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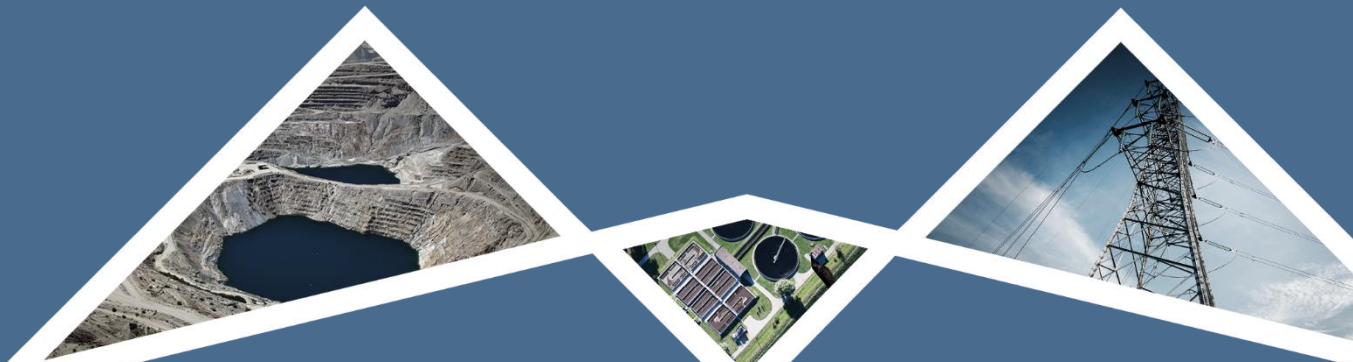
SCOPING REPORT

PROPOSED HARMONY VALLEY TAILINGS STORAGE FACILITY PROJECT



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ACRONYMS AND ABBREVIATIONS

AQSR	:	Air Quality Sensitive Receptors
ASTM	:	American Standard Testing Methodology
CA	:	Competent Authority
CARA	:	Conservation of Agricultural Resources Act, 1983
CMA	:	Catchment Management Agency
DESTEA	:	Department of Economic, Small Business Development, Tourism & Environment
DFFE	:	Department of Forestry, Fisheries and the Environment
DMRE	:	Department of Mineral Resources and Energy
DWS	:	Department of Water and Sanitation
EA	:	Environmental Authorisation
EC	:	Electrical Conductivity
ECA	:	Environmental Conservation Act
EAP	:	Environmental Assessment Practitioner
EIA	:	Environmental Impact Assessment
EIMS	:	Environmental Impact Management Services (Pty) Ltd
ELWU	:	Existing Lawful Water Use
EN	:	Endangered
EMPr	:	Environmental Management Programme
FSN	:	Free State North
GA	:	General Authorisation
GN	:	Government Notice
GQM	:	Groundwater Quality Management
HDPE	:	High Density Polyethylene
HIA	:	Heritage Impact Assessment
I&AP	:	Interested and Affected Party
IDP	:	Integrated Development Plan
IEM	:	Integrated Environmental Management
IWML	:	Integrated Waste Management Licence
IWULA	:	Integrated Water Use License Application
LC	:	Leachable Concentration
LED	:	Local Economic Development
LOM	:	Life of Mine
MAE	:	Mean Annual Evaporation
MAP	:	Mean Annual Precipitation
MAR	:	Mean Annual Runoff

MPRDA	:	Minerals and Petroleum Resources Development Act, 2002
MR	:	Mining Right
NAAQS	:	National Ambient Air Quality Standards
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, 1998
NEMBA	:	National Environmental Management: Biodiversity Act, 2004
NGDB	:	National Groundwater Database
NGO	:	Non-Governmental Organization
NHRA	:	National Heritage Resources Act, 1999
NT	:	Near Threatened
NWA	:	National Water Act, 1998
ONAs	:	Other Natural Areas
PHRA	:	Provincial Heritage Resources Authority
PIA	:	Palaeontological Impact Assessment
POI	:	Point of Interest
PPP	:	Public Participation Process
RE	:	Remaining Extent
SAHRA	:	South African Heritage Resources Agency
SANS	:	South African National Standards
SCC	:	Species of Conservation Concern
SDF	:	Spatial Development Framework
SLP	:	Social & Labour Plan
SO_4	:	Sulphate
SPLUMA	:	Spatial Planning and Land Use Management Act
SWMP	:	Stormwater Management Plan
TC	:	Total concentration
TDS	:	Total Dissolved Solids
TSF	:	Tailings Storage Facility
WMA	:	Water Management Area
WML	:	Waste Management License
WULA	:	Water Use License Application
WUL	:	Water Use Licence

EXECUTIVE SUMMARY

Harmony Gold Mining Company Limited (hereafter referred to as Harmony / "the applicant") has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to undertake the necessary environmental authorisation and associated consultation processes for a proposed new Tailings Storage Facility (TSF) near Welkom in the Matjhabeng Local Municipality in the Free State province.

A new deposition site will be required for Harmony One Plant to replace the FSS2 and St. Helena 4 Tailings Storage Facilities by July 2024. Several alternative sites were identified and assessed as possible suitable deposition sites for the tailings from Harmony One Plant but, apart from the Nooitgedacht site which is the subject of a separate EIA, none were found not feasible. Following a review of other possibilities for the One Plant's future tailings deposition, an option to utilise the space between the Free State North (FSN) 1 and Free State North 2 (FSN) TSFs and portion of the footprint of the FSN4 TSF as shown in Figure 1 has been identified as a possible deposition site. The TSF will cover an area of approximately 124 ha. The proposed TSF will be located on Farm portions Rietpan 14 (0) and Ouders Gift 48 (0/RE).

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)- Listed activity: Listing Notice 2, Activity 15 as well as various Listing Notice 1 and 3 activities as well as the National Environmental Management: Waste Act – NEMWA (Act 59 of 2008)- Activity A14, B7, B10 and B11; and
- Water Use Licence (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 Licence (WUL) has been lodged with the Department of Water and Sanitation (DWS) for the water use triggers.

PURPOSE OF THE SCOPING REPORT

The purpose of the scoping process is to:

- Identify the policies and legislation that are relevant to the activity;
- To motivate 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 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 the 4 April 2023 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). Should the CA accept the Scoping Report, an EIA Report including an EMPr, will also 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 has been made available for public review and comment for a period of 30 days from the 10 June 2023 until the 12 July 2023 Contact details are provided below:

- Environmental Impact Management Services (Pty) Ltd (EIMS)
- P.O. Box 2083 Pinegowrie 2123
- Phone: 011 789 7170 / Fax: 011 787 3059
- Contact: Lucien James
- EIMS Reference No: 1566
- Email: valley@eims.co.za

PROJECT ALTERNATIVES AND 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, public response, cumulative impact, and irreplaceable loss of resources.

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

- Groundwater quality impacts during operation and closure phases;
- Reduction in air quality during operation; and
- Continued employment during operation phase.

The 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 following EIA-phase specialist studies are to be conducted:

- Biodiversity (Terrestrial);
- Heritage;
- Agriculture Potential, Soils and Land capability;
- Geohydrology;
- Aquatic and Wetland;
- Air quality;
- Closure Costing and Rehabilitation;

- Palaeontology;
- Noise;
- Visual; and

Health Risk and Radiological.

1 INTRODUCTION

Harmony Gold Mining Company Limited (hereafter referred to as Harmony / "the applicant") has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) as the Environmental Assessment Practitioner (EAP) to undertake the necessary environmental authorisation and associated consultation processes for a proposed new Tailings Storage Facility (TSF) near Welkom in the Matjhabeng Local Municipality in the Free State province.

A new deposition site will be required for Harmony One Plant to replace the FSS2 and St. Helena 4 Tailings Storage Facilities by July 2024. Several alternative sites were identified and assessed as possible suitable deposition sites for the tailings from Harmony One Plant but, apart from the Nooitgedacht site which is the subject of a separate EIA, none were found not feasible. Following a review of other possibilities for the One Plant's future tailings deposition, an option to utilise the space between the Free State North (FSN) 1 and FSN2 TSFs and portion of the footprint of the FSN4 TSF as shown in Figure 1 has been identified as a possible deposition site. The TSF will cover an area of approximately 124 ha. The proposed TSF will be located on Farm portions Rietpan 14 (0) and Ouders Gift 48 (0/RE).

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)- Listed activity: Listing Notice 2, Activity 15 as well as various Listing Notice 1 and 3 activities as well as the National Environmental Management: Waste Act – NEMWA (Act 59 of 2008)- Activity A14, B7, B10 and B11; and
- Water Use Licence (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 Licence (WUL) has been lodged with the Department of Water and Sanitation (DWS) for the water use triggers.

The precise dimensions and details of the proposed new TSF are not known at this stage as the engineering designs are still being completed. These details will be presented in the EIA phase report once this information becomes available. The following details are relevant to the current application:

- Infrastructure will include the TSF and associated infrastructure including possible access roads and water management infrastructure including pipelines and a return water dam.
- The infrastructure will cover a total area of up to 124 hectares (1.24 km^2).
- Tailing deposition method to be used: combination of spigot and cyclone deposition.
- The height of the TSF is still being determined through the engineering designs however current design scope of the Valley TSF takes it up to the same height as the FSN2 TSF which is around 36m.
- The TSF barrier system will be determined in consultation with the authorities and will be in compliance with relevant norms and standards for determination of liner requirements in terms of the NEM:WA (GN R. 636).

It should be noted that a separate EA and WML application is being conducted by the same applicant for the adjacent proposed Nooitgedacht TSF to the immediate south of the area proposed for the Valley TSF. That project is the subject of a separate application and public consultation process and should not be confused with this Valley TSF application.

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 – 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 – 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 – 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
Appendix 2(2)(d):	A description of the scope of the proposed activity, including – 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

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
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;	4.1.20
Appendix 2(2)(h):	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including – 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; 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 – 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;	6, 7, 8 and 9
Appendix 2(2)(i):	A plan of study for undertaking the environmental impact assessment process to be undertaken, including – 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;	10

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	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;	
Appendix 2(2)(j)	An undertaking under oath or affirmation by the EAP in relation to – 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;	13
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;	14
Appendix 2(2)(l):	Where applicable, any specific information required by the competent authority; and	None
Appendix 2(2)(m):	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	None

1.2 DETAILS OF THE EAP

EIMS is appointed by Harmony as the independent EAP and to assist in preparing and submitting the 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
- E-mail address: valley@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 27 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 examples of EIA documentation currently available.

John von Mayer is a senior consultant at EIMS and has been involved in numerous significant projects the past 14 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 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;
- Aquatic and Wetland;
- Air quality;
- Palaeontology;
- Visual; and
- Health Risk and Radiological.

Engineering inputs will also be 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 as a result 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 detailed specialist 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

Farm Name	Rietpan 14 (0) and Ouders Gift 48 (0/RE)		
Application Area (Ha)	Approximately 124 Hectares (TSF footprint).		
Magisterial District	Matjhabeng Local Municipality within the Lejweleputswa District Municipality (Free State Province).		
Distance and direction from nearest towns	Welkom is located 3,7km southeast and Odendaalsrus is located 3 km northeast of the proposed TSF site. The geographic coordinates at the centre of the site are: 27°54'59.44"S, 26°40'22.09"E.		
21-digit Surveyor General Code for Property on which Project is Located	**Farm Name:**	**Portion:**	**21 Digit Surveyor General Code**
	Rietpan 14	0	F03900000000001400000
	Ouders Gift 48	0/RE	F03900000000004800000

The locality and extent of the proposed TSF is shown in Figure 1 and the proposed Valley TSF in relation to the existing mining right area is shown in Figure 2.

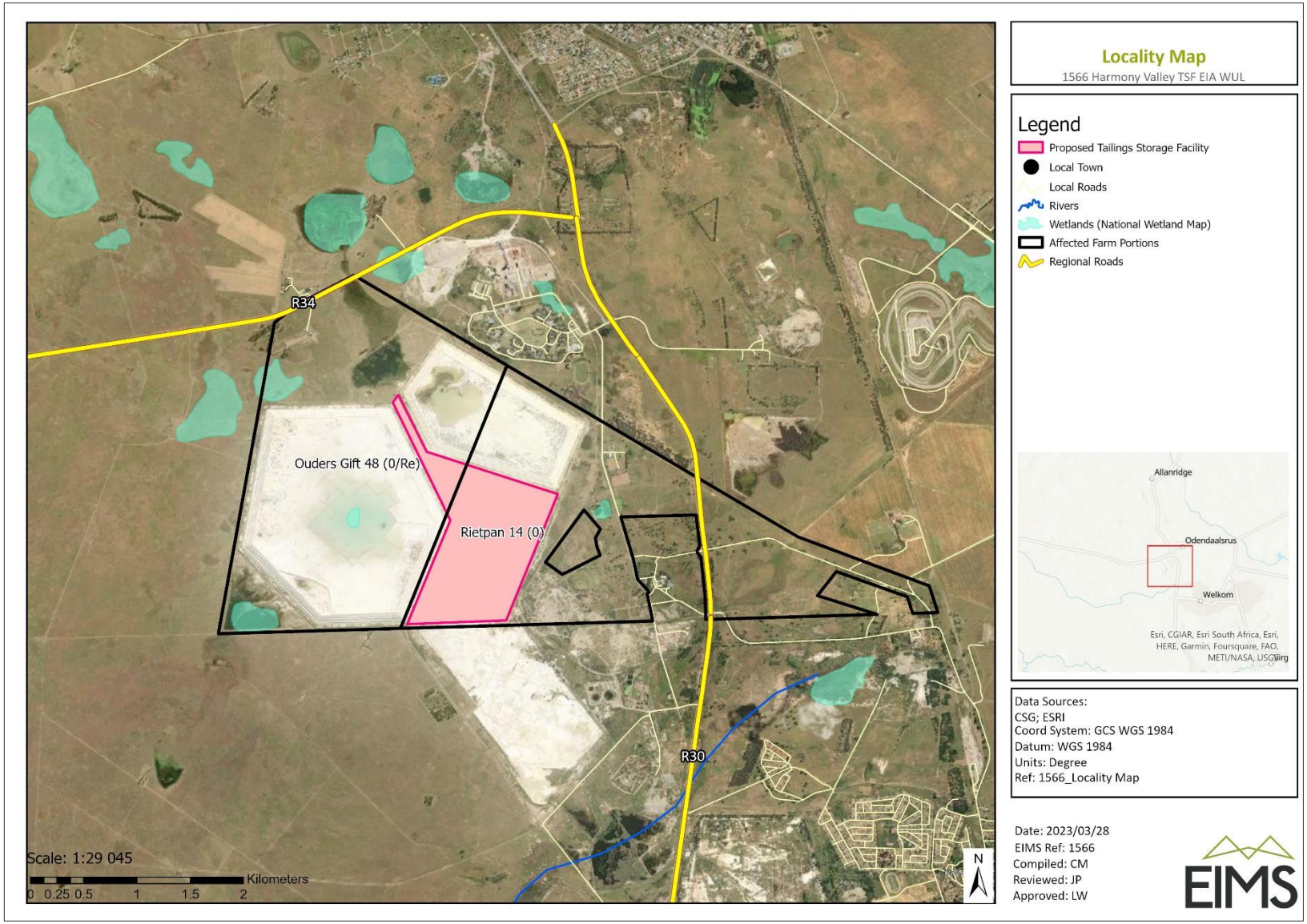

Figure 1: Aerial imagery locality map indicating the location of the proposed new tailings storage facility.

