Planning)	Vegetation clearance for pipelines, return water dam, TSF stabilization, access roads	<ul style="list-style-type: none"> ○ Surface water contamination 	<ul style="list-style-type: none"> ○ Temporary disturbance of wildlife 	<ul style="list-style-type: none"> ○ Employment opportunities 	<ul style="list-style-type: none"> ○ Disturbance / destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils
	Planned placement of infrastructure				
	Stabilization of TSF material				
	Topsoil stripping for pipelines and access roads				
Human resources management (Planning)	Employment/recruitment			<ul style="list-style-type: none"> ○ Employment opportunities 	
	I&AP consultations				
	Environmental awareness training				
	Integration with Municipalities' strategic long-term planning				
Earthworks (Construction)	Stripping and stockpiling of soils	<ul style="list-style-type: none"> ○ Erosion due to storm water runoff ○ Impact due to topsoil stripping ○ Surface water contamination ○ Loss of fertility ○ Loss of flow paths ○ Emissions and dust ○ Impacts on wetlands 	<ul style="list-style-type: none"> ○ Loss/ destruction of natural habitat ○ Introduction/ Invasion by Alien Species ○ Displacement of faunal species 	<ul style="list-style-type: none"> ○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e., noise, dust, etc.). ○ Health and safety aspects related to radiation and health as well as TSF stability ○ Impact on existing infrastructure (i.e., roads, fences, etc.) ○ Perceptions and expectations ○ Employment opportunities 	<ul style="list-style-type: none"> ○ Disturbance/ destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils
	Levelling, grubbing and bulldozing				
	Removal of waste and cleared vegetation				
	Preparing trenches and foundations				
	Establishing storm water management measures				
	Establishment of firebreak				
Civil Works (Construction)	Establishment of infrastructure and services	<ul style="list-style-type: none"> ○ Erosion due to storm water runoff ○ Impact due to topsoil stripping ○ Surface water contamination ○ Ground water contamination ○ Cone of depression 	<ul style="list-style-type: none"> ○ Loss/ destruction of natural habitat ○ Introduction/ Invasion by Alien Species ○ Displacement of faunal species 	<ul style="list-style-type: none"> ○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e., noise, dust, etc.). ○ Health and safety aspects related to radiation and health as well as TSF stability 	<ul style="list-style-type: none"> ○ Disturbance/ destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils
	Mixing of concrete and concrete works				
	Establishment of surface and sub-surface dirty water systems				
	Temporary sewage and sanitation				
	Establishment of waste area				
	Construction of crossings if required for pipelines				



Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
	General site management	<ul style="list-style-type: none"> Loss of flow paths Emissions and dust Impacts on wetlands 		<ul style="list-style-type: none"> Impact on existing infrastructure (i.e., roads, fences, etc.) Perceptions and expectations Employment opportunities 	
Deposition at TSF (Operation)	Deposition of tailings	<ul style="list-style-type: none"> Cone of depression 		<ul style="list-style-type: none"> Visual impact and impact on sense of place 	
	Maintenance and management of stormwater system	<ul style="list-style-type: none"> Impacts on surface water quality due to leachate 		<ul style="list-style-type: none"> Nuisance and impact on sense of place (i.e., noise, dust, etc.) 	
	Plant operations	<ul style="list-style-type: none"> Impacts on groundwater quality due to leachate 		<ul style="list-style-type: none"> Health and safety aspects related to radiation and health as well as TSF stability 	
	Water management	<ul style="list-style-type: none"> Loss of flow paths Emissions and dust Potential subsidence or sinkhole formation or loss of containment from TSF 			
Closure and Rehabilitation of TSF (Decommissioning and Closure)	Revegetation	<ul style="list-style-type: none"> Emissions and dust 	<ul style="list-style-type: none"> Alien and invasive species 	<ul style="list-style-type: none"> Safety and security (i.e., access to properties, theft, fire hazards, etc.) Visual and dust 	
	Slope stabilisation				
	Erosion control				
Maintenance (Post closure)	Initiate maintenance and aftercare program	<ul style="list-style-type: none"> Surface and groundwater quality 	<ul style="list-style-type: none"> Alien and invasive species 	<ul style="list-style-type: none"> Visual Site security and access control 	
	Environmental aspect monitoring	<ul style="list-style-type: none"> Potential subsidence or sinkhole formation or loss of containment from TSF 		<ul style="list-style-type: none"> Health and safety aspects related to radiation and health as well as TSF stability 	



Table 37: Impact identification matrix

Phase	Activity	Environmental Component (- = negative impact; + = positive impact)													
		Air Quality (AQ)	Geology (G)	Hydrology (H)	Groundwater (GW)	Surface water/ wetlands (W)	Noise (N)	Soils (S)	Visual / Landscape (V)	Flora (FL)	Fauna (FA)	Health and safety (H&S)	Socio-economic (SE)	Palaeontology (P)	Cultural Heritage (C)
Construction	Site establishment	-			-	-	-	-	-	-	-		+	-	-
	Spring Diversion		-	-	-	-		-		-	-				
	Decommissioning of landfill and TSF Stabilization	-					-			-	-	+	+		
	Establishment of necessary infrastructure	-	-	-	-	-	-	-	-	-	-			-	-
Operation	Deposition of tailings onto TSF	-		-	-		-		-			-	-		
	Maintenance and management of infrastructure				-	-		-		-	-				
	Clean and Dirty water management			-	-	-		-				+	+		
Closure and Rehabilitation	Revegetation	+				+		+	+	+	+	+	+		
	Erosion control			+	+	+		+		+	+	+	+		
Post Closure	Initiate maintenance and monitoring programmes				+	+		+		+	+	+	-		
	Environmental aspect monitoring and remediation	+		+	+	+		+	+	+	+	+	-		



9.3 DESCRIPTION AND PRELIMINARY ASSESSMENT OF IMPACTS

The following potential impacts were identified during the scoping phase assessment and were assessed in terms of nature, significance, consequence, extent, duration and probability. These preliminary impact calculations will be subject to amendment based on the EIA phase assessment and the results of public consultation undertaken during the Scoping as well as EIA phases.

9.3.1 PRELIMINARY IMPACT ASSESSMENT

Table 38 provides a description of each impact with preliminary mitigation measures and an indication of which impacts are to be assessed in greater detail in the EIA phase assessment. Preliminary mitigation / management measures to minimise potential negative impacts or enhance potential benefits are put forward in this Scoping Report and will be adjusted where relevant during the EIA phase once detailed specialist assessments are concluded and input from the public has been considered. Refer to Appendix E for the detailed impact assessment matrix.



Table 38: Preliminary impact assessment

#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
1	Disturbance / destruction of sites of heritage significance	Planning	Medium to low -	Medium to low -	Medium to low -	<p>The proposed Deelkraal II TSF area covers an extensive number of buildings and ruins which may be older than 60 years. While these features are not present in the first edition topographic map, they present the potential of the area being rich in heritage associated with the colonial period and early establishment of the mining industry of the area. Using the first edition topographic maps, aerial photography, and current satellite imagery, a total of 17 distinct heritage features were identified which may potentially be impacted by the proposed development. These included modern ruined buildings, farmsteads, demolished sections of mining complexes, grave sites, stone wall structures. The field survey will provide more insight into the potential heritage value of these features.</p> <p>Preliminary mitigations include:</p> <ul style="list-style-type: none"> • A 30m buffer around all identified heritage structures must be implemented, within which no proposed activities are to take place. • A 50m buffer around all identified graves must be implemented within which no proposed activities are to take place. • Should finds of an alarming significance, for example, a grave or high density of small finds be discovered during construction, the ECO must be informed of the discovery. SAHRA must likewise be contacted, and a qualified Archaeologist must be consulted to provide advice on how to proceed. • A Chance Find Procedure is advised to be followed should additional heritage finds or sites be encountered. 	<p>Detailed Heritage Impact Assessment</p> <p>EIA Phase impact assessment</p>
		Construction	High -	Medium to low -	Medium to low -		
		Operational	Medium to low -	Low -	Low -		
		Closure & Rehab	Medium to low -	Low -	Low -		
2	Disturbance / destruction of palaeontological resources	Planning	Medium to low -	Medium to low -	Medium to low -	<p>According to the SAHRIS Palaeosensitivity map, the site associated geology namely the Rooihoogte and Timeball Hill Formations are classified as High sensitivity, the Hekpoort Formation has a Moderate sensitivity, and the diabase is rated as having Zero palaeontological sensitivity. The construction activities will impact an area considered to be ranging from zero to high palaeontological sensitivity. Palaeontological heritage may be discovered and/or impacted during the project phases.</p>	<p>Palaeontological Impact Assessment</p>
		Construction	Medium to high -	Medium to low -	Medium to low -	<p>The main impact on palaeontology remains (if any) will be the physical disturbance of the material and its context. The clearing of vegetation and construction phase excavations may expose, disturb and displace archaeological sites/material. However, impact (if any) on palaeontological features will be local and not result in extensive significant loss of palaeontological features in the regional scale as there will likely be more similar features in the extended area. Therefore, the cumulative impact on palaeontological resources is low negative with mitigation.</p>	<p>EIA Phase impact assessment</p>