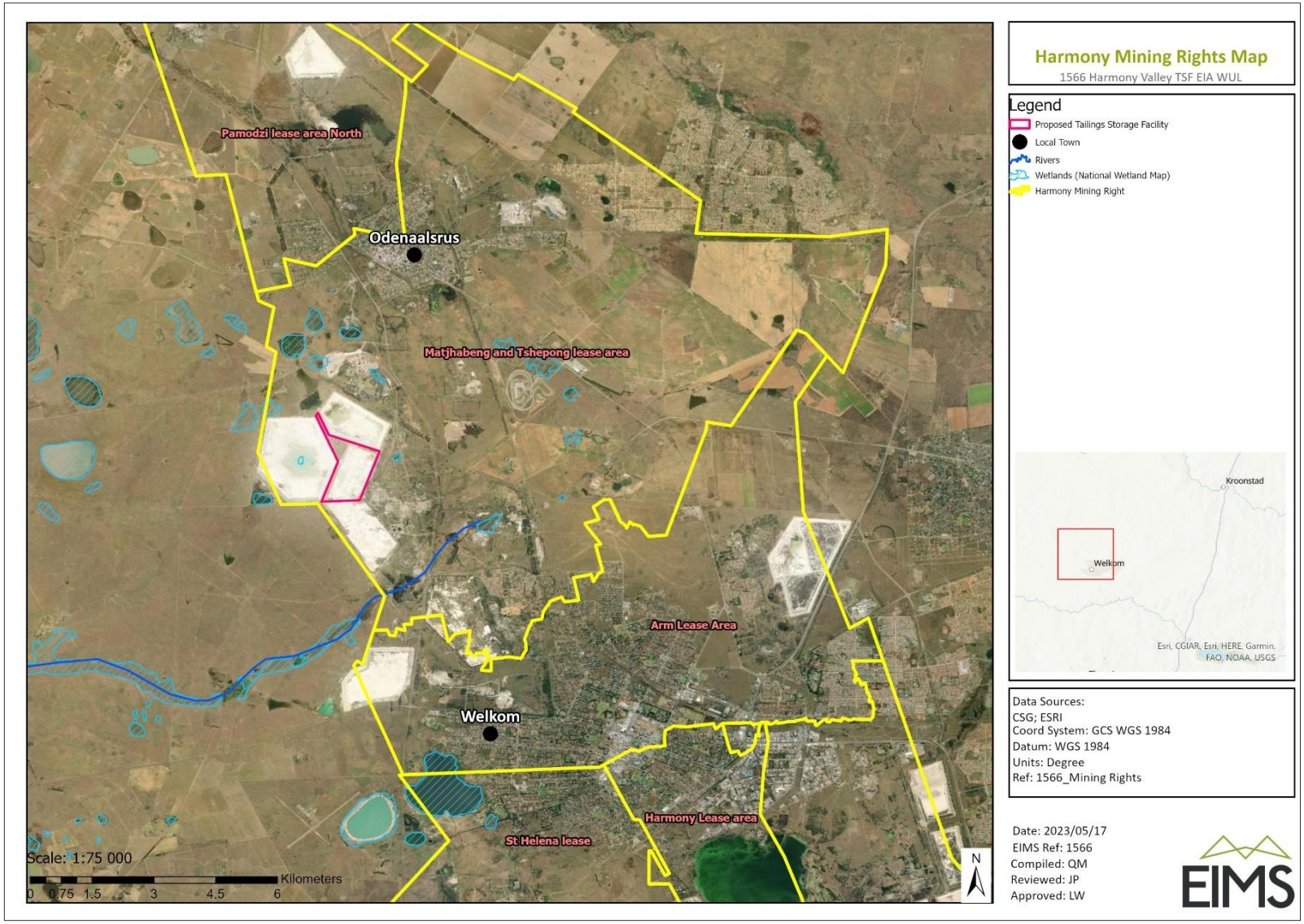

Figure 2: Locality map indicating the location of the proposed new tailings storage facility in relation to Harmony's mining right areas.

3 DESCRIPTION AND SCOPE OF THE PROPOSED ACTIVITY

Harmony (the applicant) holds an approved Mining Right (MR) and Environmental Management Programme (EMPr), in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002, as amended) (MPRDA), for the mining of gold at various operations in the Welkom area (Mining Right Ref: MR84).

A new deposition site will be required for Harmony One Plant to replace the FSS2 and St. Helena 4 Tailings Storage Facilities by July 2024. Several alternative sites, , apart from the Nooitgedacht site which is the subject of a separate EIA, none were identified and assessed as possible suitable deposition sites for the tailings from Harmony One Plant but were found not feasible. Following a review of other possibilities for the One Plant's future tailings deposition, an option to utilise the space between the Free State North 1 and FSN2 TSFs and portion of the footprint of the FSN4 TSF as shown in Figure 1 has been identified as a possible deposition site. The TSF will cover an area of approximately 124ha. The proposed TSF will be located on Farm portions Rietpan 14 (0) and Ouders Gift 48 (0/RE).

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)- Listed activity: Listing Notice 2, Activity 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 A14, B7, B10 and B11; and
- Water Use Licence (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 Licence (WUL) has been lodged with the Department of Water and Sanitation (DWS) for the water use triggers.

3.1 DESCRIPTION OF ACTIVITIES TO BE UNDERTAKEN

The precise dimensions and details of the proposed new TSF are not known at this stage as the engineering designs are still being completed. These details as well as the details of any associated infrastructure such as access roads and water management infrastructure will be presented in the EIA phase report once this information becomes available. The following details are relevant to the current application:

- Infrastructure will include the TSF, possible new access roads and water management infrastructure including pipelines and a return water dam..
- The infrastructure will cover a total area of up to 124 hectares.
- The height of the TSF is still being determined through the engineering designs however current design scope of the Valley TSF takes it up to the same height as the FSN2 TSF which is around 36m.
- Deposition method: combination of cyclone and spigot deposition.
- The TSF barrier system will be determined in consultation with the authorities and will be in compliance with relevant norms and standards for determination of liner requirements in terms of the NEM:WA (GN R. 636)..

It should be noted that a separate EA and WML application is being conducted for the adjacent proposed Nooitgedacht TSF to the immediate south of the area proposed for the Valley TSF by the same applicant. That project is the subject of a separate application and public consultation process and should not be confused with this Valley TSF application.

3.2 LISTED AND SPECIFIED ACTIVITIES TRIGGERED

The proposed TSF requires both an EA 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

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
GN983, Activity 10	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	Raw water and slurry pipeline requirements and dimensions are still to be confirmed in the EIA phase. This activity may be triggered.
GN983, Activity 12	The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;- excluding- (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; (ee) where such development occurs within existing roads, road reserves or railway line reserves; or (ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the	Various wetlands were identified within (artificial wetlands only) and in close proximity to the proposed TSF site.

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
	commencement of development and where indigenous vegetation will not be cleared.	
GN983, Activity 21D	Any activity including the operation of that activity which requires an amendment or variation to a right or permit in terms of section 102 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity contained in this Listing Notice or in Listing Notice 3 of 2014, required for such amendment.	Amendment of the approved Mining Right EMPr through a MPRDA Section 102 application will be required.
GN983, Activity 24	The development of a road- (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road- (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	Details of access roads are still to be confirmed however this activity may be triggered.
GN983, Activity 31	The closure of existing facilities, structures or infrastructure for- (i) any development and related operation activity or activities listed in this Notice, Listing Notice 2 of 2014 or Listing Notice 3 of 2014; excluding where- (aa) ..... (bb) the closure is covered by part 8 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) as decommissioning, in which case the National Environmental Management: Waste Act, 2008 applies; or (cc) such closure forms part of a mining application, in which case the requirements of the Financial Provisioning Regulations apply.	Closure and Decommissioning of the TSF
GN983, Activity 46	The expansion and related operation of infrastructure for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes where the existing infrastructure- (i) has an internal diameter of 0,36 metres or more; or (ii) has a peak throughput of 120 litres per second or more; and (a) where the facility or infrastructure is expanded by more than 1 000 metres in length; excluding where such expansion- (aa) relates to the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes within a road reserve or railway line reserve; or (bb) will occur within an urban area.	Raw water and slurry pipeline requirements and dimensions are still to be confirmed in the EIA phase. This activity may be triggered.

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
GN983, Activity 48	The expansion of- (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or where such expansion occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding- (aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 23 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such expansion occurs within an urban area; or (ee) where such expansion occurs within existing roads, road reserves or railway line reserves.	The TSF could be considered an expansion of adjacent TSF infrastructure. Various wetlands were identified within and in close proximity to the identified TSF site.
GN 983, Activity 56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre- (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.	Details of access roads are still to be confirmed however this activity may be triggered.
GN984, Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Clearance of over 20ha of indigenous vegetation will be required for the TSF footprint. The total area to be cleared is 184ha.
GN985 Activity 4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. b. Free State (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;	Details of access roads are still to be confirmed however this activity may be triggered. Part of the site falls within an ESA 2 area.
GN985 Activity 12	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	Clearance of over 300 square meters of indigenous vegetation is required and this may be located within wetland areas. Part of the site falls within an ESA 2 area.

Activity No(s):	Activity	Portion of the proposed project to which the applicable listed activity relates.
	in accordance with a maintenance management plan. b. Free State iv. Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland	
GN985 Activity 18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. b. Free State (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.	Details of access roads are still to be confirmed however this activity may be triggered. Part of the site falls within an ESA 2 area.
GN985 Activity 23	The expansion of- (ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs- (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; b. Free State (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.	The TSF could be considered an expansion of adjacent TSF infrastructure. Various wetlands were identified within and in close proximity to the identified TSF site. Part of the site falls within an ESA 2 area.

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 4 below:

Table 4: 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.	TSF decommissioning once operational phase (deposition) has concluded
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 Petroleum Resources Development Act, 2002 (Act No. 28 of 2002	TSF construction / operation

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

4 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which relates to the proposed project. A summary of the applicable legislation is provided in Table 5 below.

Table 5: Applicable legislation and guidelines overview

Legislation and Guidelines	**Applicability to Project**
(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).	
APPLICABLE LEGISLATION	
Constitution of the Republic of South Africa (Act 108 of 1996): 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 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.
National Environmental Management Act (Act 107 of 1998 – NEMA); and the EIA Regulations (2014, as amended): The NEMA (1998) provides for, amongst others, co-operative environmental governance by establishing principles for decision-making on matters affecting the environment.	The proposed TSF triggers various NEMA Listed Activities: GN 984, Activity 15 as well as various listing notice 1 and 3 activities. A full Scoping and Environmental Impact Assessment must be undertaken in terms of the Environmental Impact Assessment Regulations (2014, as amended) – GNR 982. A Screening Tool assessment was conducted to identify potential site

Legislation and Guidelines	Applicability to Project
	sensitivities as well as applicable policy guidelines.
National Environmental Management Waste Act (Act 59 if 2008 – NEM:WA); and the List of Waste Management Activities (GNR 921 of 2013, as amended): The NEM:WA (2008) aims to, amongst others, protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation.	An application for a Waste Management Licence (WML) is being applied for in terms of Categories B7, B10, B11 and A14 (construction of a facility for the disposal of hazardous waste –residue deposit).
Minerals and Petroleum Resources Development Act (Act 28 of 2002 – MPRDA) as amended; and the Mineral and Petroleum Resources Development Regulations (2004, as amended): The MPRDA (2002) makes provision for equitable access to and sustainable development of the nation's mineral and petroleum resources, and to provide for matters connected therewith. An applicant who wishes to undertake a mining operation must obtain a Mining Right.	Harmony has an approved Mining Rights and Environmental Management Programme in terms of the Minerals and Petroleum Resources Development Act (Act 28 of 2002, as amended) (MPRDA), for the mining of gold at various operations in the Welkom area.
National Water Act (Act 36 of 1998 – NWA): The NWA recognises that water is a scarce and unevenly distributed national resource which must managed encompassing all aspects of water resources. In terms of Chapter 4 of the NWA, activities and processes associated with the proposed TSF are required to be licensed by the Department of Water and Sanitation (DWS). An Integrated Water Use Licence Application (IWULA) has been lodged with the DWS in terms of Section 21 of the NWA for the TSF water uses.	A separate Water Use Licence Application (WULA) for the applicable water uses is being submitted to the DWS in parallel with the application for EA and WML.
National Heritage Resources Act (Act 25 of 1999 – NHRA): The NHRA aims to promote good management of cultural heritage resources and encourages the nurturing and conservation of cultural legacy so that it may be bestowed to future generations. 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*…".	An Archaeological Impact Assessment is being undertaken as part of the EIA for the proposed TSF.
National Environmental Management: Air Quality Act (Act 39 of 2004 – NEM:AQA)	The proposed TSF will not trigger the requirement for an Atmospheric Emissions

Legislation and Guidelines	Applicability to Project
The NEM:AQA sets out the listed activities and associated minimum emission standards identified in terms of Section 21 of the Act.	Licence (AEL). The air quality specialist study will assess the potential impact of the TSF in terms of the air quality and emission standards and provide suitable mitigation measures in this regard.
APPLICABLE GUIDELINES	
Integrated Environmental Management Information Guidelines Series: This series of guidelines was published by the Department of Environmental Affairs (DEA – now DEFF) and refers to various environmental aspects. Applicable guidelines in the series for the project include: • Guideline 5: Companion to NEMA EIA Regulations (October 2012); • Guideline 7: Public participation (October 2012); and • Guideline 9: Need and desirability (October 2014). Additional guidelines published in terms of the NEMA EIA Regulations, 2014 (as amended), in particular: • Guideline 3: General Guide to Environmental Impact Assessment Regulations, 2006; • Guideline 4: Public Participation in support of the EIA Regulations, 2006; and • Guideline 5: Assessment of alternatives and impacts in support of the EIA Regulations, 2006.	The various guidelines will be considered throughout this environmental Scoping and Impact Assessment process.
Best Practise Guideline (BPG) Series: The BPG series refers to publications by the then Department of Water Affair and Forestry (now DHSWS) providing best practice principles and guidelines relevant to certain aspects of water management. Best practice guidelines relevant to the proposed project include the following: • BPG H1: Integrated Mine Water Management; • BPG H2: Pollution Prevention and Minimisation of Impacts; • BPG H3: Water Reuse and Reclamation; • BPG G1: Storm Water Management;	The various guidelines will be considered throughout this environmental Scoping and Impact Assessment process.

Legislation and Guidelines	Applicability to Project
• BPG G3: Water Monitoring Systems; and • BPG G4: Impact Prediction.	
Tailings Management Good Practice Guide (ICMM): The ICMM Tailings Management: Good Practice Guide represents work by ICMM member companies and external experts to develop guidance for safely and responsibly constructing and managing mine tailings facilities.	The various guidelines will be considered throughout this environmental Scoping and Impact Assessment process as well as by the engineering design team.

Environmental legislation applicable to the project includes those discussed below.

4.1.1 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 April 2017.

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 EMPr, as well as Interested and Affected Party (I&AP) consultations, all of which must be submitted to the DMRE 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 WML application for the proposed new Valley TSF.

4.1.2 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 DEA) 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. 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 DMRE for the waste listed activities and provincial DESTEA 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 3 below provides a graphic representation of all the components of a full EIA process.

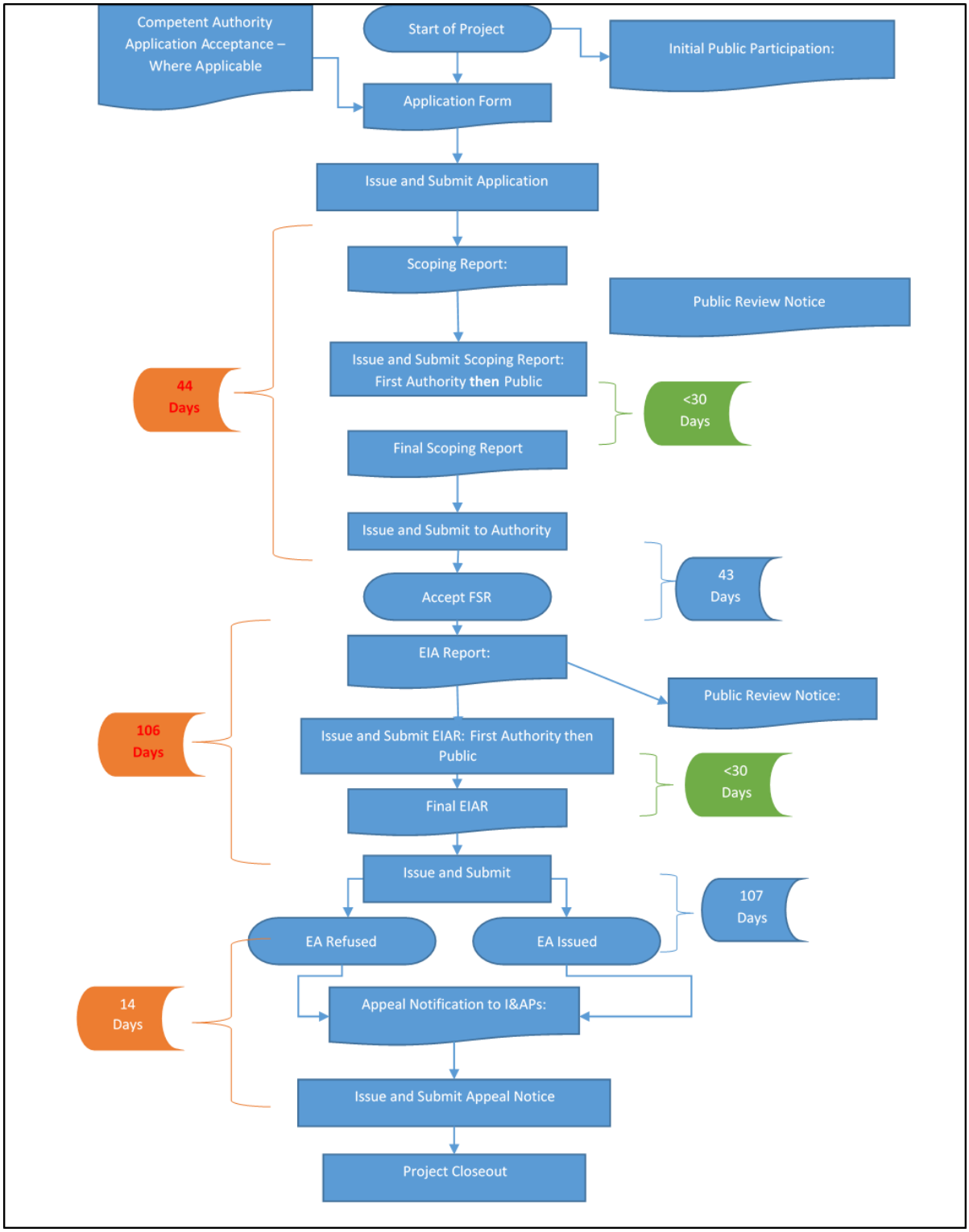

Figure 3: EIA process diagram

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 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 licences, 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 licence 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 (ELWU);
- Permissible in terms of a general authorisation (GA);
- Permissible under Schedule 1; or
- Authorised by a licence.

These water use processes are described in Figure 4.

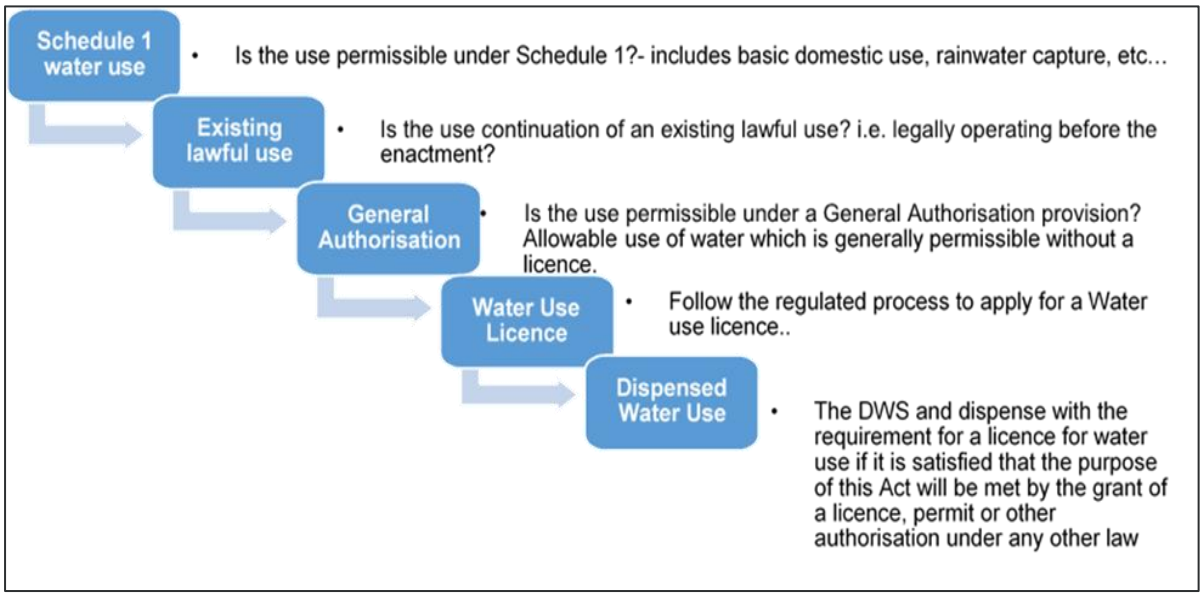

Figure 4: Authorisation processes for new water uses

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

- Taking water from a water resource;
- Storing water;
- Impeding or diverting the flow of water in a watercourse;
- Engaging in a stream flow reduction activity contemplated in section 36;
- Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;
- Disposing of waste in a manner which may detrimentally impact on a water resource;
- Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

- Altering the bed, banks, course or characteristics of a watercourse;
- 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
- Using water for recreational purposes.

4.1.4 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 new TSF will not be located within the 1:100 year floodline of a watercourse however it will be located within 100m from the edge of a watercourse (i.e. wetlands).

4.1.5 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 site is positioned within quaternary catchment C43B which has an area of 723 km^2 and C25B which has an area of 1 895km^2 both

of which are located within the Middle Vaal WMA. The Mahemspruit River is the only defined river relevant to this assessment (when considering the more detailed 1:50,000 topographical map data).

According to the Middle Vaal WMA Internal Strategic Perspective (2004), The land use in the Middle Vaal WMA is characterised by agriculture with the main irrigation crops being wheat, maize, groundnuts, sorghum and sunflowers. There are also extensive gold mining activities located in the Middle Vaal water management area. These activities are generating substantial return flow volumes in the form of treated effluent from the urban areas and mine dewatering that are discharged into the river system. These discharges are having significant impacts on the water quality in the main stem of the Vaal River in the Middle Vaal WMA.

The Broad Management Objectives within the Middle Vaal WMA include:

- To manage the water quality by setting WQOs and developing a CMS as per the Water Quality Management Strategy.
- The monitoring of the system to provide management information for water quality management, abstraction control and input to the overarching operations and planning processes.
- Provide input into the supply of local authorities from local groundwater and surface water resources. This will be in the form of strategic level guidance as to where water can be obtained, and the level of study needed to be submitted with the license application.
- Promotion of WC&DM through the water service providers and local authorities to achieve efficient use of water. Only once efficient use has been achieved can further transfers be considered.

Harmony has submitted 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.

4.1.6 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).

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, owning 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 licence application*."

The listed waste activities that are triggered by the new TSF, and which form the basis of this waste management licence application, are presented in Table 6.

Table 6: List of waste activities that are triggered by the proposed TSF

Waste Category and Number	Description
Category A14	The decommissioning of a facility for a waste management activity listed in Category A or B of this Schedule.
Category B7	The disposal of any quantity of hazardous waste to land.
Category 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).
Category 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 Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).

4.1.7 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 Licence;
- 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.

4.1.8 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.

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

These Regulations, 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 0, 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.

4.1.10 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.

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).

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.

4.1.11 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, 2013) prescribes measures for the control of dust in residential and non-residential areas. Acceptable dustfall rates are measured (using American Standard Testing Methodology (ASTM) D1739:1970 or equivalent) at and beyond the boundary of the premises where dust originates. In addition to the dustfall 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.

4.1.12 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 Scoping Report (HSR) is compiled.

4.1.13 NATIONAL ENVIRONMENTAL MANAGEMENT BIODIVERSITY ACT (NEMBA)

This Act is applicable since is protects 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.

The provisions of this Act have been considered and where relevant will be incorporated into the proposed mitigation measures and requirements of the EMPr.

4.1.14 THE SUB-DIVISION OF AGRICULTURAL LAND ACT

In terms of the Subdivision of Agricultural Land Act (Act 70 of 1970), any application for change of land use must be approved by the Minister of Agriculture, and while under the Conservation of Agricultural Resources Act (Act 43 of 1983) no degradation of natural land is permitted. No rezoning or subdivision of land is anticipated to be required for the Valley TSF project as the properties are located within a mining right area.

4.1.15 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 new TSF, and mitigation and management measures recommended. These will be updated during the EIA phase of this project as and where necessary.

4.1.16 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 (LUS); and municipal planning tribunals. Furthermore, the SPLUMA strengthens the position of mining right holders when land needs to be re-zoned for mining purposes. No rezoning of any of the properties for the Valley TSF site will be required as the properties fall within an approved mining right.

4.1.17 ENVIRONMENT CONSERVATION ACT (ECA)

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.

4.1.18 NOISE CONTROL REGULATIONS, 1992 (GN R.154)

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 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.

4.1.19 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.

4.1.20 OTHER APPLICABLE ACTS AND GUIDELINES

Other applicable acts and guidelines include The National Veld and Forest Fire Act 101 of 1998 and The Matjhabeng Local Municipality Land Use Scheme, 2021/22. In addition, the municipal planning documents such as The Matjhabeng Local Municipality Spatial Development Framework, and The Matjhabeng Local Municipality By-laws on Spatial Planning and Land Use Management are also applicable to the project.

5 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITY

A new deposition site will be required for Harmony One Plant to replace the FSS2 and St. Helena 4 Tailings Storage Facilities by July 2024. Several alternative sites were identified and assessed as possible suitable deposition sites for the tailings from Harmony One Plant but were found not feasible. Following a review of other possibilities for the One Plant's future tailings deposition, an option to utilise the space between the Free FSN1 and FSN2 TSFs and portion of the footprint of the FSN4 TSF has been identified as a possible deposition site.

5.1 GUIDELINE ON NEED AND DESIRABILITY IN TERMS OF THE EIA REGULATIONS

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 7 present the needs and desirability analysis undertaken for the project.

A reserve reclamation study which looked at the reclamation and treatment of the 774Mt of tailings contained in reserve status in TSFs in the Free State indicated that Harmony will require deposition space in future.

Table 7: Needs and desirability analysis for the proposed TSF.

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.	A number of specialist studies will inform this application and include: • Biodiversity (Terrestrial) • Heritage • Agriculture Potential, Soils and Land capability • Geohydrology • Aquatic and Wetland • Air quality • Palaeontology • Visual • Health Risk and Radiological • Closure Costing The conclusions of these studies will be included in the EIA report.
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 9 of this 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?	
1.4	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?	Waste will not be generated during the operational phase, apart from the tailings material. During construction, the types of waste generated include sewage waste, biodegradable wastes, and non-biodegradable solid waste. Waste has been identified as an impact and assessed in Section 9 below. However, it is anticipated that the following measures can be utilised to reduce the impact of the waste on the receiving environment:

Ref No.	Question	Answer
		• 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	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?	A heritage impact assessment is being conducted as part of the EIA.
1.6	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?	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 only it is anticipated that this project will not lead to a significant impact or depletion of non-renewable resources.
1.7	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?	Refer to the impact assessment in Section 9 of this report. It is anticipated that the project will have a low impact on the localised ecology.
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 Free State 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 footprint area to be cleared.

Ref No.	Question	Answer
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 Free State 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.
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 survey 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	Refer to Section 6 - details of the alternatives considered.

Ref No.	Question	Answer
	proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	
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 8.5 of this report for a breakdown of the demographics and social environment in the project area. The Matjhabeng IDP identifies Economic infrastructure and development as one of the key mayoral strategic priorities (IDP 2023/24). More detail will be provided in the Social Assessment report that will form part of the EIA.
2.1.2	Spatial priorities and desired spatial patterns (e.g. need for integrated 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 Welkom. The Free State Provincial Growth and Development Strategy (FGDS) is based on six pillars, each with its own set of drivers (FSDF, 2012). One of the drivers included is to minimise the impact of the declining mining sector and ensure that existing mining potential is harnessed
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.
2.1.4	Municipal Economic Development Strategy ("LED Strategy").	Considering the location of the activities, it is not anticipated to significantly promote or facilitate spatial transformation and sustainable urban development.
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 such as Welkom. In addition Harmony

Ref No.	Question	Answer
		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.
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 Welkom.
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 surrounding area is impacted by existing TSF facilities.
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.
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),	

Ref No.	Question	Answer
2.5.9	Discourage "urban sprawl" and contribute to compaction / densification.	Not applicable. The proposed project is not located within an urban area.
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 Welkom. In addition Harmony has various social and LED initiatives required under their various SLP commitments.
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 One plant and various Harmony Welkom mining operations to continue.
2.6	How was a risk-averse and cautious approach applied in terms of socio-economic impacts:	
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.

Ref No.	Question	Answer
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.
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.
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 will specify timeframes within which mitigation measures must be implemented.

Ref No.	Question	Answer
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 Sesotho to assist in understanding of the project. Further public consultation will be held during the review period of the Scoping / EIA report 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 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)?	Refer to Section 7 of this report, describing the public participation process undertaken for the proposed project.
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.

Ref No.	Question	Answer
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 Welkom. 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.
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.
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?	The proposed survey activities are not anticipated to produce significant pollution, environmental damage or adverse health effects in the long term.

Ref No.	Question	Answer
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.

6 PROJECT ALTERNATIVES

As this application relates only to a new TSF, 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 sites were identified and assessed as possible suitable deposition sites for the tailings from Harmony One Plant but apart from the Nooitgedacht site which is the subject of a separate EIA, none were found not feasible. Following a review of other possibilities for the One Plant's future tailings deposition, an option to utilise the space between the FSN1 and FSN2 TSFs and portion of the footprint of the FSN4 TSF as shown in Figure 1 has been identified as the preferred deposition site The existing TSF is surrounded by existing or planned mining infrastructure and therefore expansion of the existing facility in other directions is not feasible as part of this application. The study area contains open space to the south of the TSF which is currently under consideration for the Nooitgedacht TSF EIA, also being undertaken by EIMS.

Several alternative sites were identified and assessed as part of a 2008 study completed by Golder Environmental. Various sites were identified as part of this 2008 study as indicated in Figure 5 below.

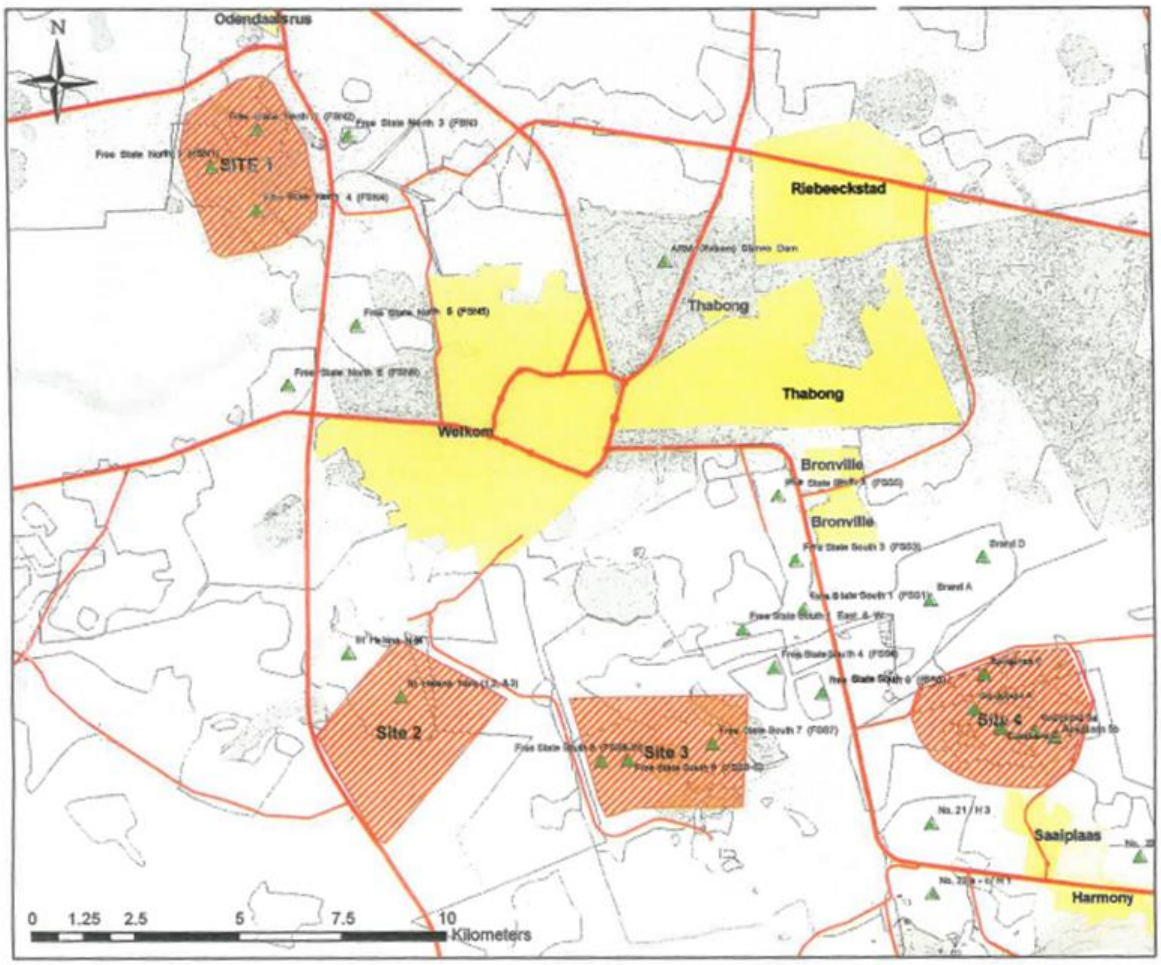

Figure 5: Sites assessed in the 2008 Golder Site Selection Study.

As part of the 2008 Golder Study various specialist input was obtained from ecological, surface water and groundwater specialists. During a Steering Committee meeting involving various stakeholders including DWS

that was convened on the 25 October 2007 the site selection findings were discussed and an optimal site selected. Site 1 was agreed upon as the preferred site for the TSF (as agreed by the Steering Committee). This site overlaps with the Valley site currently being proposed for the TSF. The reason for this is that the proposed footprint is largely brownfields with a partial greenfields take. The resultant negative impacts on agriculture and ecosystems are considered to be negligible but outweighed by the positive attributes of the site. As such, no further location alternatives are considered in this assessment. The previous 2008 site selection study is considered suitable motivation for the current Valley TSF site. A copy of the site selection summary report completed as part of the 2008 study is included in Appendix G.

The only feasible and reasonable location for the new TSF is the area proposed. This proposed area is vacant, disturbed land surrounded by existing TSF structures and is ideally situated to be used as additional deposition space. As such, no further location alternatives are considered in this assessment.

6.2 LAYOUT AND DESIGN ALTERNATIVES

The total volume of material to be deposited of on the TSF is based on the forecast gold reserves to be processed at the existing One Plant. As such, the total volume is a firm parameter which cannot be downscaled. 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. 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. Details regarding the height and slope gradient of the facility will be discussed in the EIA report once engineering designs are complete.