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Operational	Medium to low -	Low -	Low -	Preliminary mitigation measures include: <ul style="list-style-type: none"> The planning must take cognizance of the heritage sensitivities depicted on the heritage sensitivity maps; A Chance Finds Protocol must be implemented; The palaeontologist must apply for a valid permit from SAHRA for the collection / removal of fossils if necessary; All known heritage features should be retained and avoided with a buffer zone of 30m as per SAHRA guidelines; An independent and suitably qualified ECO must be appointed and should be able to recognise potential palaeontological features; and Should any palaeontological features be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the ECO shall be notified within 24hours, and a Chance Find Protocol must be implemented. The responsible heritage resources authority (PHRA), as well as the South African Police Service (SAPS) must be notified within 72 hours. 	
		Closure & Rehab	Medium to low -	Low -	Low -		
3	Soils and Agriculture: Soil erosion and sedimentation & loss of soil fertility	Planning	Medium to low -	Low -	Low -	Clearing of vegetation for the construction activities will result in compaction of soils which will impact the soils and increase the rate of erosion, especially on sloping terrain. Additionally, soil contamination and loss viable agricultural of land or potential impacts related to the construction of the TSF and associated infrastructure. Considering that the construction activities on or near watercourse will be short-term and erosion control measures will be required, the risk of sedimentation of watercourses is considered low. In addition the agricultural potential of the area is moderate to low. Through the implementation of the proposed mitigation measures, the soil impacts are considered to have an overall low negative cumulative impact significance subject to adherence of the mitigation measures. Preliminary mitigation measures include: <ul style="list-style-type: none"> The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on soils; Best known techniques of soil erosion and management should be adopted for the project if necessary; Construction impacts associated with the proposed project must be contained within the footprint of the assessed areas; and Rehabilitation of the disturbed areas must be made a priority. Any disturbed area must be re-habilitated to its pre-disturbed state. 	Soils and Agricultural Impact Assessment EIA Phase impact assessment
		Construction	Medium to low -	Low -	Low -		
		Operational	Medium to low -	Low -	Low -		
		Closure &	Medium to low -	Low -	Low -		
4	Air quality and	Planning	Medium to low -	Low -	Low -	The proposed activities entail the storage of tailings. Gold TSFs primarily contain finely milled ore waste, including silica (quartz), clays, unrecoverable metals and minerals (like iron, arsenic, lead, zinc, and copper), chemicals used in processing, and water. The proposed activities will result in emissions to air from a variety of activities and sources. The main source of dust and air pollution from the project will be wind erosion from the TSF as a tailings deposition area. Additionally the planned upgrades to the Kusasaletu plant will	Air Quality Impact Assessment



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Construction	Medium to low -	Medium to low -	Medium to low -	<p>also result in potential air quality impacts. Airborne PM is the most significant pollutant of concern. The impact of particles on human health is largely dependent on: (i) particle characteristics, particularly particle size and shape, and chemical composition; and (ii) the duration, frequency and magnitude of exposure. From gold mining and processing facilities the radioactive particles in the form of radionuclides and radon releases are of concern.</p> <p>The area is a gold mining area with several existing TSFs. It is assumed that the cumulative impact on air quality will be low negative. However, the quantification of GHG for the project will only be undertaken during the impact assessment phase, the significance rating can only be provided once the impact assessment has been undertaken.</p> <p>Preliminary mitigation measures include:</p> <ul style="list-style-type: none"> • Limit air emissions as far as practically possible through best practice design and implementation; • Reduce to nuisance factor of dust to neighbouring residents; • Implement dust suppression measures in all areas that will be affected by construction activities and where dust will be generated. Dust suppression must also be undertaken during windy and dry weather conditions; • Speed restriction measures must be implemented for all construction vehicles within the construction site; • Dust management plan; • Air quality monitoring; • GHG reporting; and • Design liner to cater for future climate change predictions. 	<p>Climate Change Impact Assessment</p> <p>EIA Phase impact assessment</p>
		Operational	Medium to high -	Medium to low -	Medium to low -		
		Closure & Rehab	Medium to low -	Low -	Low -		
5	Health and Safety of the Community: Release of gases, pollution of surface water,	Planning	Medium to low -	Low -	Low -	<p>Various emissions can be expected from the project. Airborne PM is the most significant pollutant of concern from the proposed project. From gold mining and processing facilities the radioactive particles in the form of radionuclides and radon releases are of concern. Another major concern associated with TSFs is the potential negative impacts to surface and groundwater, runoff from the TSF can enter the surface water bodies leading to contamination while leaching can result in infiltration of the groundwater. In addition, unstable and/or unsafe TSF practices can result in the TSF breaking the dam wall, resulting in massive sudden uncontrolled flood of liquid sludge.</p> <p>The area is a gold mining area with several existing TSFs located within and around the proposed project area. The addition of the TSF in the area with the implementation of the necessary stabilization activities will result in medium-low negative health and safety cumulative impact subject to adherence of the mitigation measures.</p>	<p>Health Risk & Safety Assessment</p> <p>Engineering Designs</p> <p>EIA Phase Impact Assessment</p>
Construction	Medium to high -	Medium to low -	Medium to low -				



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Operational	High -	Medium to high -	Medium to high -	Preliminary mitigation measures include: <ul style="list-style-type: none"> The applicant must undertake the Dam Safety Technical Assessment and register with the DWS Dam Safety Office; Long term ground improvement, such as dynamic compaction must be implemented for the TSF; Dedicated and adequate clean and dirty water management systems must be installed prior deposition; Installation of the geomembrane according to design specifications and industry best practice to prevent ultraviolet radiation exposure and/or instability of the TSF; Radiation monitoring; Regular monitoring and maintenance of infrastructure based on the engineering specifications shall be undertaken; and Emergency preparedness plan shall be compiled and implemented throughout the lifetime of the project activities. 	
		Closure & Rehab	Medium to high -	Medium to low -	Medium to low -		
6	Noise	Planning	Medium to low -	Medium to low -	Low -	Noisy activities associated with the project will be limited to the planning and construction phases. During the planning phase, site establishment which may require vehicular movement and clearance of vegetation as well as establishment of temporary infrastructure. During the construction phase, noisy activities such excavations for infrastructure and movement of heavy vehicles is expected. During the operation and decommissioning phase, minimal noise disturbance is expected due to the nature of the proposed activity.	Noise Compliance Statement EIA Phase impact assessment
		Construction	Medium to low -	Medium to low -	Medium to low -	The project is located close to potential noise sensitive receptors which include individual households and residential areas (i.e. Deelkraal, Elandsrand, Elandsridge, Wedela, Western Deep Levels, Southdene, Northdene, The Village and Doornfontein). The acoustic climate in the area is mainly influenced community activities, vehicle traffic and mining activities. During the day and night, the predominant wind direction is from the northern sector. On average, noise impacts are expected to be more notable to the south, with the proposed mitigations, it is anticipated there will be medium-low negative cumulative impact emanating from noise.	
		Operational	Medium to low -	Low -	Low -	Preliminary mitigation measures include: <ul style="list-style-type: none"> The working hours stipulated in the Construction permit, where applicable, must be adhered to. Where this is not applicable, the following working hours must be adhered to: Monday to Friday from sunrise to sunset and where applicable on a Saturday which must be agreed upon between the affected parties and the Contractor; The contractor must attempt to restrict noisy activities as far as possible to times and locations whereby the potential for noise nuisance is reduced; and 	