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.

6.3 TECHNOLOGY ALTERNATIVES

The only available technology alternatives relate to the liner design for the TSF however the liner requirements are 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.

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 6: 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 7: 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 material. 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 8: Example of cyclone deposition (source: international mining)

Currently cyclone deposition is the vastly preferred method of deposition for all 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. As such no other deposition methods or technologies will be considered in the EIA phase.

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. A new deposition site will be required for Harmony One Plant to replace the FSS2 and St. Helena 4 Tailings Storage Facilities by July 2024 and for this there are no feasible or applicable activity or process alternatives, additional deposition space will be required for the tailings material. No other process or activity alternatives have been identified that could be applicable to the TSF application.

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 Welkom operations. A new deposition site will be required for Harmony One Plant to replace the FSS2 and St. Helena 4 Tailings Storage Facilities by July 2024. The no go option would mean that the new TSF project would not proceed, and this would therefore negatively affect the future viability of Harmony's Welkom mining operations from July 2024 and beyond due to lack of deposition space. This would have a significant financial impact on not only Harmony but also have a direct negative impact on the workforce on the mine and surrounding businesses and communities that are directly or indirectly linked to the operations. 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.

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

Government Authorities were notified of the proposed project and include:

- Civil Aviation Authority;
- Eskom Holdings SOC Limited;
- Endangered Wildlife Trust;
- Lejweleputswa District Municipality;
- Matjhabeng Local Municipality;

- Free State Department of Agriculture& Rural Development;
- Free State Department of Cooperative Governance and Traditional Affairs;
- Free State Department of Public Works and Infrastructure;
- Free State Department of Police, Roads and Transport;
- Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs;
- Free State Development Corporation;
- Free State Department of Mineral Resources and Energy;
- Free State Department of Small Business, Tourism, and Environmental Affairs;
- National Department of Agriculture, Forestry and Fisheries;
- National Department of Mineral Resources and Energy;
- National Department of Rural Development and Land Reform;
- National Department of Human Settlements Water and Sanitation;
- South African Civil Aviation Authority;
- South African Heritage Resources Agency;
- South African National Roads Agency Limited; and
- Transnet SOC Limited.

7.1.2 INITIAL NOTIFICATION

The PPP commenced on the 4th of April 2023 with an initial notification and call to register for a period of 30 days. The initial notification was given in the following manner:

7.1.2.1 **REGISTERED LETTERS, FAXES AND EMAILS**

Notification letters (English, Afrikaans and Sesotho), 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 describing the proposed project and EIA process were placed in newspapers with circulation in the vicinity of the study area. The initial advertisements were placed in the Vista Newspaper as well as the provincial Gazette (in English, Afrikaans and Sesotho) on the 6th of April 2023. The 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 were placed at 10 locations within the local project area on the 4th of April 2023. 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 were placed at local public gathering places in Welkom 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

Notification regarding the availability of this Scoping Report for public review was 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 will be available for public review from the 10 June 2023 to the 12 July 2023 for a period of 30 days.

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 EIR/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 as well as baseline information provided by certain specialists. Please note that detailed specialist assessments are being completed to inform the EIA-phase report. The DEA screening tool was also used to inform this section and a copy of the screening report is included in Appendix F.

8.1 LOCATION

The study area falls within a landscape that contains pipelines and existing TSFs, thus the area can be described as largely disturbed. The landscape has historically been used for informal cattle grazing. Other elements of disturbance identified within the study area include farm and provincial roads and other infrastructure associated with the existing pipelines and other mining activities. The TSF will cover an area of approximately 124ha. The proposed TSF will be located on Farm portions Rietpan 14 (0) and Ouders Gift 48 (0/RE). The locality map is included in Figure 1. The study area is serviced by the R34, R30, provincial gravel roads and farm roads. Existing infrastructure includes mine infrastructure such as existing TSFs, electricity transmission lines, telephone lines, fences and other recent structures.

8.2 TOPOGRAPHY

The topography of the location of the proposed TSF is fairly flat, comprising of undulating terrain. An analysis of topographical data indicated a slope of less than 1:10 over most of the project area.

8.3 GEOLOGY

The Free State Goldfield which forms s triangle between Allanridge, Welkom and Virginia, produces gold from auriferous bearing reefs situated within sediments of the Central Rand Group of the Witwatersrand Supergroup. A detailed description of the geology of the Welkom Goldfields is provided by in Minter *et. al*; (1986). The mine geology, from shallow to deep, consist of the following:

- Karoo Supergroup;
- Ventersdorp Supergroup; and
- Witwatersrand Supergroup.

Sediments of the Vryheid Formation of the Ecca Group underlie the study area. The Vryheid Formation (Ecca Group) mainly comprises mudstone, siltstone and fine- to coarse-grained sandstone (pebbly in places).

Within the Free State Goldfield, the Ventersdorp Supergroup can be divided into the Pniel sequence, the Platberg Group and the basal Klipriviervberg Group consisting of alternating sediments, amygdaloidal and non-amygdaloidal andesitic lavas, tuffs and agglomerates (Minter *et.al*; 1986). Based on prospecting/exploration drilling, the Ventersdorp Supergroup has an average thickness of 1 319m in the study area.

The Witwatersrand Supergroup is unconformably overlain by the volcanic and sedimentary rock of the Ventersdorp Supergroup. Within the Free State Goldfield, the Witwatersrand Supergroup, comprising a thick succession of clastic sediments with minor intercalated lava flows, rests on the granites and schist of the Archean Basement. The Central Rand Group of the Witwatersrand Supergroup contains the economic reef horizons mined throughout the basin. The Central Rand Group is dominated by quartzite with minor shale and conglomerate. Several unconformities in the succession are overlain by the economic auriferous paleoplacers (reefs). Refer to Figure 9 for a map showing the regional geology.

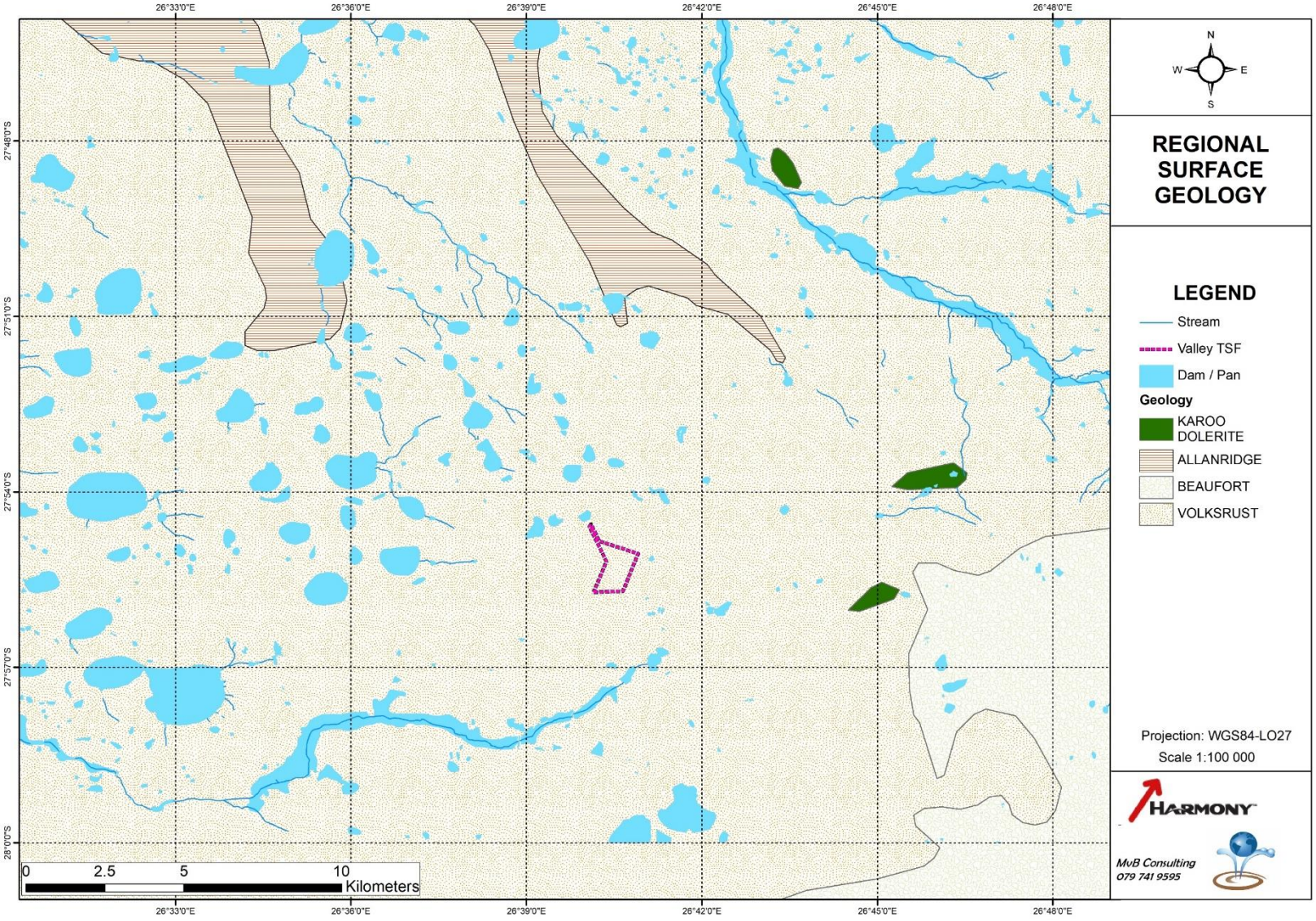

Figure 9: Regional surface geology

8.4 CLIMATE

The average climate for the site is presented in Figure 10 using the outcome of the investigation into rainfall and evaporation for the site. The combination of rainfall (Pegram, 2016) and evaporation and temperature (Schulze and Lynch, 2006) result in a cold arid steppe climate according to the Köppen-Geiger climate classification1.

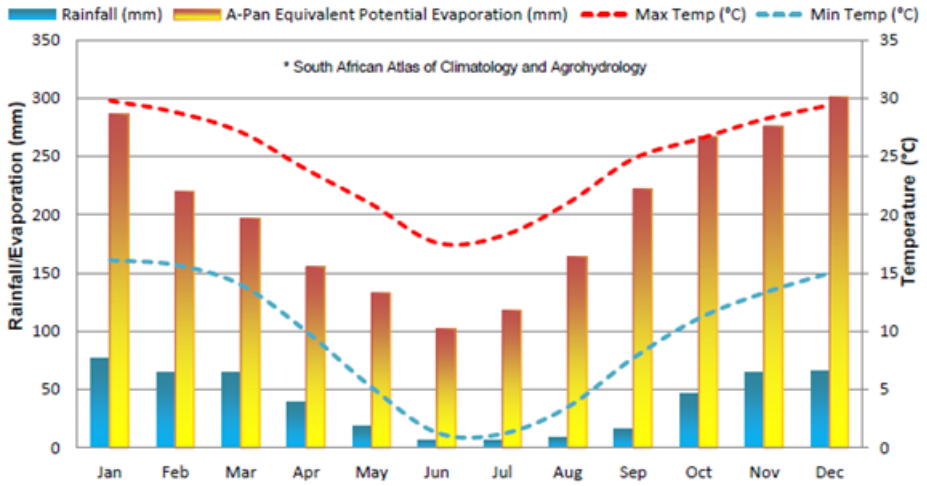

Figure 10: Climate summary

Evaporation data was sourced from the South African Atlas of Climatology and Agrohydrology (Schulze and Lynch, 2006) in the form of A-Pan equivalent potential evaporation. The average monthly evaporation distribution is presented in Table 8 and shows the site has an annual potential evaporation of 2,441mm.

Table 8: Average Monthly A-Pan Equivalent Evaporation

Month	Evaporation (mm)
January	286
February	220
March	197
April	155
May	133
June	102
July	118
August	164
September	222
October	267
November	276

Month	Evaporation (mm)
December	301

8.5 SOCIO-ECONOMIC

The Lejweleputswa District Municipality is situated in the north western part of the Free State and borders the North West Province to the north; the Fezile Dabi and Thabo Mofutsanyane District Municipalities to the north-east and east respectively; the Xhariep District Municipality and Mangaung Metropolitan Municipality to the south; and the Northern Cape Province to the west. The LDM is accessible from Johannesburg, Cape Town, Klerksdorp and Kimberley through one of South Africa's main national roads, the N1. The district covers an area of 32 286 km2 and make up almost a third of the Free State province. It consists of the Masilonyana, Matjhabeng, Nala, Tokologo and Tswelopele Local Municipalities (www.lejweleputswa.co.za). The economy of the district relies heavily on the gold mining sector which is dominant in the Matjhabeng and Masilonyana Local Municipalities (Lejweleputswa DM IDP 2021/22). The mining sector is on a downward trend and many businesses that have traditionally depended on the mining sector have either closed down are in the process of closing down. The other municipalities are dominated by agriculture.

The main towns in the Matjhabeng Local Municipality are Welkom, Odendaalsrus, Virginia, Hennenman, Allanridge and Ventersburg (www.matjhabeng.fs.gov.za). The economy of the municipality is centred on mining activities in and around Welkom, Allanridge, Odendaalsrus and Virginia. Manufacturing aimed at the mining sector exists to a limited extent in the above towns, with other activities being limited. Other main economic sectors include manufacturing, tourism, agriculture, gold jewellery, transportation (logistics), and retail (Matjhabeng LM IDP 2022/2023).

The number of households in the study area has increased on all levels (Table 9). The proportionate increase in households were greater than the increase in population on all levels and exceeded the growth in households of 12.3% on a national level. The average household size has shown a decrease on all levels, which means there are more households, but with less members.

Table 9: Population density and growth estimates (sources: Census 2011, Community Survey 2016)

Area	Size in km2	Population 2011	Population 2016	Population density 2011	Population density 2016	Growth in population (%)
Free State Province	129,825	2,745,590	2,834,714	21.15	21.83	3.25
Lejweleputswa DM	31,930	627,626	649,964	19.66	20.36	3.56
Matjhabeng LM	5,155	406,461	428,843	78.85	83.19	5.51

The intensity of poverty experienced refers to the average proportion of indicators in which poor households are deprived (Statistics South Africa, 2014). The intensity of poverty has increased slightly on all levels. The intensity of poverty and the poverty headcount is used to calculate the SAMPI score. A higher score indicates a very poor community that is deprived on many indicators. The SAMPI score in the Matjhabeng LM area has decreased, suggesting an improvement in some aspects relating to poverty in this area (Table 10).

Table 10: Poverty and SAMPI scores (sources: Census 2011 and Community Survey 2016).

Area	Poverty headcount 2011 (%)	Poverty intensity 2011 (%)	SAMPI 2011	Poverty headcount 2016 (%)	Poverty intensity 2016 (%)	SAMPI 2016
Free State Province	5.5	42.2	0.023	5.5	41.7	0.023
Lejweleputswa DM	5.6	42.8	0.024	4.8	42.2	0.020
Matjhabeng LM	5.5	43.0	0.024	4.3	41.8	0.018

Ward 35 has the highest proportion of people of economically active age (aged between 15 years and 65 years) that are employed (Figure 9). Since 2010 employment in the gold mining industry showed a steady decline from 157 019 in 2010 to 93 841 in 2022 (www.mineralscouncil.org.za). As such the proportion unemployed people in the area are likely to have increased since 2011. Ward 35 has the highest average household income (

Figure 11), indicating more employed people than on local, district or provincial level.