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Closure & Rehab	Medium to low -	Low -	Low -	<ul style="list-style-type: none"> All construction plant and other equipment must be in a good working order to reduce possible noise pollution. 	
7	Nuisance and Impact on Sense of Place	Planning	Medium to low -	Low -	Low -	<p>The proposed activities will temporarily impact on the established sense of place of the Class 2 ridge and heritage sensitive area. The character of the area would change due to the activities being undertaken on that particular place. Additional vehicles, increased noise and dust, the removal of vegetation will all contribute to the alteration of the sense of place.</p> <p>The study area is generally a mining area in nature. Grasslands, naturally occurring dams, residential areas, watercourse, wetlands, mines and ridges are also located within and surrounding the study area. The TSF is located within a greenfields site with partial brownfields intake. The larger project area surrounding is classified as industrial in nature. Therefore, the additional activities largely will have minimal impacts on sense place. Minimal changes to the current sense of place are anticipated and low cumulative impact is expected.</p> <p>Preliminary mitigation measures include:</p> <ul style="list-style-type: none"> Rehabilitation of the disturbed areas must be made a priority. Any disturbed area must be re-habilitated to its pre-disturbed state after completion of such activity; Disturbed areas must be rehabilitated to support its post-closure land use; All construction/operational and access must make use of the existing roads; Noise producing activities should be limited to day-time hours between 07h00 and 17h00 with the exception of necessary activities during the operational phase; Adequate dust suppression measures should be utilized to minimize dust production; The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on the area; and Areas outside the direct project footprint, should under no circumstances be disturbed 	<p>Visual Impact Assessment</p> <p>EIA Phase impact assessment</p>
		Construction	Medium to low -	Medium to low -	Medium to low -		
		Operational	Medium to high -	Medium to low -	Medium to low -		
		Closure & Rehab	Medium to low -	Low -	Low -		
		Construction / Operational	Medium to high -	Low -	Low -		



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
8	Impact on Groundwater Quality and Quantity: Leaching and migration of radionuclides into groundwater, loss of flow path & cone of depression	Planning	Medium to low -	Low -	Low -	<p>A major concern associated with TSFs is the potential to contaminate groundwater. There is always a risk of seepage from the TSF to the groundwater regardless of the geohydrological conditions. The current design of the TSF includes a liner (inverted barrier system) liner to be installed which should mitigate the potential groundwater contamination impacts. The groundwater model, once calibrated, will be used to simulate contaminant migration and the effectiveness of recommended management options. The latter includes, but not restricted to the mitigations listed below:</p> <p>Preliminary mitigation measures include:</p> <ul style="list-style-type: none"> Lining of the proposed new tailings facility. Cut-off trenches on the down-gradient side of the TSF's. Scavenger boreholes to intercept and contain the contaminant plume. Phyto-remediation. <p>Additional Preliminary mitigation measures relating to potential groundwater contamination from other sources include:</p> <ul style="list-style-type: none"> Construction vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum; Spill trays must be provided if refuelling of vehicles is done on site; Chemical sanitary facilities should be provided for the crew. Construction workers should only be allowed to use temporary chemical toilets on the site. Chemical toilets shall not be within close proximity of the drainage system. Frequent maintenance should include the removal without spillages; Adequate fuel containment facilities to be used; The use of all materials, fuels and chemicals which could potentially leach into the environment must be controlled; All materials, fuels and chemicals must be stored in a specific and secured area to prevent pollution from spillages and leakages; No potential formation water must be discharge into the environment, it was be manged as a hazardous waste and disposed at a registered hazardous waste disposal facility; No uncontrolled discharges from the site shall be permitted; and Any spills that occur must immediately be cleaned up and the contaminated soils, etc. suitably disposed of at a registered waste disposal facility; and Sound groundwater management measures and monitoring need to be developed based on the results of the impact assessment. 	<p>Hydrogeological Impact Assessment</p> <p>EIA Phase impact assessment</p>
	Construction	Medium to low -	Medium to low -	Medium to low -			
	Operational	Medium to high -	Medium to low -	Medium to low -			
	Closure & Rehab	Medium to low -	Low -	Low			



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
9	Impact on Surface water Quality and Quantity: Introduction of pollutants to water environment, wetland disturbance and decrease in functionality & altering of Hydrological Regime	<p>Planning</p> <p>Construction</p>	<p>Medium to low -</p> <p>Medium to high -</p>	<p>Low -</p> <p>Medium to low -</p>	<p>Low -</p> <p>Medium to low -</p>	<p>When surface water becomes polluted by contaminants, it puts strains on local and regional drinking water supplies and aquatic ecosystems that rely on surface water environments. Because of their geographical location, surface waters easily become polluted, and some leading causes of water pollution come from contaminated rainwater runoff, from fertilizers and other harmful chemicals that are used on farms, in homes, industries, and on infrastructure such as roads. Surface water pollution can also come from sewage leaks and waste products that leach into the environment.</p> <p>Surface water may be impacted through the clearing of vegetation close to the water resource habitat, introduction of pollutants onto the water resource. This disturbance may also result in the proliferation of alien and invasive species within the surrounding watercourses. There are concerns surrounding the potential for contamination of water resources (including surface water resources). For the proposed activity, surface water may be negatively impacted throughout all the project phases, during the planning phase there may be contamination of surface water during the site establishment, during the construction phase watercourse and wetlands will be impacted through the establishment the pipelines, and during the operation phase there may be run-off of contaminants into the watercourse from the TSF while during decommissioning, contaminants may be indirectly introduced into the watercourse during backfilling or revegetation.</p> <p>Although the Deelkraal II TSF would be an additional TSF and expected to cumulatively add to the surface water quality and quantity impacts there are several proposed measures which will mitigation the impact on surface water such as the clean and dirty water systems, sub-surface drainage and consistent dust suppression which will aid in reducing the impact on the water resource. Therefore, the accumulative surface water impact associated with the proposed development is low and this impact has been rated with a low negative significance.</p> <p>Preliminary mitigation measures include:</p> <ul style="list-style-type: none"> • Ensure that detailed baseline water quality and quantity samples are obtained and analysed for reference purposes; • Ensure that all mitigation measures as stipulated in the EMPr relating to the activities are adhered to; • Excavations should be open for as short period as practically possible and rehabilitated; • Construction vehicles and machines must be maintained properly to ensure that oil spillages are kept at a minimum; • Spill trays must be provided if refuelling of vehicles is done on site; 	<p>Hydrological Impact Assessment</p> <p>Freshwater and Wetlands Impact Assessment</p> <p>EIA Phase impact assessment</p>



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Operational	Medium to high -	Medium to low -	Medium to low -	<ul style="list-style-type: none"> Chemical sanitary facilities should be provided for the crew. Construction workers should only be allowed to use temporary chemical toilets on the site. Chemical toilets shall not be within close proximity of the drainage system. Frequent maintenance should include the removal without spillages; Adequate fuel containment facilities to be used; The use of all materials, fuels and chemicals which could potentially leach into the environment must be controlled; All materials, fuels and chemicals must be stored in a specific and secured area to prevent pollution from spillages and leakages; No uncontrolled discharges from the site shall be permitted; and Any spills that occur must immediately be cleaned up and the contaminated soils, etc. suitably disposed of at a registered waste disposal facility. 	
		Closure & Rehab	Medium to low -	Medium to low -	Medium to low -		
10	Impacts on natural habitat: Destruction, loss and fragmentation of natural habitats	Planning	Medium to high -	Medium to low -	Medium to high -	<p>The proposed activities will lead to localised disturbance to the TSF Footprint area, RWD, reclamation pump station and pipeline routes. There will possibly also be damage to habitats associated with the new activities especially on the Class 2 Ridge environment. The activities will fragment these habitat units regarded as important consisting of CBAs and ESA, not only within the local landscape, but also regionally as they are used for habitat, foraging and movement corridors for fauna within a landscape fragmented by mining to more natural areas where they may reproduce.</p> <p>Although the proposed activities on site will lead to localised disturbances the ridge habitat has already been partly transformed. The pipelines will be aboveground on concrete plinths resulting in less impact. Therefore, the proposed project is anticipated to have a low negative cumulative impact on natural habitats upon implementation of the mitigation measures.</p> <p>Preliminary mitigation measures include:</p> <ul style="list-style-type: none"> Minimise vegetation clearance. Rehabilitation of the disturbed areas must be made a priority. Any disturbed area must be re-habilitated to its pre-disturbed state or to support its post-closure land use; An Invasive Species Management Plan must be compiled and implemented during the lifecycle of the project; The use of the existing roads must be prioritised as far as possible; A suitable qualified Environmental Officer (EO) or Environmental Compliance Officer (ECO) must be appointed prior to the planning phase. Monthly compliance monitoring and reporting must be undertaken by the ECO; 	<p>Terrestrial Biodiversity Impact Assessment</p> <p>EIA Phase impact assessment</p>
		Construction	High -	Medium to low -	Medium to low -		



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Operational	Medium to low -	Medium to low -	Medium to low -	<ul style="list-style-type: none"> No sensitive vegetation or floral SCC are to be impacted unless permits have been obtained; Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed further; Areas rated as High sensitivity outside of the direct development footprint should be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent development access to these areas from construction workers and machinery; and All laydown, chemical toilets etc. should be restricted to low / medium sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. 	
		Closure & Rehab	Medium to low -	Low -	Low -		
11	Impacts on Vegetation and Flora species: Loss of floral SSC species, Introduction or spread of alien plant species	Planning	Medium to high -	Medium to low -	Medium to low -	<p>There will possibly be damage to habitats associated with the new activities especially on the Class 2 Ridge environment. The activities will fragment these habitat units regarded as important consisting of CBAs and ESA, not only within the within the local landscape, but also regionally as they are used for habitat, foraging and movement corridors for fauna within a landscape fragmented by mining to more natural areas where they may reproduce.</p> <p>Localised loss of floral habitat and diversity may occur within areas of increased ecological sensitivity, such as the rocky grassland and water resource habitat. Due to the clearance of indigenous vegetation for the TSF and associated infrastructure, disturbance and mortalities of flora species is anticipated. Clearing of vegetation for construction purposes as well as compaction of soils due to vehicular movement will result in reduced floral habitat availability and re-establishment success post closure and rehabilitation phase. Disturbances to soil and vegetation on site will also favour alien plants in places.</p>	<p>Terrestrial Biodiversity Impact Assessment</p> <p>EIA Phase impact assessment</p>
		Construction	High -	Medium to low -	Medium to low -	<p>The proposed activities will result in a loss of vegetation supporting the floral and fauna. However, due to the small scale of clearing required within intact vegetation areas for the proposed activities, the short duration thereof and the rehabilitation that will occur, this impact is anticipated to have a low negative cumulative impact significance.</p> <p>Preliminary mitigation measures include:</p>	



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Operational	Medium to low -	Medium to low -	Medium to low -	<ul style="list-style-type: none"> Rehabilitation of the disturbed areas must be made a priority. Any disturbed area must be re-habilitated to its pre-disturbed / pre-determined state or to support its post-closure land use; An Invasive Species Management Plan must be compiled and implemented during the lifecycle of the project; The use of the existing roads must be prioritised as far as possible; A suitable qualified EO or ECO must be appointed prior to the planning phase. Monthly compliance monitoring and reporting must be undertaken by the ECO; No sensitive vegetation or floral SCC are to be impacted; Areas of indigenous vegetation, even secondary communities outside of the direct project footprint, should under no circumstances be fragmented or disturbed; Areas rated as High sensitivity outside of the direct footprint should be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent impacts and access to these areas from construction workers and machinery; and All laydown, chemical toilets etc. should be restricted to low / medium sensitivity areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. 	
		Closure & Rehab	Medium to low -	Medium to low -	Medium to low -		
12	Impacts on Fauna species: Loss of Fauna SCC, loss of fauna community, mortality / disturbance of wildlife due to increased	Planning	Medium to high -	Medium to low -	Medium to low -	<p>The proposed activities will lead to localised disturbance to the TSF Footprint area, reclamation pump station, RWD and pipeline routes. There will possibly also be damage to habitats associated with the new activities especially on the Class 2 Ridge environment. The activities will fragment these habitat units regarded as important consisting of CBAs and ESA, not only within the within the local landscape, but also regionally as they are used for habitat, foraging and movement corridors for fauna within a landscape fragmented by mining to more natural areas where they may reproduce. Localised loss of modified habitat may occur within the remaining areas providing shelter for faunal species due the clearance of vegetation and construction activities. The loss of habitat will directly result in the loss of fauna community (i.e., reptiles, amphibians and birds, etc.). Loss of habitat also means loss of food and nesting resources, cover and movement corridors, which could lead to the disappearance of the affected species from the area.</p> <p>Although fauna species will be negatively impacted due to the construction, there is a high likelihood that they can easily relocate to the adjacent properties and may even resettle during the post construction phase of the project. The cumulative impact for impact on fauna species is, therefore, expected to be low negative with mitigation.</p> <p>Preliminary mitigation measures include:</p>	<p>Terrestrial Biodiversity Impact Assessment</p> <p>EIA Phase impact assessment</p>
		Construction	High -	Medium to low -	Medium to high -		



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Operational	Medium to low	Medium to low	Medium to low	<ul style="list-style-type: none"> The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna; Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals; No trapping, killing, or poisoning of any wildlife is to be permitted on site; Outside lighting should be designed and limited to minimize impacts on fauna; Rehabilitation of the disturbed areas must be made a priority. Any disturbed area must be re-habilitated to its pre-disturbed state or to support its post-closure land use; The use of the existing roads must be prioritised as far as possible; A suitable qualified EO or ECO must be appointed prior to the planning phase. Monthly compliance monitoring and reporting must be undertaken by the ECO No sensitive, protected or SCC fauna species are to be directly impacted; Areas rated as High sensitivity outside of the direct development areas should be declared as 'no-go' areas during the life of the project, and all efforts must be made to prevent impacts / access to these areas from construction workers and machinery; and Identified protected or SCC fauna species that will be impacted upon must be relocated by a suitably qualified environmentalist / ecologist. 	
		Closure & Rehab	Medium to low	Medium to low	Medium to low		
13	Visual - Change of Landscape Character	Planning	Medium to low	Medium to low	Medium to low	<p>The study area features a varied aesthetic and visual landscape, with mining activities predominating the eastern sections of the study area. In general terms, the mine and associated infrastructure is located within a valley system which serves to screen views from main roads (to the north the R501 and South N12) and the closest residential areas outside of mine villages. Roadside vegetation helps to reinforce the screen. There are numerous existing pipelines and mining infrastructure throughout the area. The majority of the proposed pipeline alignments are located adjacent to internal roads. Whilst they are obviously likely to be visible from adjacent roads, the view is over mining areas and is not a critical landscape area. Settlement areas in the study area (Deelkraal, Elandsrand, Elandsridge, Wedela, Western Deep Levels, Southdene, Northdene, The Village and Doornfontein) and the adjacent roads are likely to be the most sensitive to changes in view associated with the TSF. Having said that, there are numerous TSF facilities in the area that are highly visible. The majority of settlement areas are unlikely to be affected.</p> <p>There are also two protected areas approximately 20km to the south-east that could be partly affected. However, at this distance, whilst it may be visible, it is highly unlikely that the facility will be distinguishable from the surrounding landscape. From within the adjacent mining villages vegetation is sufficiently dense to pretty much screen all views of surroundings. There is an attractive dam and braai area approximately 1.5km to the east of the TSF site. This area contrasts with the adjacent open areas that are affected by informal dumping.</p>	<p>Visual Impact Assessment</p> <p>EIA Phase impact assessment</p>
		Construction	Medium to low	Medium to low	Medium to low		



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Operational	Medium to low -	Medium to low -	Medium to low -	<p>In a relatively flat landscape, the scale and nature of the TSF will be impossible to screen however the site is already impacted by other TSFs and mining infrastructure. Sensitive receptors are locations where people would most likely be susceptible to adverse changes in the landscape caused by the physical presence of the Project. The overall effect of the project, which is near existing mine activities, would be low. That is, considering potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will lead to spatial and temporal cumulative change. Subsequently, the existing mining and TSF fabric and the mitigation of night light impact, the cumulative visual impact is anticipated to be low negative.</p> <p>Preliminary mitigation measures include:</p> <ul style="list-style-type: none"> • Apply dust suppression methods to limit the dust generated during the establishment phase. • Ensure the post-closure rehabilitation plan is geared toward acceptable topographic and ecological conditions; • Where new vegetation is proposed to be introduced to the site (on the rising side slopes), an ecological approach to rehabilitation should be adopted. For example, communities of indigenous plants (primarily grasses) will enhance biodiversity, a desirable outcome for the area. This approach can significantly reduce long-term costs as less maintenance would be required over conventional landscaping methods, and the introduced landscape would be more sustainable; • Good housekeeping procedures should be developed for the project to ensure that the Project site and adjacent lands are kept clean of debris and that dust generation is limited; • Should light fixtures be installed, ensure precisely directed illumination to reduce light spillage beyond the site's immediate surroundings; • Minimise the number of light fixtures to the bare minimum, including security lighting; and • Mitigation for the dam and braai area could include tree planting in close proximity to the dam. 	
		Closure & Rehab	Medium to low -	Low -	Low -		
14	Impacts on Traffic and road infrastructure	Planning	Medium to low -	Low -	Low -	<p>The movement of construction vehicles during the construction of the proposed roads can result in an increase in traffic congestion on local roads. Activities during the planning and construction phase of the project such as the movement of abnormal loads of infrastructure in and out of the development area and/or temporary lane closures during the construction phase can impact on the overall traffic and subsequently damage to the road infrastructure. However, during visits to the study area, it was also noted that there is minimal traffic in and out of the area, mainly limited to the flowing traffic on the N12 to the south of the project area.</p>	EIA Phase impact assessment