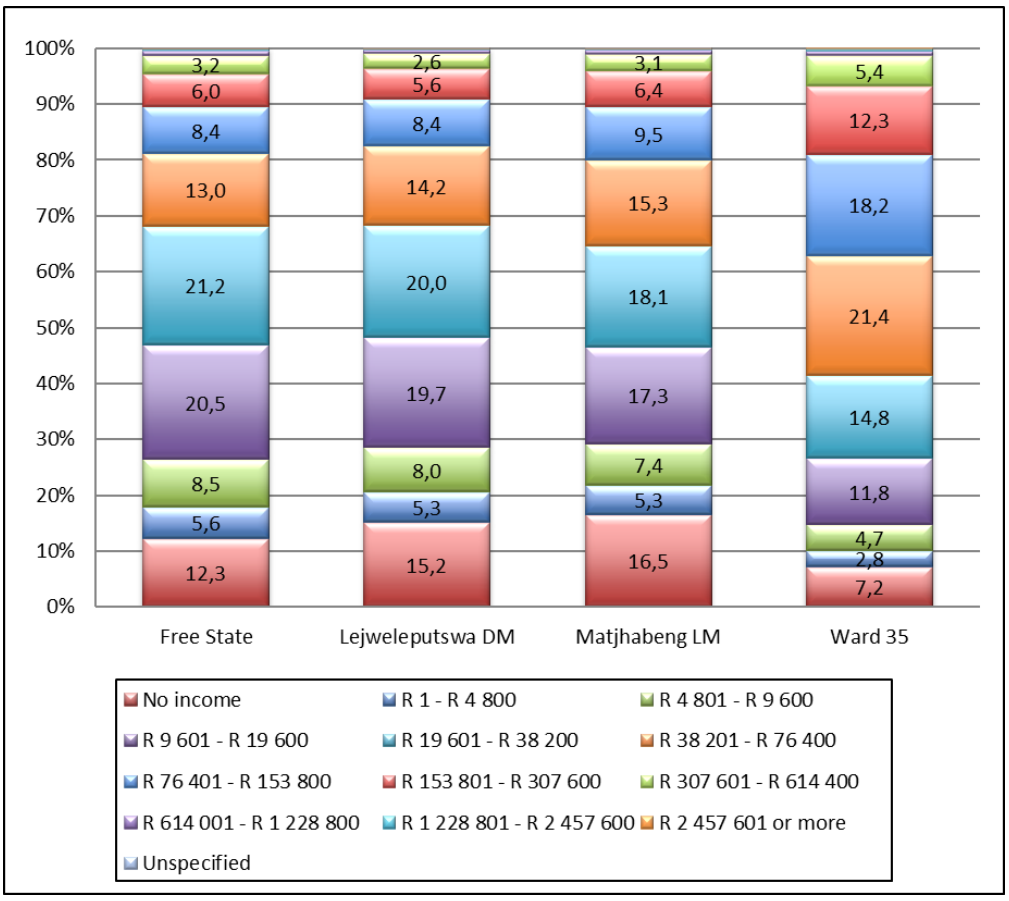

Figure 11: Annual household income (shown in percentage, source: Census 2011)

8.6 CULTURAL, HERITAGE AND FOSSIL RESOURCES

Heritage and paleontological studies were undertaken by PGS and Banzai Environmental respectively (refer to Appendix D) and the baseline information from those reports is presented in this section.

The Free State has a rich archaeological and historical history going back millions of years and includes significant aspects such as Later Stone Age rock art, Battlefields and Iron Age stonewalled enclosures. The general surroundings of the study area became a melting pot of contact and conflict as it represents one of many frontiers where San hunter- gatherers, Nguni and Sotho-Tswana agro-pastoralists, Dutch Voortrekkers and British Colonists all came together. The ravages of war also swept across these plains, and in particular the South African War (1899-1902) as well as the Boer Rebellion (1914-1915). The Free State has a rich archaeological and historical history going back millions of years and includes significant aspects such as Later Stone Age rock art, Battlefields and Iron Age stonewalled enclosures. The general surroundings of the study area became a melting pot of contact and conflict as it represents one of many frontiers where San hunter- gatherers, Nguni and Sotho-Tswana agro-pastoralists, Dutch Voortrekkers and British Colonists all came together. The ravages of war also swept across these plains, and in particular the South African War (1899-1902) as well as the Boer Rebellion (1914-1915).

A heritage screening report was compiled by the Department of Environmental Affairs National Web-based Environmental Screening Tool as required by Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended. According to the heritage screening report, the project area has a Low Heritage Sensitivity. A site visit was conducted by the heritage specialist. The fieldwork was conducted by an archaeologist (Nikki Mann) and field assistant (Xander Fourie) from PGS on 23 March 2023. The fieldwork team were able to confirm that the study area was disturbed from historical agricultural activities and mining-related activities. No heritage resources were identified in the study area.

According to the Palaeosensitivity Map available on the South African Heritage Resources Information System database (SAHRIS), the Palaeontological Sensitivity of the proposed development areas are mostly rated high) and moderate. A site-specific field survey of the development footprint was conducted on foot and by motor vehicle on 17 April 2023. No fossiliferous outcrop was detected in the proposed development area. The apparent rarity of fossil heritage in the proposed development footprint suggests that the impact of the development will be of a Low significance in palaeontological terms.

8.7 SOILS

In considering the Soil Conservation Service for South Africa (SCS-SA) dataset of the site, soils are classified as being of hydrological C (moderately high runoff potential). The soils in the TSF area are mostly medium potential agricultural soils. The natural vegetation of the site is classified as Western Free State Clay Grassland (according to SANBI, 2018). ‘Grassland’ is predominant over the site according to the DFFE’s 2020 land-cover dataset, with ‘mines & quarries’ positioned to the east in association with an existing TSF (FSN 4.2). Refer to Figure 12 for a map showing the soil types in the study area.

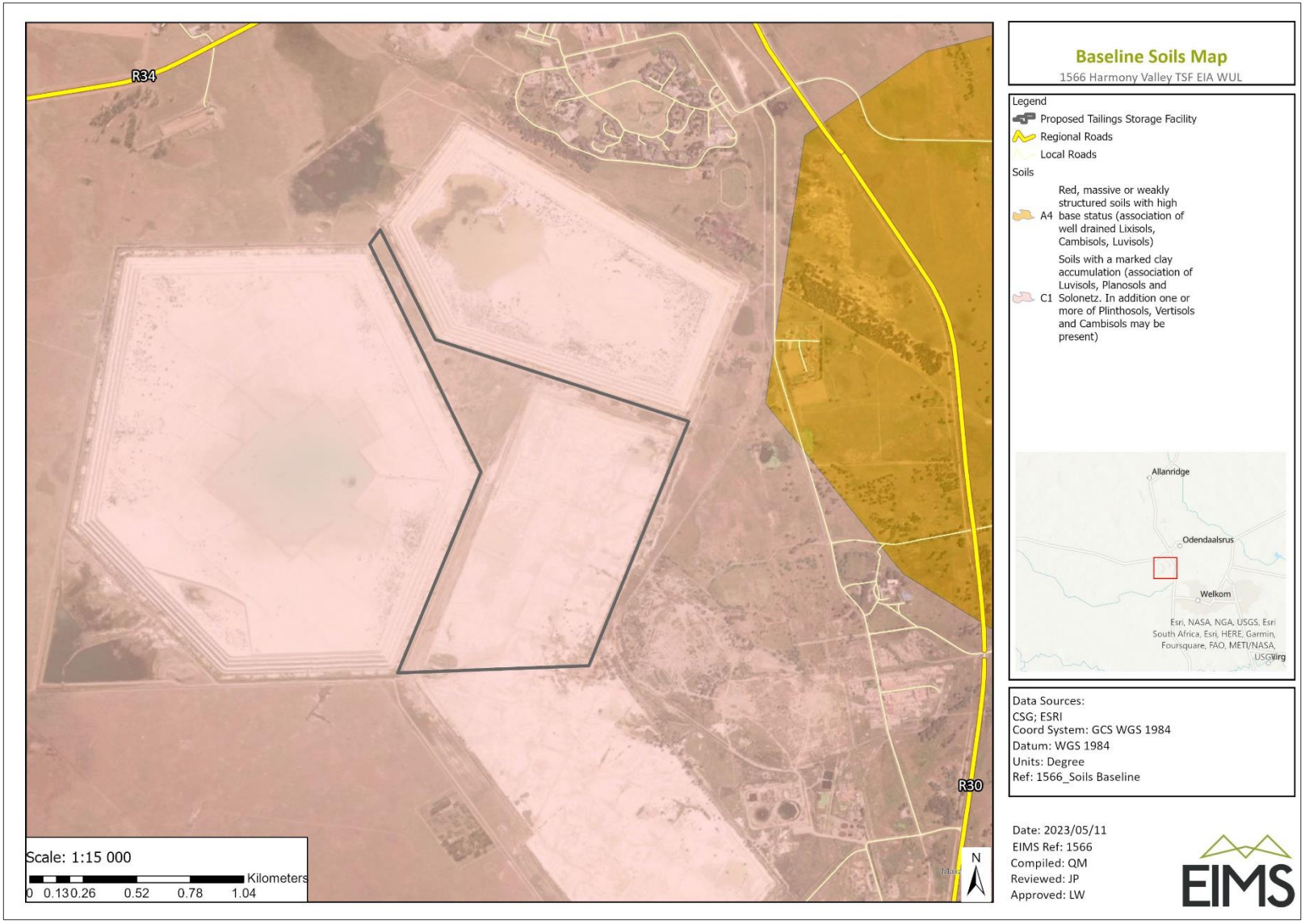

Figure 12: Soil types within study area.

8.8 FAUNA AND FLORA

The approach adopted for the fauna and flora assessment has taken cognisance of the recently published Government Notice 320 in terms of NEMA dated 20 March 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation”. The National Web based Environmental Screening Tool has characterised the plant and animal species and is assigned a “very high sensitivity” and “high sensitivity” respectively (refer to Appendix F).

The project area has historically transformed by mining activities. A change to the land use is not envisioned to have any notable negative effect on the proposed footprint area due to the current transformed state of the area, and due to the project area being isolated from any natural surrounding areas. The project area does not represent the very high plant sensitivity as per the screening report, as it has been determined to be mostly very low based on specialist site visit conducted in April 2023. A specialist site survey was undertaken to identify the current status of the vegetation composition on site as well as to confirm if any species of special concern occur on site. The potential animal species presence on the development site is also very low based on the disturbed state of the site. Figure 13 presents an overview of the ecological constraints mapping exercise completed by the specialist.

The NEMA contains listed activities for clearing of indigenous vegetation and which require environmental authorisation prior to commencing with such clearing. The Valley TSF will require clearance of just over 20ha of indigenous vegetation. A specialist terrestrial ecology survey will be conducted as part of the EIA for the project.

8.9 SURFACE WATER AND WETLANDS

The site is positioned within quaternary catchment C43B which has an area of 723 km^2 and C25B which has an area of 1 895km^2 both of which are located within the Middle Vaal WMA. The Mahemspruit River is the only defined river relevant to this assessment (when considering the more detailed 1:50,000 topographical map data). Two additional (and significant) dams are within close proximity to the site and. This includes D-Dam Complex.

A specialist aquatic ecology survey will be conducted as part of the EIA for the project. A site visit was conducted by an aquatic specialist in April 2023. Several wetlands were identified and delineated however these are located outside the site or bordering the site for the TSF aside from the two artificial wetlands located within the proposed TSF footprint area. Apart from the wetlands indicated in Figure 13 and Figure 14 the location of the proposed TSF site does not contain any surface water resources and is situated approximately 2 km at its closest from the nearest river/stream (the Mahemspruit River located southeast of the TSF site).

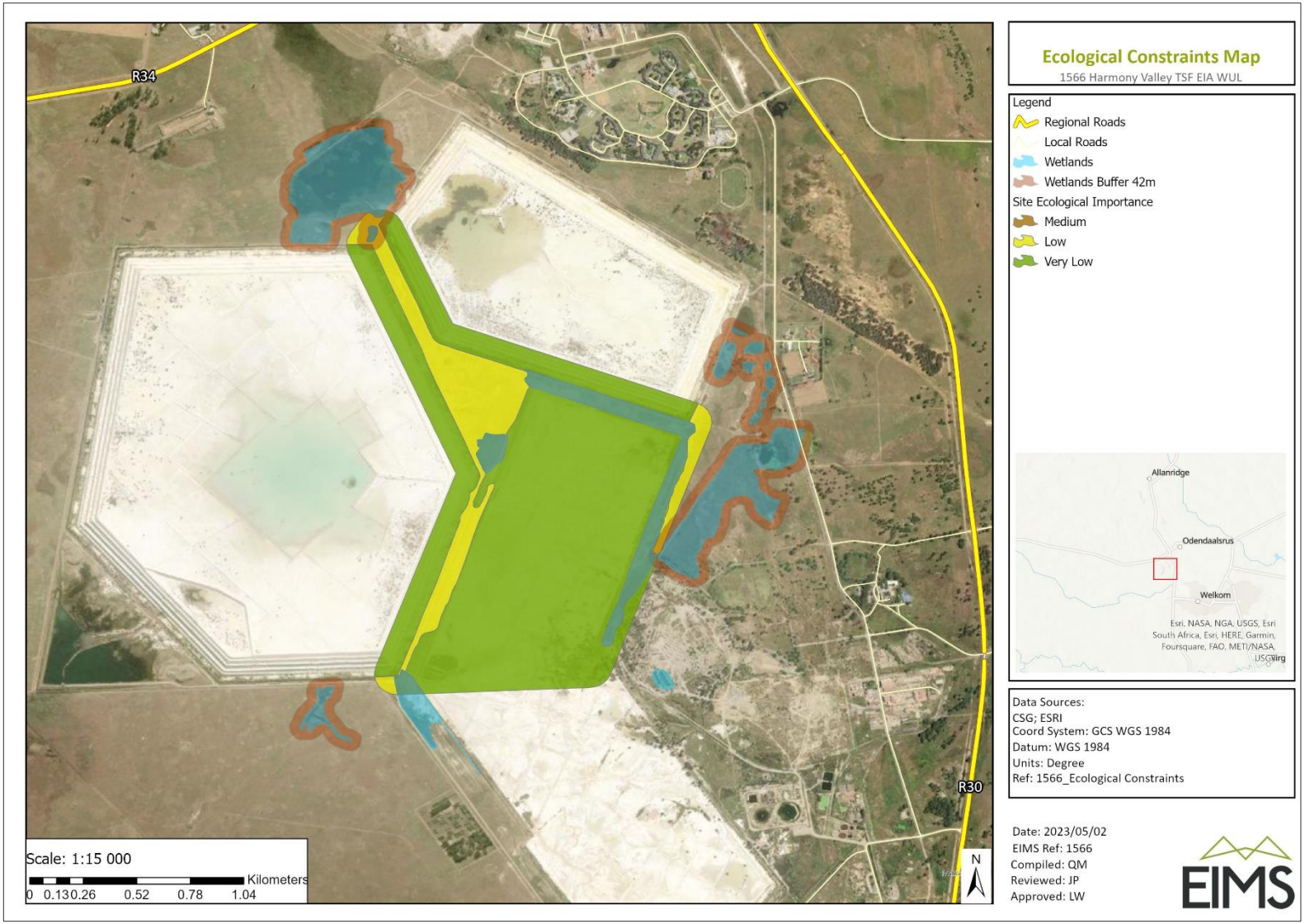

Figure 13: Baseline ecological constraints.

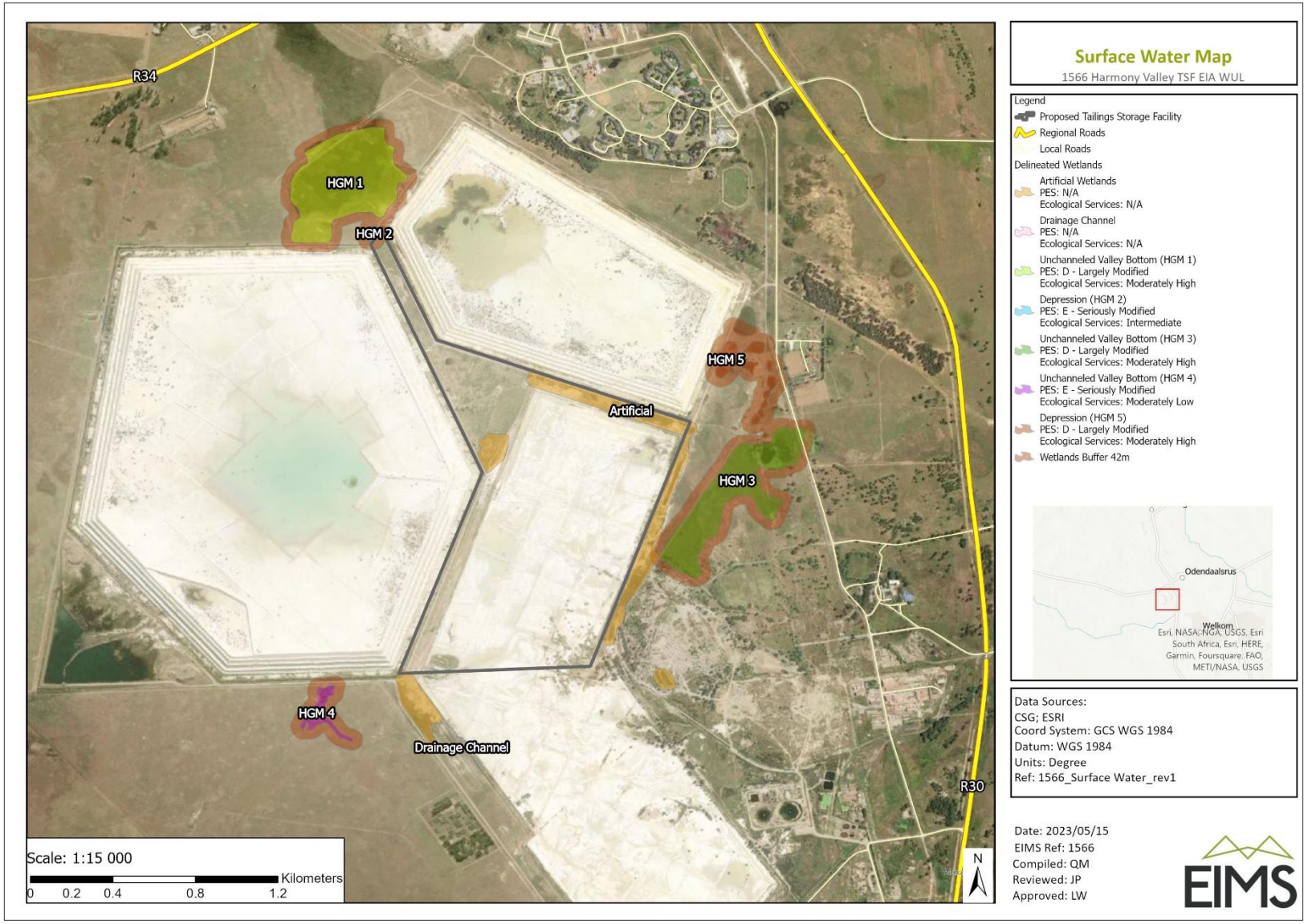

Figure 14: Surrounding delineated wetlands.

8.10 GROUNDWATER

A new geohydrological specialist study will be conducted as part of this EIA and included in the EIA phase report. The geohydrological setting and conceptual model of the study area is described according to the following criteria:

- Borehole information;
- Aquifer type;
- Groundwater use;
- Aquifer parameters;
- Aquifer recharge;
- Groundwater gradients and flow;
- Groundwater quality; and
- Aquifer classification.

8.10.1 BOREHOLE INFORMATION

During a study conducted by Golder Associates in 2009 eighteen new boreholes were drilled to assess the groundwater regime underlying the Valley TSF and surrounds. Information from these boreholes was used to conduct the geohydrological assessment. The localities of the boreholes are shown on Figure 16. The borehole information is summarised in Table 11.

Table 11: Borehole Information (Golder Associates, 2009)

ID	X	Y	Z	Depth (mbc)	Water Level (mbc)
BH1	26.65620	-27.92963	1335	90	5.50
BH2	26.65627	-27.92970	1331	36	6.41
BH3	26.65732	-27.94308	1334	73	54.03
BH4	26.65735	-27.94312	1336	24	Artesian
BH5	26.64065	-27.93760	1327	73	Dry
BH6	26.64062	-27.93755	1330	23	17.99
BH7	26.64061	-27.93019	1336	73	72.38
BH8	26.64057	-27.93023	1336	26	20.87
BH9	26.67978	-27.94499	1330	73	4.12
BH10	26.67975	-27.94496	1329	23	6.47
BH11	26.67250	-27.90450	1350	68	Artesian
BH12	26.67256	-27.90454	1348	27	Artesian
BH13	26.68095	-27.90938	1354	73	52.48
BH14	26.68097	-27.90936	1349	29	2.02
BH15	26.68849	-27.91220	1353	73	52.13
BH16	26.68845	-27.91220	1352	30	Dry

ID	X	Y	Z	Depth (mbc)	Water Level (mbc)
BH17	26.67954	-27.92358	1345	73	40.06
BH18	26.67952	-27.92365	1345	29	4.03

8.10.2 AQUIFER TYPE

The mine infrastructure is situated on interbedded siltstone/sandstone and shale of the Vryheid Formation. Even though the shale and sandstone are not known to contain economic aquifers, groundwater contributes to stream flow and in some instances, high yielding boreholes have been recorded. The following three aquifers underlie the site:

- Weathered Aquifer (Karoo Formations): A shallow, weathered aquifer exists in the weathered shale and sandstone at an average depth of 10m – 20m below ground level. The most consistent water strike is located at the fresh bedrock / weathering interface. The hydraulic conductivity of the weathered aquifer is typically in the order of 0.1 m/day. The vertical permeability is in the order of 0.001 m/day to 0.00010 m/day, which is sufficiently low to confine the groundwater in the underlying fractured rock aquifer.
- Fractured Aquifer (Karoo Formations): The primary porosity of the Vryheid Formation is very low. Any water bearing capacity is therefore associated with secondary joints, bedding planes and faults. The contact zones of dolerite intrusions are characterised by cooling joints and fractures, which are considered the primary source of groundwater flow within the deeper formations. The hydraulic conductivity of the fractured rock aquifer is typically in the order of 0.001 m/day to 0.1 m/day. The depth to groundwater in this aquifer can be variable due to confining layers in parts of the study area.

The two aquifers may or may not be hydraulically connected, dependent on the local geology.

- Witwatersrand / Ventersdorp Aquifer: The deep brine Witwatersrand aquifer is situated approximately 300m below surface. Mining prospecting boreholes indicated this level to be between 170m to 270m (EMP, 2009). This aquifer is thought to be connate (i.e. original formation water) or extremely old (fossil) water and is usually concentrated on geological structures such as fault zones or igneous intrusions (e.g. dykes). The time gap between the end of the Central Rand Group and the start of the Karoo deposition was in the order of 2.3Ga. There is also a significant time gap between the Central Rand Group and the Ventersdorp Supergroup. During these intervening periods, the older rocks were uplifted and exposed to erosion and the near surface rocks to pressure release. This resulted in the forming of fractures in approximately the upper 150m of the rock succession. Subsequent land surface changes and inundation by a shallow sea allowed marine water to percolate into the network of fractures in the Witwatersrand and Ventersdorp rocks (Young, 1990).
- The major fractures that that formed during the Ventersdorp tectonic events were filled with water to a depth of several kilometres. The impermeable nature of the overlying Karoo sediments, particularly the Dwyka Formation at the base of the Karoo, effectively sealed of the aquifer (Van Biljon, 1995). Post-Karoo movement and intrusions provided conduits for leakage from the Karoo aquifers to the deep Witwatersrand aquifer. However, the deep aquifer recharge from surface is regarded as negligible and at best localised (Van Biljon, 1995). The Witwatersrand aquifer has been largely dewatered during the past 40 years of mining and the water levels in the aquifer dropped significantly. In spite of the dewatering of the Witwatersrand aquifer, there is no evidence of dewatering of the Karoo aquifers.

It is therefore concluded that:

- There is no or very limited hydraulic connectivity between the Karoo aquifers and the deeper Witwatersrand aquifer.
- Recharge to the Witwatersrand aquifer is negligible.

- Once the Witwatersrand aquifer is dewatered (or the water level lowered) it will not recover. The estimated post-mining water level in the Witwatersrand aquifer will therefore be deeper than the pre-mining water level of ~200m below surface.

A graphical illustration of the aquifers is presented in Figure 15.

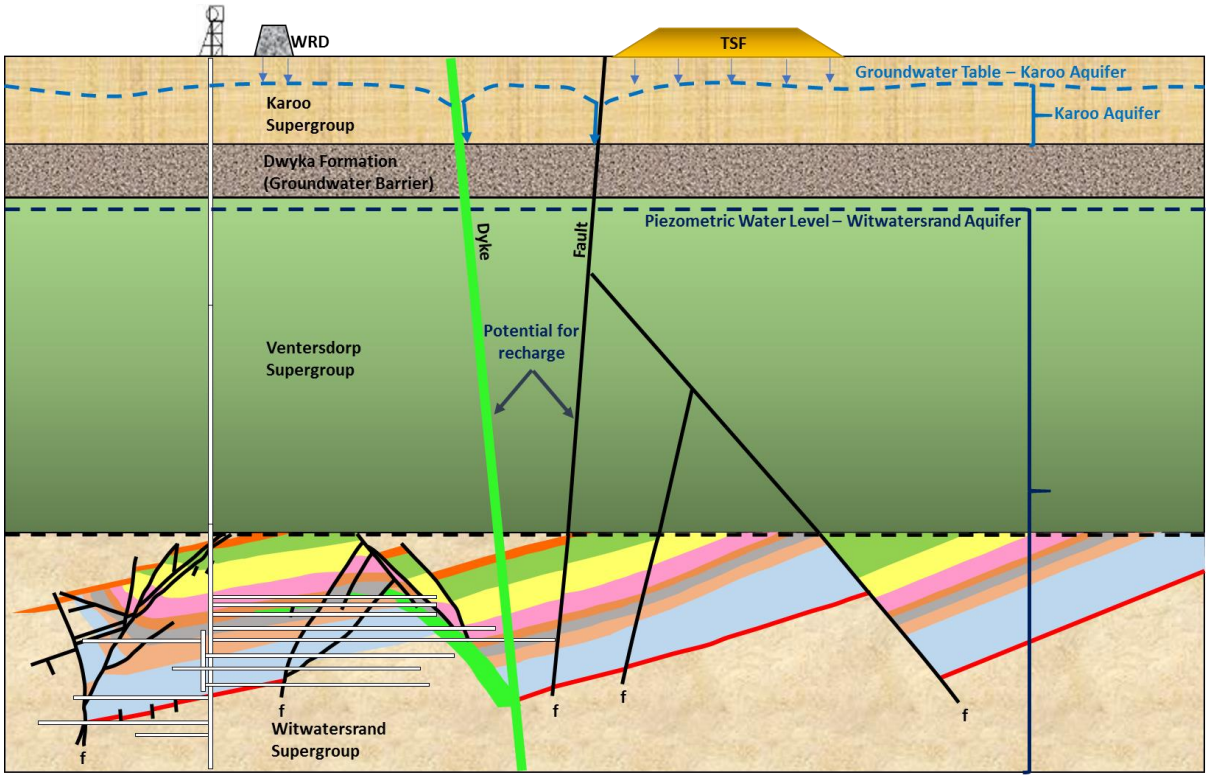

Figure 15: Graphical illustration of the aquifers in the study area

8.10.3 GROUNDWATER USE

There are no large-scale groundwater supply boreholes within the immediate study area. Farmers are, however, reliant on boreholes for domestic use and stock watering. Windmills have traditionally been utilised in the area. There are no springs recorded. Percussion boreholes drilled through the Karoo established the following information (EMP, 2009):

- Number of Boreholes: 43
- Average Thickness of Karoo: 117m
- Percentage of boreholes intersecting dolerite in Karoo: 33%
- Average depth of dolerite from surface: 74m

The drilling indicated that groundwater occurrence is predominantly on the contact zones with dolerite intrusions and on the contact between the Karoo sediments and the Ventersdorp lavas. Measured yields vary from 0.10 litre per second (ℓ/sec) to 22 ℓ/sec.

8.10.4 AQUIFER PARAMETERS

The newly drilled boreholes were pump tested by Golder Associates (2009). Important parameters that can be obtained from borehole or test pumping include Hydraulic Conductivity (K), Transmissivity (T) and Storativity (S). These parameters are defined as follows (Krusemann and De Ridder, 1991):

- Hydraulic Conductivity: 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: 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: 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 average transmissivity of the shallow aquifer is estimated at 2.3 m2/day, while that of the deep aquifer is estimated at 0.9 m2/day.

8.10.5 AQUIFER RECHARGE

Recharge is defined as the process by which water is added from outside to the zone of saturation of an aquifer, either directly into a formation, or indirectly by way of another formation. According to the Groundwater Assessment Phase II (GRAII) the recharge is approximately 4% of mean annual precipitation. This implies that approximately 8.64 mm/a of precipitation recharges the groundwater system which is lower than the GRAII values.

8.10.6 GROUNDWATER GRADIENTS AND FLOW

Figure 16 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-west.

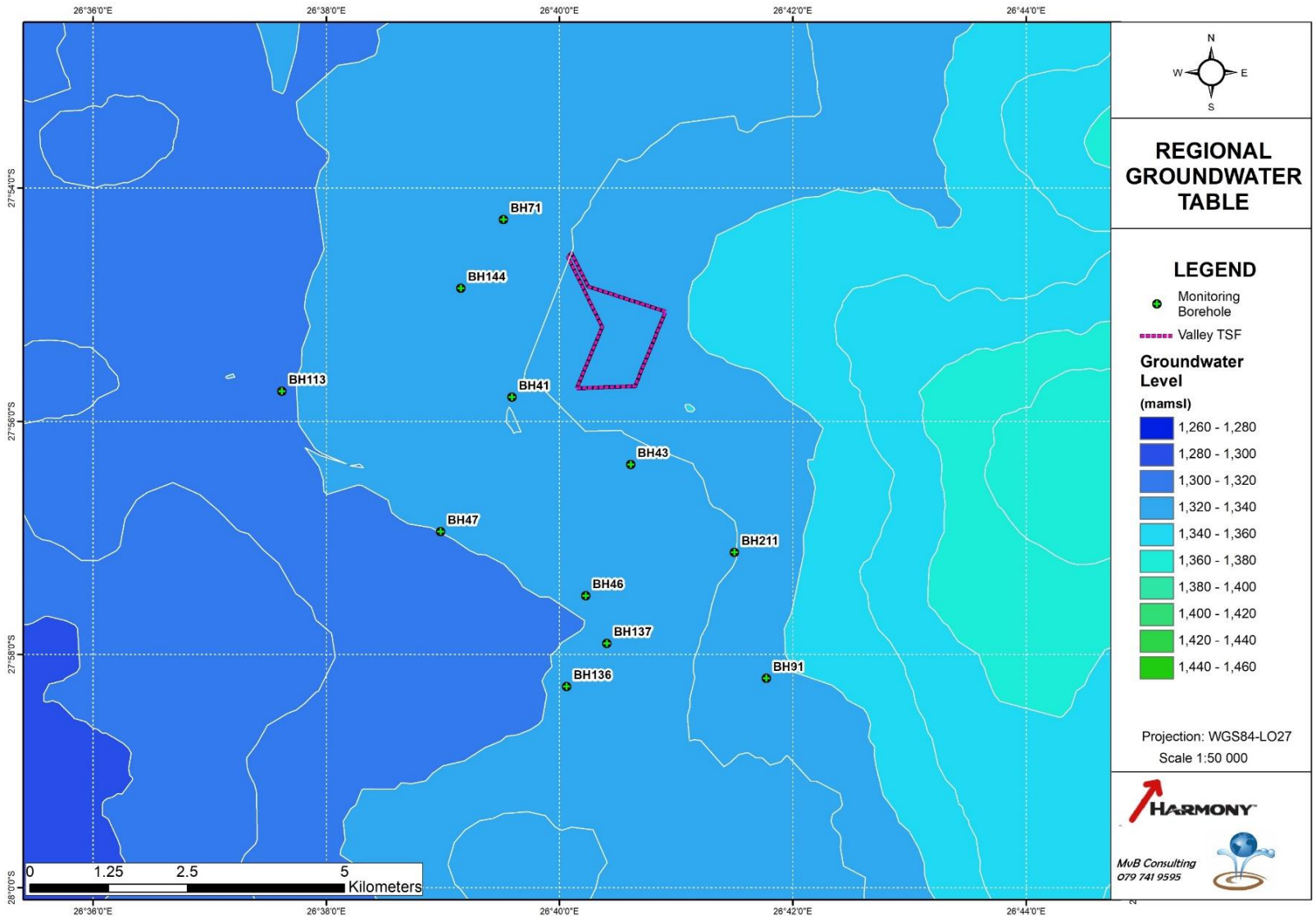

Figure 16: Regional groundwater gradient and borehole locations

8.10.7 GROUNDWATER QUALITY

The groundwater chemistry is compared to the South African Water Quality Guidelines (second edition) Volume 5: Agricultural Use: Livestock Watering (Department of Water Affairs and Forestry, 1996), as well as the SANS 241 (2015). 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 chemical concentrations are compared to the Guidelines for Livestock Watering. Where these guidelines are exceeded, the values are highlighted in red. In the absence of limits for livestock watering the chemical concentrations are compared to the SANS 241 (2015) Guidelines for Drinking Water.

The chemistry of the groundwater is presented in Table 12. The following is observed:

- The groundwater in the Free State is generally saline and most of the boreholes have Electrical Conductivity (EC) and Total Dissolved Solids (TDS) concentrations that exceed the guideline limits. Very high TDS concentrations are recorded in borehole BH46. This borehole is situated very close to a stream indicating that spillage is occurring or has occurred into this stream. The high concentrations are not attributed to natural plume migration.
- The high salt concentrations are primarily attributed to chloride, sulphate and sodium.
- The existing tailings facilities have impacted on the surrounding groundwater environment. The extent of this impact is best illustrated through the sulphate (SO_4) concentrations in the monitoring boreholes (Figure 17). The most impacted areas appear to be associated with the return water dams, and / or spillage into a surface stream and not necessarily the TSF itself. Additional assessments will be undertaken to fully understand the distribution of the impact as illustrated by the sulphate concentration.