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
		Construction	Medium to low -	Low --	Low -	<p>The short duration of potential increased traffic as a result of the construction works is not anticipated to have a significant impact on the existing road networks and subsequent damage to road infrastructure. Therefore, it is anticipated that there will be low negative cumulative impact on traffic and damage to road infrastructure. However, the applicant must monitor the condition of roads to ensure that any damage caused by the construction works is adequately rectified.</p> <p>Preliminary mitigation measures include:</p> <ul style="list-style-type: none"> • All construction and vehicles using public roads must be in a roadworthy condition and their loads secured. They must adhere to the speed limits and all local, provincial and national regulations with regards to road safety and transport; • Damage caused to public roads as a result of the construction activities must be repaired in consultation with the relevant municipal authorities; • The working hours stipulated in the Construction permit, where applicable, must be adhered to. Where this is not applicable, the normal construction working hours (Monday – Friday: 07H00 -17h00) must be adhered to; and • Construction vehicles must not exceed speed limits of 20 km/h within the construction site(s). 	
	Operational	Medium to low -	Low -	Low -			
	Closure & Rehab	Low -	Low -	Low -			



#	Impact	Phase	Pre-mitigation	Post-mitigation Risk	Final Significance	Description of Impact, Assessment of Cumulative Impact and Preliminary Mitigation	Further Assessment
15	Socio-economic: Upliftment of communities/ employment opportunities, integration of Merafong City IDP and perceptions relating to the risk of TSF failure	Planning	Medium to low +	Medium to low +	Medium to low +	<p>As the proposed TSF forms part of an existing mining operation, the potential for new job creation is limited. Some jobs will be created during planning and construction. The majority of the employment opportunities are related to the future ongoing operation of the West wits operations which requires additional deposition space in order to continue operations. Employment opportunities for some unskilled, skilled labour as well as providing services during construction (e.g. accommodation, transportation, etc.) may arise from this project. It is important to note that employment opportunities for locals will be minimal as the project entails aspects which require qualified and skilled personnel especially for the operational phase. The proposed activities also cover a small footprint and a short period of construction. Therefore, there will be minimal opportunities for locals for tasks largely related to unskilled labour, resulting in low positive cumulative impact on socioeconomics.</p> <p>As indicated on item 5 above, unstable and/or unsafe TSF practices can result in the TSF breaking the dam wall, resulting in massive sudden uncontrolled flood of liquid sludge. Fears of such an event occurring remains high especially amongst communities living within proximity of TSFs as result of the recent Jagersfontein TSF Dam Wall Collapse in September 2022. The failure resulted in the sudden and uncontrolled release of more than 6 million m³ of liquid sludge, smothering nearly 200 nearby houses and approximately 1600 ha of agricultural and grazing land (Marais et al., 2024). Two people died, and one person believed to have been swept away is still declared missing. The surrounding communities may have negative perceptions relating to the risk of TSF failure which the applicant should address.</p> <p>Randfontein Estates and Invest must put a communication strategy in place that will communicate in an open and honest way on the kind of jobs that will be created, who will qualify and how the recruitment process will work. Heavy vehicles should travel during off peak times and should be clearly marked. Relevant mitigation proposed in the biophysical studies should be adhered to. Surrounding communities should be educated regarding the risk of TSF failure. A community safety strategy with regard to TSF failure should be developed and shared with the community. Develop & implement an Influx Management Strategy as per IFC Guidelines. Contractors should be required to make use of a certain proportion of local labour as far as possible. Jobs should be advertised in a way that is accessible to all members of society. Preference should be given to local labour that is within easy travelling distance from the site of work. If necessary, skills development programmes should be put in place to develop local skills.</p> <p>Preliminary mitigation measures include:</p> <ul style="list-style-type: none"> • Developer must undertake the Dam Safety Technical Assessment and register with the DWS Dam Safety Office; • Developer should make the reports relating to structural monitoring and integrity of the TSF available the I&APs to address the negative perceptions relating to the risk of TSF failure; • Developer must allow for a transparent employment opportunity for locals; and • Local suppliers and workers must be prioritised as far as possible for economic and professional growth. 	<p>Engineering Designs</p> <p>Social Impact Assessment</p> <p>EIA Phase impact assessment</p>



9.3.2 CUMULATIVE IMPACTS

A cumulative impact, in relation to an activity, refers to the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts eventuating from similar or diverse undertaking in the area.

Cumulative impacts have been considered in the assessment table above and will be considered in further detail in the EIA phase. Several tailings storage facilities already exist in the project area, which is mostly already heavily modified due to existing mining infrastructure. The potential direct cumulative impacts as a result of the proposed project are expected to be associated predominantly with:

- Visual impact on the surrounding area.

The potential indirect cumulative impacts as a result of the proposed project are expected to be associated predominantly with:

- Flora, fauna and ecological processes – at a regional level and driven primarily by the on-going negative effects of mining activities in the area.
- Groundwater and air quality impacts – at a local level driven by the large number of existing TSFs in the area.
- Impacts on health and wellbeing are cumulative with other social pressures in the area.
- Increased pressure on road and other infrastructure.

It should be noted however that Deelkraal II TSF will cater for reworking of multiple TSFs across the West Wits area. TSFs will be reworked and processed at Central Plant, Saaiplaas plant and new modules will either be constructed at Central plant or Saaiplaas plant (or a new plant, however the plant is still in pre-feasibility at this stage). These TSFs (the existing Deelkraal 1 TSF and Kusasaletu TS) will be reclaimed for processing at Kusasaletu plant and then fully rehabilitated in the future. This will also allow Harmony to manage a single large TSF rather than having to deal with numerous smaller TSF sites, which should also improve the management related to the various environmental and social issues of the existing TSFs in the region.

This reclamation and rehabilitation of existing Harmony TSFs will significantly reduce the following cumulative impacts associated with the existing unlined Harmony TSFs in the area:

- Cumulative groundwater contamination impacts from existing Harmony TSFs in the region;
- Cumulative health and radiation impacts from existing Harmony TSFs in the region;
- Cumulative air quality and dust / nuisance issues from the existing Harmony TSF's in the region; and
- Safety impacts and risks associated with the existing TSFs.

In addition, the project will have a significant positive social impact relating to the continued employment and continuation of mining (reclamation) at Harmony's various West Wits operations. Cumulatively this is considered a significant positive environmental impact (and social benefit) for the entire Harmony West Wits operation area into the future.



10 SENSITIVITY MAPPING

Environmental sensitivity mapping provides a strategic overview of the environmental, cultural and social assets in a region. The sensitivity mapping technique integrates numerous datasets (basemaps and shapefiles) into a single consolidated layer making use of Geographic Information System (GIS) software and analysis tools. Environmental sensitivity mapping is a rapid and objective method applied to identify areas which may be particularly sensitive to development based on environmental, cultural and social sensitivity weightings – which is determined by specialists input within each respective field based on aerial or ground-surveys. Therefore, the sensitivity mapping exercise assists in the identification of low, medium and highly sensitive areas within the study area, towards selecting the preferred location, design and layout, and process or technology alternatives for the proposed activities and infrastructure. This sensitivity mapping approach allows for the proposed activities to be undertaken whilst protecting identified sensitive environmental areas / features. Furthermore, environmental sensitivity is used to aid in decision-making during consultation processes, forming a strategic part of Environmental Assessment processes. **Table 39** below provides a breakdown of the sensitivity rating and weightings applied to determine the sensitivity score of each aspect. **Figure 50** presents the preliminary combined sensitivity map for the project.