Table 12: Groundwater chemistry

Parameter	SANS 241	DWAF	BH71	BH144	BH41	BH47	BH43	BH46	BH211	BH137	BH136	BH91	BH113
pH	<5 - >9.7	NG	8.29	7.61	7.89	8.63	2.63	7.80	8.19	8.87	7.66	7.83	8.06
EC mS/m	170	NG	615	1 641	906	146	1 355	4 980	142	141	2 234	302	74
TDS mg/L	1 200	1 000	3 860	11 124	6 110	1 029	8 997	39 137	852	863	14 881	2 381	472
Total Alk mg/L	NG	NG	244	513	501	190	6	551	238	518	472	405	194
Cl mg/L	300	1 500	1 373	4 466	2 229	246	5 106	16 284	171	105	6 854	562	94
SO_4 mg/L	500	1 000	939	2 660	1 583	107	1 121	8 622	233	115	2 723	834	84
NO_3-N mg/L	11	100	38.77	<0.46	0.50	51.43	1.63	<0.46	<0.46	0.59	1.55	<0.46	0.81
Ca mg/L	NG	1 000	284	478	182	31	823	738	90	13	528	241	13
Mg mg/L	NG	500	172	279	214	24	671	1 979	33	4	487	121	10
Na mg/L	200	2 000	746	2 902	1 576	268	1 254	11 146	171	306	3 975	348	138
K mg/L	NG	NG	26	24	18	8	15	29	8	2	19	26	11
Fe mg/L	2	10	0.009	<0.009	0.090	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	0.016	<0.009
Mn mg/L	0.4	10	0.001	<0.001	2.142	<0.001	12.288	<0.001	<0.001	<0.001	<0.001	<0.001	0.011

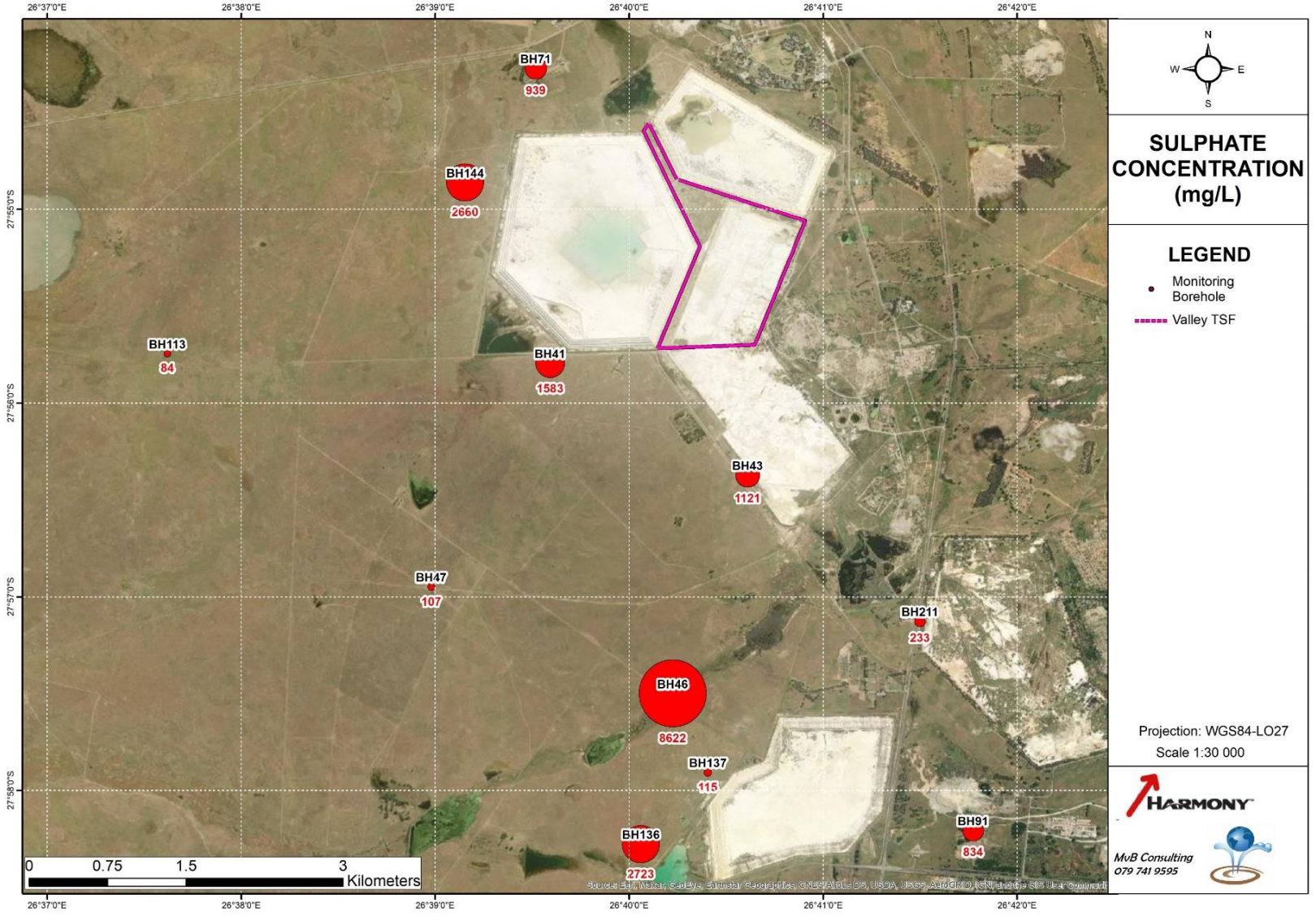

Figure 17: Sulphate concentration distribution in the groundwater monitoring boreholes.

8.10.8 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.

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; and
- 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”.

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:

Table 13: Aquifer Classification

Description	Aquifer	Vulnerability	Rating	Protection
Weathered Aquifer	Minor (2)	2	4	Medium
Fractured Aquifer	Minor (2)	1	2	Low

8.11 AIR QUALITY

The wind roses comprise 16 spokes, which represent the directions from which winds blew during a specific period. The colours used in the wind roses below, reflect the different categories of wind speeds; the yellow area, for example, representing winds in between 4 and 5 m/s. The dotted circles provide information regarding the frequency of occurrence of wind speed and direction categories. The frequency with which calms occurred, i.e. periods during which the wind speed was below 1 m/s are also indicated. The period wind field and diurnal variability in the wind field are shown in Figure 19, while the seasonal variations are shown in Figure 20.

During the 2019 to 2021 period, the wind field was dominated by winds from the north-northeast and northeast, followed by northerly and easterly winds. During the day (6AM – 6PM), the prevailing wind field is from the north to northeast and the west, with less frequent winds from the north-westerly sector, the easterly sector and the south-west. During the night, the wind field shifts to the easterly sector (north-northeast to east-southeast), with very little flow from the westerly sector. Long-term air quality impacts are therefore expected to be the most significant to the south and southwest of the project area. The strongest winds (more than 6 m/s) were also from the north and northeast and occurred mostly during the day, with 15 m/s the highest wind speed recorded. The average wind speed over the three years is 3.7 m/s, with calm conditions occurring for 3.5% of the time (Figure 19).

Seasonally, the wind flow pattern conforms to the period average wind flow pattern. The seasonal wind field shows little seasonal differences in the wind fields. During summer and spring, the dominant winds are from the north-northeast to east, with more frequent westerly winds during spring. Autumn reflects dominant north-easterly and easterly winds, with a similar wind field during winter, but with more frequent north-northeasterly and east-southeasterly winds.

Air quality sensitive receptors (AQSRs) refer to places where humans reside. Ambient air quality guidelines and standards, as discussed under section 2.2, have been developed to protect human health. Ambient air quality, in contrast to occupation exposure, pertains to areas outside of an industrial site or boundary where the public has access to and according to the Air Quality Act, excludes air regulated by the Occupational Health and Safety Act (Act No 85 of 1993).

A map showing locations of AQSRs within the Project boundary is included in Figure 18.. These include residential areas, farmsteads, schools and hospitals. The closest towns in the immediate region of the project include Welkom and its suburbs (located about 4 kilometres (km) southeast of the Project boundary) and Odendaalsrus (located about 5 km north of the Project boundary).

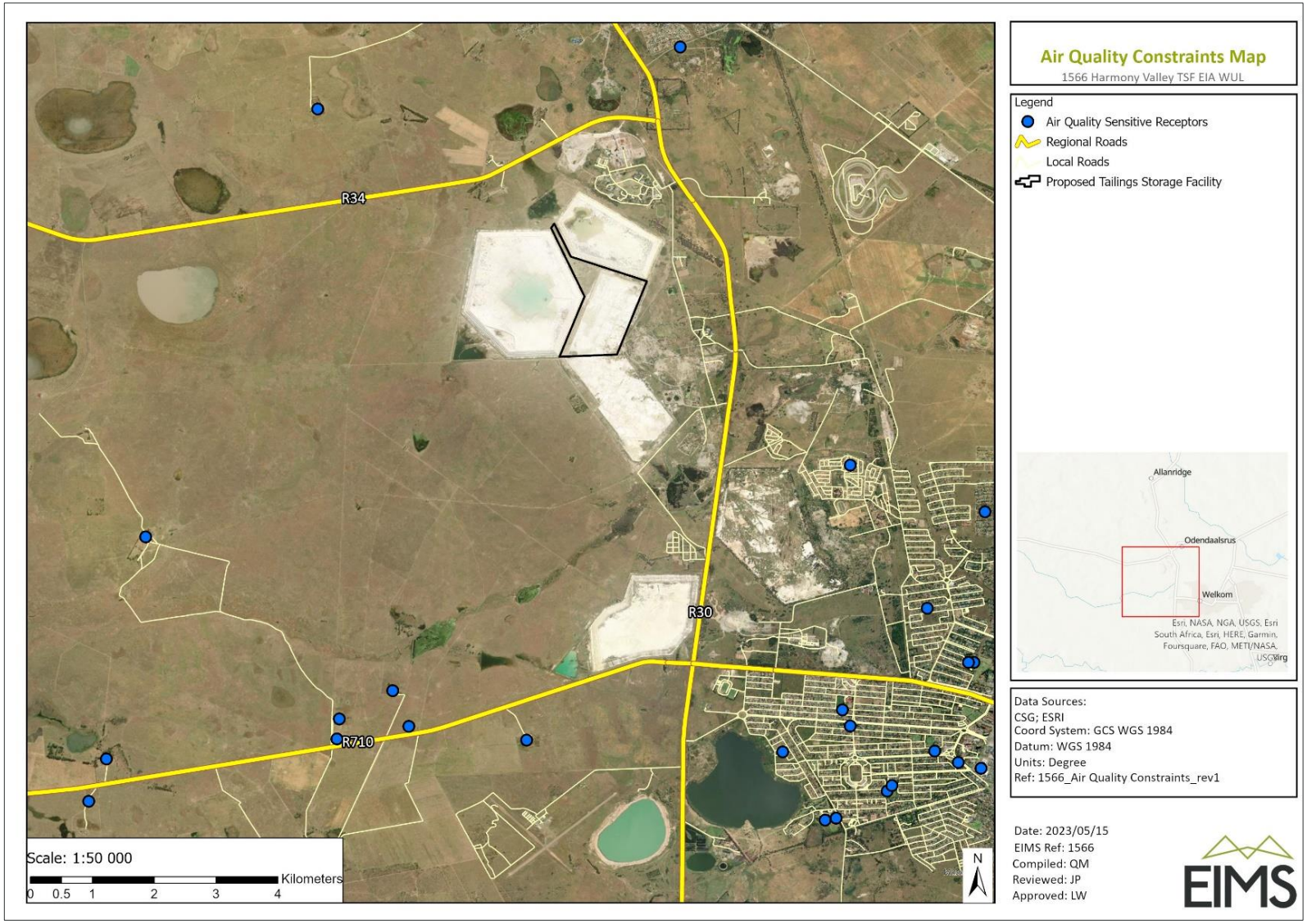

Figure 18: Location of sensitive receptors relative to the Project.

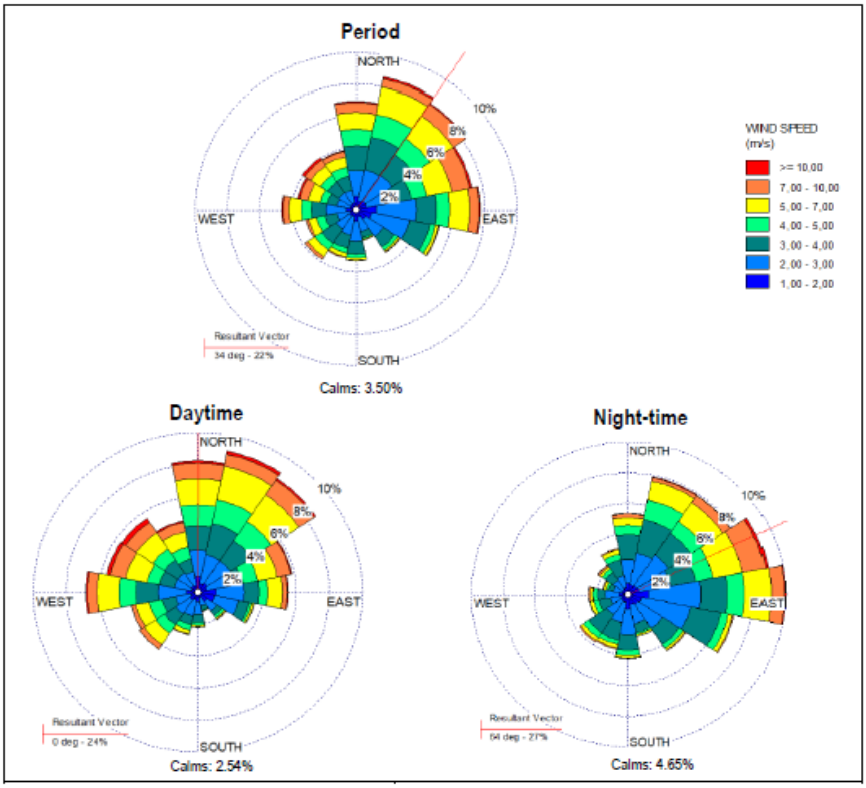

Figure 19: Period, day- and night-time wind roses (SAWS Welkom Data, 2019 to 2021).

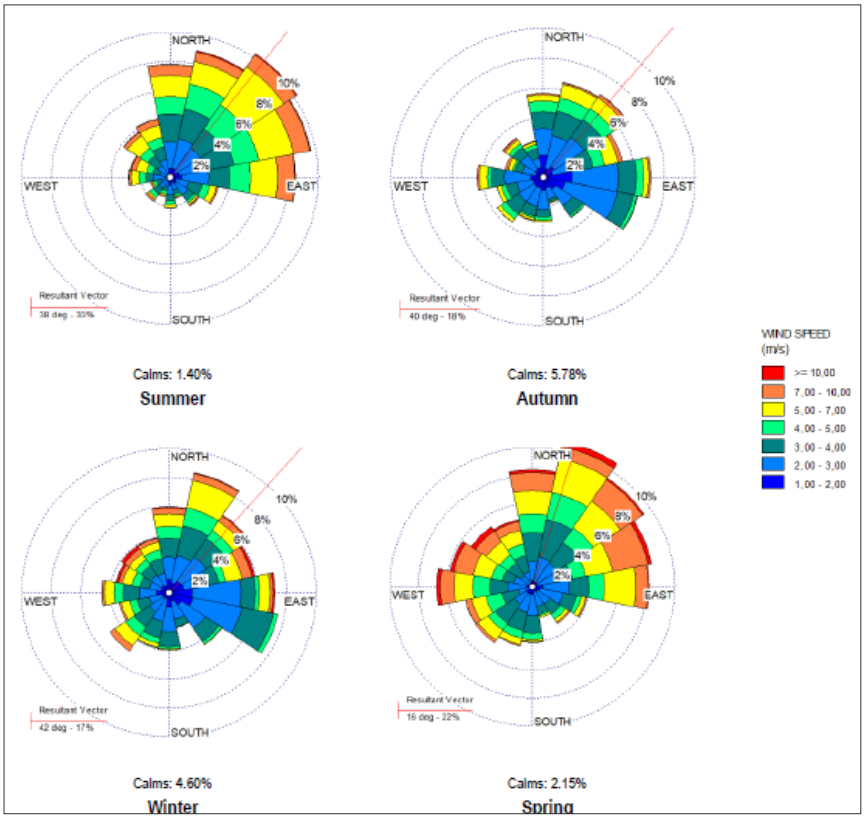

Figure 20: Seasonal wind roses (SAWS Welkom Data, 2019 to 2021)).

According to the Beaufort wind force scale (https://www.metoffice.gov.uk/guide/weather/marine/beaufort-scale), wind speeds between 6-8 m/s equates to a moderate breeze, with wind speeds between 9-11 m/s referred to as a fresh breeze. Wind speeds between 11-14 m/s are described as a strong breeze with winds between 14-17 m/s near gale force winds and 17-21 m/s as gale force winds. Over the 3-year period, wind speeds within 14-17 m/s occurred for 0.03% of the time, and winds between 11-14 m/s for 0.46%. The likelihood for wind erosion to occur from open and exposed surfaces, with loose fine material, but taking into account that the TSF surfaces are typically crusted, was estimated when the wind speed exceeds 9 m/s (Mian & Yanful, 2003). Wind speeds exceeding 9 m/s occurred for 2.27% over the 3-year period.

8.12 VISUAL RECEPTORS

A visual scoping study was undertaken by Graham Young (refer to Appendix D) and the baseline information from that study is presented in this section. The site is located within an area that is predominantly surrounded by existing mining infrastructure. There are no protected areas in the vicinity of the proposed site. The existing visual condition of the landscape that may be affected by the proposed Project has been described. Most of the study area's scenic quality has been rated moderate to low within the context of the sub-region, and sensitive viewing areas and landscape types identified and mapped indicating potential sensitivity to the project, specifically from farmsteads and people travelling along arterial roads west of the site. The site is in a landscape type rated as moderate to low.