Key Sensitive areas identified to date relate to the presence of Class 1 and 2 ridges and other potential terrestrial biodiversity sensitive areas, wetlands and aquatic areas, as well as potential heritage sites and potential sensitive air quality receptors. It should be noted that various amendments to the layout (and specifically the various pipeline routes) took place subsequent to the compilation of the specialist baseline reports, leading to some of the identified sensitivities identified in the map below not strictly following the most recent pipeline routes presented on the sensitivity map.

The sensitivity of the wetlands at the TSF site is currently high, based on the DFFE screening tool sensitivities, however the specific sensitivity and delineation of these wetlands and all other potentially affected wetlands can only be confirmed in the EIA phase once site visits and detailed assessments have been completed. These areas and sensitivities are based on available desktop information and will be further refined in the EIA phase once detailed site investigations have been completed.

Table 39: Sensitivity rating and weighting

Sensitivity Rating	Description	Weighting
Least concern	The inherent feature status and sensitivity is already degraded or contain no inherent sensitivities. The proposed development will not affect the current status and/or may result in a positive impact. These features would be the preferred alternative for mining or infrastructure placement.	-1
Low/Poor	The proposed development will not have a significant effect on the inherent feature status and sensitivity.	0
Medium	The proposed development will moderately negatively influence the current status of the feature.	1
High	The proposed development will have a significantly negative influence on the current status of the feature.	2



Sensitivity Rating	Description	Weighting
Very High	The proposed development will have a very high significant negative influence on the current status of the feature.	3

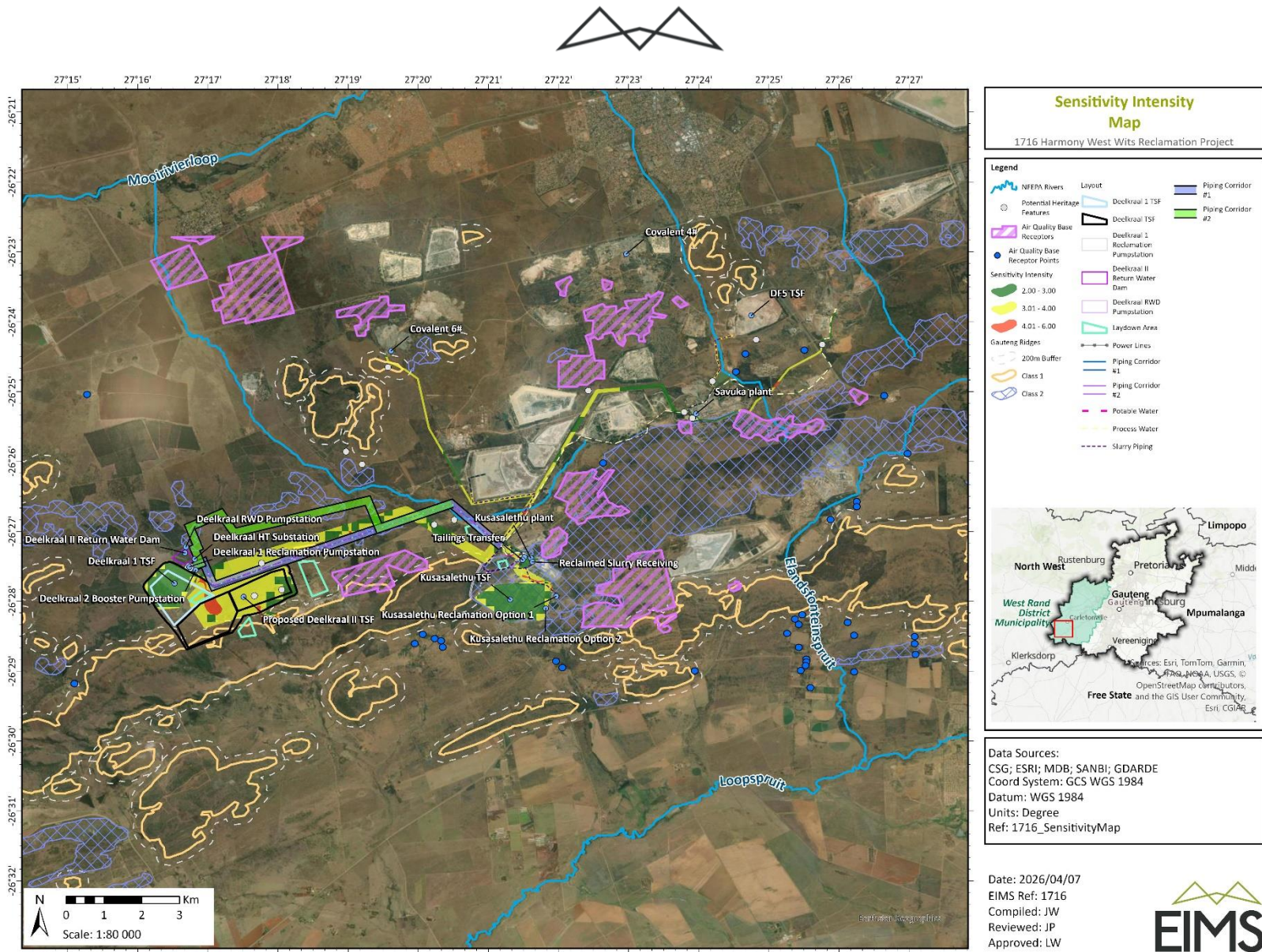


Figure 50: Combined scoping sensitivity map



11 PLAN OF STUDY FOR ENVIRONMENTAL IMPACT ASSESSMENT

The section below outlines the proposed plan of study which will be conducted for the various environmental aspects during the EIA Phase. It is also important to note that the plan of study will also be guided by comment obtained from I&AP's and other stakeholders during the PPP.

11.1 DESCRIPTION OF ALTERNATIVES TO BE CONSIDERED IN EIA PHASE

Owing to the nature of the proposed TSF and associated infrastructure, there are limited reasonable or feasible alternatives that can be considered as per the motivation provided in Section 6. The EIA process being undertaken includes the assessment of potential impacts and the identification of environmental sensitivities within and in the vicinity of the proposed project area thereby allowing for the recommendation of mitigation measures towards the avoidance, minimisation and / or management of the anticipated impacts. The layout and design of the TSF will be planned to avoid any additional no-go areas identified from the various specialist studies, if required. Several alternative disposal options are being assessed as part of a Harmony's trade-off assessment. These location, layout and design, alternatives will be considered in detail in the EIA phase of the project. No technology or process alternatives are considered applicable for assessment in the EIA phase.

11.2 DESCRIPTION OF THE ASPECTS TO BE ASSESSED AS PART OF THE EIA PROCESS

The following aspects will be assessed further during the EIA phase investigation to be undertaken, many of which have already been completed and are attached in Appendix D (however further updates to certain reports may be required for the EIA phase):

- Biodiversity (Terrestrial);
- Aquatics and Wetlands;
- Heritage;
- Agriculture Potential, Soils and Land capability;
- Geohydrology;
- Hydrology;
- Air quality;
- Climate Change;
- Palaeontology;
- Traffic;
- Visual;
- Social;
- Noise (compliance statement only);
- Health Risk and Radiological; and
- Closure Costing.

The following aspect will be disregarded at scoping:

- None.



11.3 ASPECTS TO BE ASSESSED BY SPECIALISTS

Table 40 below details the various aspects of the project to be addressed in the EIA phase through detailed specialist studies. It should be noted that many of the specialist studies have already been drafted and those that have been drafted already are appended to this Scoping Report, however further updates to certain reports will be required for the EIA phase of the project. All final updated specialist reports will be included as part of the EIA report for public review.



Table 40: Details of specialist input during the EIA phase.

Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
Air quality	Air Quality Impact Assessment	Airshed Planning Professionals	Hanlie Liebenberg-Enslin	<p>The following will be undertaken as part of the EIA phase study:</p> <ul style="list-style-type: none"> • Emissions Inventory (tailings wind erosion only); • Dispersion Modelling; • Inhalation Health Risk Screening, Compliance Assessment and information for radiological study; • Mitigation and management measures; and • Compilation of a comprehensive report.
Climate Change	Climate Change Impact Assessment	Airshed Planning Professionals	Hanlie Liebenberg-Enslin	<p>The following will be undertaken as part of the EIA phase study:</p> <ul style="list-style-type: none"> • A study of legal requirements pertaining to GHG emissions – applicable national and international legal guidelines such as the International Finance Corporation (IFC). • GHG Emissions Statement and Climate Change Impact Assessment • Identification of the Transitional and Physical Risks associated with the project (as per the Task Force on Climate-related Financial Disclosures). • The GHG emissions during the construction, operation and decommissioning of the project. These emissions will be compared to the global and national (if available) emission inventory; and compared to international benchmarks for the project. Calculated emissions will be compared to any guidelines provided by the IFC. • The robustness of the project in terms of forecasted climate change impacts to the area over the lifetime of the project. • The vulnerability of communities in the immediate vicinity of the project to climate change. <p>The specialist will compile a report that complies with the requirements of Appendix 6 of the EIA Regulations, 2014 (Government Notice (GN) R 982 of 2014, as amended); and/or</p>



Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				The Department of Forestry, Fisheries and Environment (DFFE) "Protocols for the assessment and minimum report content requirements of environmental impacts" (GN 320 of 2020 and GN 1150 of 2020).
Visual	Visual Impact Assessment	Environmental Planning and Design	Jon Marshall	<p>The following will be undertaken as part of the EIA phase study:</p> <ul style="list-style-type: none"> • Site visit; • Baseline Mapping; • Viewshed and Building of Computer Model and • Compiling of an impact assessment report.
Biodiversity (Terrestrial)	Terrestrial Biodiversity Assessment	The Biodiversity Company	Andrew Husted	<p>The following will be undertaken as part of the EIA phase study:</p> <ul style="list-style-type: none"> • Desktop assessment to identify the relevant ecologically important geographical features within the project area; • Desktop assessment to compile an expected species list and possible threatened flora and fauna species that occur within the project area; • Field survey to ascertain the species composition of the present flora and fauna community within the project area; • Delineate and map the habitats and their respective sensitivities that occur within the project area; • Identify the manner that the proposed project impacts the flora and fauna community and habitat systems to evaluate the level of risk being posed. <p>The prescription of mitigation measures and recommendations for identified risks. All sensitive areas, as described by the provincial and national legislation, will be identified. The locality and extent, as well as species composition of sensitive areas such as the wetlands or pans, streams, rivers and rocky outcrops will be conducted to identify and map all such sensitive areas present. Sensitive areas will be identified and delineated.</p> <p>A terrestrial ecology assessment report will be written. This report will be compiled according to the necessary requirements and standards.</p>



Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
Biodiversity (Aquatic)	Aquatic and Wetland Biodiversity Assessment	The Biodiversity Company	Andrew Husted	<p>The areas will be traversed on foot to identify local freshwater resources. The following will be achieved to supplement the approach:</p> <ul style="list-style-type: none"> • A desktop assessment of all available datasets; • GIS processing to preliminary identify water accumulation areas; and • The delineation of water resources in accordance with the DWAF (2005) guidelines, whereby the outer edges will be identified. • A functional and integrity assessment of the water resources. <p>The “Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries” (Macfarlane, <i>et al.</i>, 2014) will be used to determine the appropriate buffer zone for the proposed activity.</p> <p>The risk assessment will be completed in accordance with the requirements of the DWS General Authorisation (GA) in terms of Section 39 of the NWA for water uses as defined in Section 21(c) or Section 21(i) (GN 509 of 2016).</p> <p>An aquatics and wetlands assessment report will be written. This report will be compiled according to the necessary requirements and standards.</p>
Agriculture Potential, Soils and Land capability	Soils and Agriculture Assessment	EIMS	Jessica Jordaan	<p>Land capability and agricultural potential is determined by a combination of soil, terrain and climate features. Land capability is defined by the most intensive long term sustainable use of land under rain-fed conditions. At the same time an indication is given about the permanent limitations associated with the different land use classes.</p> <p>Land capability is divided into eight classes and these may be divided into three capability groups. The land classes and groups are arranged in order of decreasing capability and ranges of use. The risk of use increases from class I to class VIII (Smith, 2006). The land potential classes are determined by combining the land capability results and the climate capability of a region.</p> <p>Land use will be identified using aerial imagery and then ground-truthed while out in the field. The land use categories are split into:</p> <ul style="list-style-type: none"> • Cultivated; • Grazing;



Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				<ul style="list-style-type: none"> • Natural; • Mines; • Urban Built-Up; and • Waterbodies. <p>Compilation of a soils report including mitigation measures.</p>
Heritage	Heritage Impact Assessment	EIMS	Lucien James	<p>The following will be included in the HIA for the EIA phase of the project:</p> <ul style="list-style-type: none"> • Desktop Study An archaeological and historical desktop study will be undertaken by utilising the previous studies conducted. This will be augmented by an assessment of old topomaps and previous archaeological and heritage impact assessments undertaken for the study area and surroundings. • Fieldwork: An experienced fieldwork team from PGS will undertake an archaeological and heritage site survey to identify the heritage resources within the study area. Tracklogs will be recorded and the locations of all heritage resources identified during the fieldwork will be documented using a hand-held GPS. Furthermore, the documentation will reflect a brief qualitative description and statement of significance for each site and includes a photographic record of all the sites. • Report: A Heritage Impact Assessment will be written. This report will be compiled according to the necessary requirements and standards.
Palaeontology	Palaeontology Impact Assessment	Banzai Environmental	Elize butler	<p>The following is included in the PIA for the EIA phase of the project:</p> <ul style="list-style-type: none"> • A PIA desktop study will be undertaken by utilising available data. • A site survey will be undertaken. • A Palaeontological Impact Assessment will be compiled according to the necessary requirements and standards.
Geohydrology	Geohydrological Assessment	MvB Consulting	Marius van Biljon	<p>The aim of the geohydrological study is to assess the following:</p>



Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				<ul style="list-style-type: none"> Assessment of the geohydrological environment in terms of aquifer development, aquifer hydraulics, groundwater flow and groundwater chemistry. Assessment of the potential short and long-term impact from the TSF on the groundwater environment. Recommended management measures to mitigate potential impacts. <p>The study will include the following:</p> <ul style="list-style-type: none"> Desktop study of existing information. Conceptual model of the groundwater system. Numerical groundwater flow and mass transport model. Risk assessment and reporting.
<p>Hydrology</p>	<p>Hydrological Assessment</p>	<p>Hydrologic</p>	<p>Mark Bollaert</p>	<ul style="list-style-type: none"> A 2D approach to hydraulic modelling will be utilised to maximise the benefit to flood modelling, with regards to the available terrain data. The relevant floods event will be modelled to produce respective flood-lines for the current (baseline) scenario only. A potential deliverable of a rain-on-grid model which considers the accumulation of surface water (and thereby demonstrates surface water flooding and not only river (fluvial) flooding is included as an optional extra. This result would assist in planning the design of berms to divert clean water around the facility. It will also identify preferential flow paths that are not defined by the 1:50,000 topographical river. This deliverable is recommended given the environmental significance of the proposed TSF. HEC-RAS 6.3.1 is expected to be used for this study. <p>A specialist surface water reports to inform and contribute towards the application in terms of NEMA will be produced. This report will meet the requirements of Appendix 6 of GN.R982 (as amended) of NEMA. A detailed evaluation of the predicted impacts of the project on the receiving environment, or of the receiving environment on the project as per the methodology that uses the criteria of extent, duration and intensity to quantify the significance of the potential impact. The evaluation of impacts will include:</p>



Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				<ul style="list-style-type: none"> • An assessment of impacts during the construction, operation phases and decommissioning phases; • An assessment of the probability of each impact occurring, the reversibility of each impact and the level of confidence in each potential impact; • An assessment of the significance of each impact before and after mitigation; • The identification of any residual risks that will remain after implementation of any mitigation of an impact; and • The cumulative impact in terms of the current and proposed activities in the area. <p>Recommendations to avoid negative impacts or where this will not be possible, then practical mitigation, management and/or monitoring options to reduce negative impacts and enhance positive impacts. Recommendations on the preferred placement of infrastructure will be provided if any watercourses intersect sensitive infrastructure (as determined by river buffers or flood-lines if available). An outline of recommended measures to manage residual impacts will be provided where necessary (i.e. impacts that remain after optimisation of design and planning) for the construction, operation and decommissioning phases.</p> <p>Where required, a surface water monitoring plan will be included with an indication of the following:</p> <ul style="list-style-type: none"> • Aspects to be measured; • Responsible person/body; • Frequency of monitoring actions; • Standards to be met; and • Reporting requirements. • The conditions, in respect of the surface water environment, for inclusion in the Environmental Authorisation. <p>A sensitivity map will be produced outlining area of increased surface water sensitivity (low, medium and high).</p>



Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
Noise	Noise Compliance Statement	Airshed Planning Professionals	Hanlie Liebenberg-Enslin	<p>A noise impact statement will be compiled for the potential impact of noise from the construction and operation of the TSF and associated infrastructure. As part of this statement, the following will be included:</p> <ul style="list-style-type: none"> • Compilation of project source term; • General discussion of the potential noise impacts on human receptors due to project activities; and, • Determination of environmental noise risk according to the EIMS stipulated Impact Assessment methodology.
Health Risk and Radiological	Health Risk and Radiological Assessment	AquiSim Consulting	Japie van Blerk	<p>The overall framework within which the radiological public safety and impact assessment will be consistent with international practice (e.g., IAEA ISAM Safety Assessment Methodology), the following logical elements will be included in the scope of the assessment:</p> <ul style="list-style-type: none"> • Definition of the assessment context: High-level definition of what will be included and excluded in the assessment, and justification for the choices made. This will include a definition of the regulatory framework within which the assessment will be performed based on international guidelines and requirements. • High-level description of the system: The system as used here refers to the mining operation and associated activities, the potentially affected environment, as well as the public habits and behavioural conditions that might determine their potential levels of radiological exposure. • Definition of exposure conditions: During this step, assessment context and system description information will be used to define a limited number of credible public exposure conditions associated with the mining operations. • Development of conceptual and mathematical models: The development of conceptual and mathematical models for each exposure condition will be done systematically and transparently to increase general confidence in the assessment results. Parameter values will be assigned using site-specific conditions, or if not available, will be justified using literature values. • Consequence analysis: During this step, the mathematical models will be used to evaluate the radiological consequences of each exposure condition



Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				<p>defined for the workers and public, both for the operational and post-operational periods.</p> <ul style="list-style-type: none"> • Interpretation of the results: During this step, the results will be interpreted in terms of the assessment context defined in the first step.
<p>Social</p>	<p>Social Impact Assessment</p>	<p>Equispectives</p>	<p>Dr Ilse Aucamp</p>	<p>The following activities will form part of the SIA:</p> <ul style="list-style-type: none"> • Fieldwork will be conducted to obtain additional information and communicate with key stakeholders. Key stakeholders are likely to include: <ul style="list-style-type: none"> ○ Authorities: local municipalities that fall in the project area. ○ Affected parties: communities and individuals that will be affected by the project. ○ Interested parties: local business in the area, community-based organisations and non-governmental organisations within the affected communities, trade unions, and political groups. • Methodologies will include in-depth interviews, participatory rural appraisal, in-the-moment discussion groups, focus groups and immersions. Field notes will be kept of all interviews and focus groups. Initial meetings have been conducted. • An interview schedule might be utilised instead of formal questionnaires. An interview schedule consists of a list of topics to be covered, but it is not as structured as an interview. It provides respondents with more freedom to elaborate on their views. • The final report will focus on current conditions, providing baseline data. Each category will discuss the current state of affairs and also investigate the possible impacts that might occur in future. The impacts identified in the scoping report will be revisited and rated accordingly. New impacts that have not been identified will be added to the report. Recommendations for mitigation will be made at the end of the report. • The SIA process will have a participatory focus. This implies that the SIA process will focus strongly on including the local community and key stakeholders. The public consultation process needs to feed into the SIA.



Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				<ul style="list-style-type: none"> Impacts will be rated according to significance (severity), probability, duration, spatial extent, and stakeholder sensitivity. Information obtained through the public processes will inform the writing of the final SIA and associated documents.
Traffic	Traffic Impact Assessment	SMEC	Victor de Abreu	<p>The TIA will determine the impact of construction traffic on nearby roads and road users and will include:</p> <ul style="list-style-type: none"> Desktop study and site visit. Traffic Counts. Traffic analysis and modelling. <p>Report compilation including drawings.</p>
Closure and Rehabilitation	Closure Costing	MineLock Environmental Engineers	Johann Roux Le	<p>A closure cost estimate in support of the TSF application will be undertaken. This report will address the closure measures that will be implemented and provides the cost of environmental rehabilitation at closure.</p>



11.4 PROPOSED METHOD OF ASSESSING ENVIRONMENTAL ASPECTS

The same method of assessing impact significance as was used during the Scoping phase will be applied during the EIA phase. This methodology is described in detail in Section 9.1 of this report.

11.5 PROPOSED METHOD FOR ASSESSING DURATION AND SIGNIFICANCE

The significance of environmental impacts will be rated before and after the implementation of mitigation measures. These mitigation measures may be existing measures or additional measures that may arise from the impact assessment and specialist input. The impact rating system considers the confidence level that can be placed on the successful implementation of the mitigation. The proposed method for the assessment of environmental issues is set out in the Section 9.1. This assessment methodology enables the assessment of environmental issues including: the severity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

The specialist studies will recommend practicable mitigation measures or management actions that effectively minimise or eliminate negative impacts, enhance beneficial impacts, and assist project design. If appropriate, the studies will differentiate between essential mitigation measures, which must be implemented and optional mitigation measures, which are recommended.

11.6 STAGES AT WHICH COMPETENT AUTHORITIES WILL BE CONSULTED

Competent authorities have been and will be consulted during the initial notification period, the scoping phase as well as during the EIA phase.

11.7 DESCRIPTION OF TASKS THAT WILL BE UNDERTAKEN DURING THE EIA PROCESS

The plan of study detailed in the above sections and is summarised below. The following tasks will be undertaken as part of the EIA phase of the project:

- EIA-phase specialist studies.
- Public consultation:
 - Notification of the availability of the EIA Report for review and comment to all registered I&AP's;
 - Public and focus group meetings.
- Authority consultation:
 - Consultation with DMPr, DESTEA, DWS and the various commenting authorities; and
 - Authority consultation (including meetings where necessary) to provide authorities with project related information and obtain their feedback.
- Document compilation:
 - The EIA and EMPr will be compiled in line with the requirements of Appendix 3 and 4 of the NEMA EIA Regulations.
 - The EIA and EMPr will be made available for public comment for a period of 30 days.
 - The EIA and EMPr will be finalised and submitted to the DMPr for adjudication and decision making.



11.8 PROPOSED METHOD OF EIA PHASE PUBLIC PARTICIPATION

The proposed public participation process to be followed for the EIA phase is provided below.

- The commenting periods that will be provided to the I&AP's (and the competent authorities) will be 30 days as per the relevant legislative requirements.
- The dates of the review and commenting period for the EIA/EMPr will be determined at a later date and communicated to all registered I&AP's through faxes, emails, SMS's and/or registered letters.
- The location at which the hard copy of the EIA report will be made available is at the same public places in the project area that the Scoping Report was made available (refer to Section 7.1.3), sent electronically to stakeholders who request a copy, and placed on the EIMS website: www.eims.co.za.
- The public participation will be undertaken in compliance with NEMA GNR 982 (Chapter 6).
- A public meeting will be held during the review period for the EIA report. Focus group meetings will also be held with key stakeholders as and where necessary.
- All comments and issues raised during the comment periods will be incorporated into the final EIA Report.

11.9 MEASURES TO AVOID, REVERSE, MITIGATE, OR MANAGE IMPACTS

All comments received from I&APs during the Scoping Report review will be taken into consideration and where applicable inform the high-level mitigation measures. Detailed mitigation measures will be further developed as part of the EIA phase. The potential impacts will further be assessed in terms of the mitigation potential, taking into consideration the following:

- Reversibility of impact:
 - Reversible.
 - Partially reversible.
 - Irreversible.
- Irreplaceable loss of resources:
 - Replaceable.
 - Partially replaceable.
 - Irreplaceable.
- Potential of impacts to be mitigated:
 - High.
 - Medium.
 - Low.

This information for each identified impact will be provided in the EIA and EMPr.



12 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations relating to this scoping phase assessment should be noted:

- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project.
- Identified impact significance ratings and mitigation measures will be further refined based on specialist input during the EIA phase.
- Detailed Assumptions and Limitations for each specialist study completed will be presented in the EIA report once these assessments have been completed.



13 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION AND LEVEL OF AGREEMENT

I John von Mayer herewith undertake that the information provided in the foregoing report is correct to the best of my knowledge, and that the comments and inputs and the level of agreement from stakeholders and Interested and Affected Parties has been correctly recorded in the report where applicable.

Signature of the EAP

Date: 2026/04/09



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APPENDICES

Appendix A: Copy of Application Form

Appendix B: EAP CV

Appendix C: Public Participation

Appendix D: Specialist Reports

Appendix E: Impact Assessment Matrix

Appendix F: DFFE Screening Tool Reports and Site Sensitivity Verification Report