Impacts on views are the highest when viewers are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the change. The visual impact of the Project will cause changes in the landscape that are noticeable to viewers experiencing the study area from the R30 and the far western areas of Rheederpark. Visual impacts that would potentially result are likely to be adverse, long-term, and will cause a minor loss to the baseline landscape and visual resources resulting in a low severity of impact.

The visual receptors identified at desktop level within the project area are shown in Figure 21 which identifies receptor locations where people would most likely be susceptible to negative changes in the landscape caused by the physical presence of the Project. The main areas of concern might be:

- Residential areas east of the development site (Rheederpark and Flamingo Park);
- Farmstead(s) east of the R30 and south of Phakisa Freeway; and
- Travellers along the R30 arterial route.

People living and passing through these locations will experience some negative change and s minor loss of the baseline landscape aesthetic due to the scale and extent of the TSF. However, due to the high VAC of the existing landscape, sensitive views to the development would mostly be obstructed by existing facilities and tall trees east and south east of the proposed site. These negative changes would occur over an extended time frame i.e. over the life of the mine and beyond as the TSF would remain as a residual structure in the landscape and represent the worst case scenario.

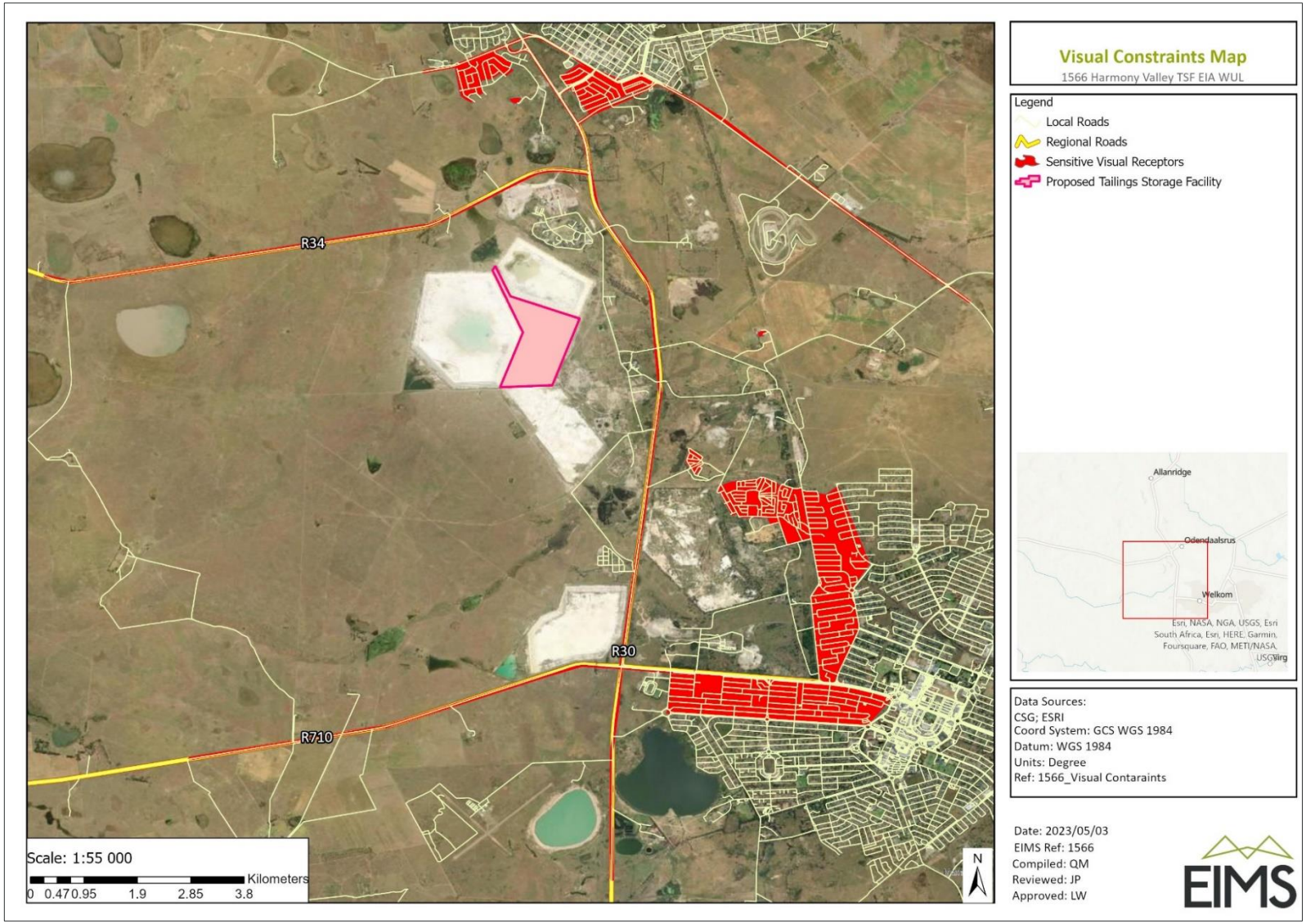

Figure 21: Landscape Character Areas and visual sensitive receptors.

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:

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

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 14 below.

Table 14: 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. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary),
	3	Local (i.e. the area within 5 km of the site),
	4	Regional (i.e. extends between 5 and 50 km from the site
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years),
	3	Medium term (6-15 years),
	4	Long term (the impact will cease after the operational life span of the project),
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction).

Aspect	Score	Definition
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),
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way),
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).
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 prohibitively 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 15.

Table 15: Probability Scoring.

Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur),

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

ER= C x P

Table 16: Determination of Environmental Risk.

Consequence	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10

	1	1	2	3	4	5
		1	2	3	4	5
	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 17.

Table 17: Significance Classes.

Environmental Risk Score	
Value	Description
< 9	Low (i.e. where this impact is unlikely to be a significant environmental risk).
≥9 - <17	Medium (i.e. where the impact could have a significant environmental risk),
≥17	High (i.e. where the impact will have a significant environmental risk).

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.

Table 18: 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.
	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.

Irreplaceable Loss of Resources (LR)	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 18. The impact priority is therefore determined as follows:

Priority = CI + 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 19).

Table 19: Determination of Prioritisation Factor.

Priority	Ranking	Prioritisation Factor
2	Low	**1**
3	Medium	**1.125**
4	Medium	**1.25**
5	Medium	**1.375**
6	High	**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 20: Final Environmental Significance Rating.

Significance Rating	Description
<-17	High negative (i.e. where the impact must have an influence on the decision process to develop in the area).
≥-17, ≤-9	Medium negative (i.e. where the impact could influence the decision to develop in the area).
>-9, < 0	Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area).
0	No impact
>0, <9	Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥9, ≤17	Medium positive (i.e. where the impact could influence the decision to develop in the area).

Significance Rating	Description
>17	High positive (i.e. where the impact must have an influence on the decision process to develop in the area).

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&APs 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 were identified during the scoping process. These impacts were identified by the EAP, the appointed specialists, as well as the public. Table 21 provides the list of potential impacts identified.

Without proper mitigation measures 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 21: Identified 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 Planned placement of infrastructure Topsoil stripping		○ Temporary disturbance of wildlife		○ Disturbance/ destruction of archaeological sites or historic structures (if any)
Human resources management (Planning)	Employment/recruitment I&AP consultations Environmental awareness training HIV/AIDS Awareness programmes Integration with Municipalities' strategic long-term planning			○ Employment opportunities.	
Earthworks (Construction)	Stripping and stockpiling of soils Levelling, grubbing and bulldozing Removal of waste and cleared vegetation Preparing trenches and foundations Establishing storm water management measures Establishment of firebreak	○ Erosion due to storm water runoff ○ Impact due to topsoil stripping ○ Loss of fertility ○ Loss of flow paths ○ Emissions and dust ○ Impacts on wetlands	○ Loss/ destruction of natural habitat ○ Introduction/ Invasion by Alien Species ○ Displacement of faunal species	○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e. noise, dust, etc.). ○ Safety and security (i.e. access to properties, theft, fire hazards, etc.). ○ Impact on existing infrastructure (i.e. roads, fences, etc.) ○ Perceptions and expectations ○ Employment opportunities	○ Disturbance/ destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
Civil Works (Construction)	Establishment of infrastructure and services Mixing of concrete and concrete works Establishment of dewatering pipelines Sewage and sanitation Establishment of waste area Access control and security General site management	○ Erosion due to storm water runoff ○ Impact due to topsoil stripping ○ Loss of fertility ○ Loss of flow paths ○ Emissions and dust ○ Impacts on wetlands	○ Loss/ destruction of natural habitat ○ Introduction/ Invasion by Alien Species ○ Displacement of faunal species	○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e. noise, dust, etc.). ○ Safety and security (i.e. access to properties, theft, fire hazards, etc.). ○ Impact on existing infrastructure (i.e. roads, fences, etc.) ○ Perceptions and expectations ○ Employment opportunities	○ Disturbance/ destruction of archaeological sites or historic structures ○ Disturbance/ destruction of fossils
Deposition at TSF (Operation)	Deposition of tailings Maintenance and management of stormwater system Water management	○ Subsidence effects ○ Impacts on surface and/or groundwater quality due to leachate ○ Loss of fertility ○ Loss of flow paths ○ Emissions and dust		○ Visual impact and impact on sense of place ○ Nuisance and impact on sense of place (i.e. noise, dust, etc.). ○ Safety aspects related to radiation and health as well as stability.	
Closure and Rehabilitation of TSF	Revegetation Slope stabilisation Erosion control	○ Emissions and dust	○ Alien and invasive species	○ Safety and security (i.e. access to properties, theft, fire hazards, etc.).	

Main Activity / Action / Process	Ancillary Activity	Geo-physical (geology, topography, air, water)	Biological	Socio-economic	Heritage and cultural
(Decommissioning and Closure)				○ Perceptions and expectations ○ Visual and dust	
Maintenance (Post closure)	Initiate maintenance and aftercare program Environmental aspect monitoring	○ Surface and groundwater quality	○ Alien and invasive species	○ Visual ○ Site security and access control	

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. The preliminary scoping level impact assessment matrix (including pre- and post-mitigation assessment) is included in Appendix E. Table 22 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. The impact ratings and mitigation measures presented in this section will be updated in the EIA phase assessment once detailed specialist input has been received. 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.

Table 22: Preliminary impact assessment.

#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description and Preliminary Mitigation	Further Assessment
1	Disturbance / destruction of sites of heritage significance	Construction	-3,5	-1,5	No heritage sites, graves or palaeontological resources have been identified on the development footprint based on the fieldwork already conducted. Mitigation measures include development and implementation of a chance finds procedure with notification to the SAHRA in the event of a possible find during construction.	Detailed Assessments already completed
2	Disturbance / destruction of palaeontological resources	Construction	-3,5	6,5		
3	Destruction, loss and fragmentation of the vegetation community	Construction	-6,75	-6	Existing vegetation within the proposed development footprint will need to be cleared. Since the proposed development site is situated directly adjacent to existing mining infrastructure, no fragmentation of vegetation communities is likely occur. Mitigation could include avoidance of sensitive areas, preconstruction survey for SCC and to limit disturbance as far as possible. A biodiversity compliance statement will be undertaken for the EIA phase.	EIA Phase impact assessment (compliance statement)
4	Introduction or spread of alien plant species	Construction	-6	-4,5	The proposed development footprint currently contains significant alien species. These will need to be controlled to ensure that they do not spread into the surrounding areas. Care must be taken to prevent alien and invasive species from establishing. A biodiversity compliance statement will be undertaken for the EIA phase.	EIA Phase impact assessment
		Operation	-6	-4,5		
		Rehab and closure	-6	-4,5		
5	Erosion due to stormwater runoff	Operation	-4,5	-4	Erosion of the side slopes is likely unless specific measures are implemented to reduce erosion. Furthermore, the rainfall runoff from the TSF must be contained in a dirty water system to prevent any contaminants from entering the natural environment. A soils assessment is being undertaken as part of the EIA phase.	EIA Phase impact assessment

#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description and Preliminary Mitigation	Further Assessment
6	Mortality / disturbance of wildlife due to increased human presence and use of machinery and vehicles.	Construction	-7,5	-6,75	Even though the development footprint is surrounded by existing mine infrastructure fauna is still likely to occur. The area must be walked though prior to construction to ensure no faunal species remain in the habitat and get killed. Should animals not move out of the area on their own, relevant specialists must be contacted to advise on how the species can be relocated. Clearing of the area must be done in a systematic manner, moving from one end to the other to allowing resident fauna to move off. A detailed biodiversity assessment will be undertaken for the EIA phase.	EIA Phase impact assessment
7	Soils and Agricultural Potential Impacts	Construction	-8.25	-8.25	Loss of land capability will occur during construction however the area is already surrounded by existing mine infrastructure and is located in an area of low – medium land capability. A soils compliance statement will form part of the EIA in order to propose various mitigation measures to reduce erosion soil contamination. Avoidance of spills and leaks will be an important part of mitigation in this regard.	EIA Phase impact assessment (compliance statement)
		Operation	-6,75	-5,5		
8	Wetlands Impacts	Construction	-13	-7,5	There are several wetlands in close proximity to the TSF site. The most notable impact is the potential damage to some water resources, the delineated wetlands in particular, however the identified wetlands are located at the edge of the TSF site and are unlikely to be severely affected. A detailed wetland assessment will be undertaken for the EIA phase.	EIA Phase impact assessment
9	Aquatic Biodiversity Impacts	Construction	-13	-6,75	There are several wetlands in close proximity to the TSF site. Damage to aquatic ecosystems and wetland habitats is a potential impact. A detailed	EIA Phase impact assessment

#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description and Preliminary Mitigation	Further Assessment
					wetland assessment will be undertaken for the EIA phase.	
10	Health impacts	Operation	-11,25	-6,5	Potential health and safety impacts include radiation from the TSF on potential receptors of radiation exposure. A detailed health and radiological assessment will be undertaken for the EIA phase.	EIA Phase impact assessment
		Rehab and closure	-11,25	-6,5		
11	Noise	Construction	-2,25	-2,25	Noise generation from construction and operation of the TSF will be confined to the development footprint. The construction and operation of the new TSF is not likely to significantly increase noise levels on any receptors as there are no sensitive receptors in close proximity to the site. Appropriate noise control measures will be included in the EMPr to reduce noise generated from activities at the TSF.	No further impact assessment required in the EIA phase. Mitigation measures to be included in the EMPr.
		Operation	-2,5	-2,5		
		Operation	-11,25	-7,5		
		Rehab and closure	-11,25	-7,5		
12	Groundwater quality	Operation	-11,25	-10,5	The proposed TSF has the potential to contaminate groundwater unless suitable measures are implemented to prevent and/or contain runoff and infiltration. The TSF barrier system will be determined in consultation with the authorities and will be in compliance with relevant norms and standards for determination of liner requirements in terms of the NEM:WA (GN R. 636).	EIA Phase impact assessment
		Rehab and closure	-11,25	-10,5		
13	Reduction in air quality	Construction	-12	-8	The proposed TSF could have a significant incremental impact on the surrounding environment and human health during the operational phase. Air quality management and monitoring will be important. A detailed air quality impact assessment will be undertaken during the EIA phase to quantify the incremental and cumulative impacts of the proposed TSF.	EIA Phase impact assessment
		Operation	-16,25	-14		
		Decommissioning	-12	-8		
		Rehab and closure	-12	-8		

#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description and Preliminary Mitigation	Further Assessment
14	Visual - Change of Landscape Character	Construction	-6	-5,5	In a relatively flat landscape, the scale and nature of the TSF will be impossible to screen however the site is already surrounded by other TSFs. The desktop visual assessment will be re-evaluated during the EIA phase to confirm the initial assessment and suggest appropriate mitigation measures. Preliminary mitigation includes landscaping, good housekeeping, management of lighting impact and planning to reduce visual impacts as far as possible.	EIA Phase impact assessment
		Operation	-7	-7		
		Decommissioning	-6	-5,5		
15	Visual - Impact on Urban Edge, Adjacent Roads and towns	Construction	-6	-5,5		
		Operation	-7	-6		
		Decommissioning	-6	-5,5		
16	Employment opportunities	Planning	5,25	6	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 construction. The majority of the employment opportunities are related to the future ongoing operation of the Harmony One Plant which requires additional deposition space in order to continue operations.	No further impact assessment required in the EIA phase. Mitigation measures to be included in the EMPr.
		Construction	6	6,75		
		Operation	9	9,75		
		Decommissioning	6	6,75		
		Rehab and closure	6	6,75		
17	Expectations regarding creation of opportunities	Planning	-6	-5,5	Harmony must put a communication strategy in place that will communicate in an open and honest way what kind of jobs 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. Where possible, try to avoid productive land. Develop and implement an Influx Management Strategy as per IFC Guidelines on Influx Management. Contractors should be	
18	Impacts of traffic on people – dust, noise, safety – from a social and nuisance perspective	Operation	-6	-5,5		
19	Negative perceptions relating to the risk of TSF failure.	Operation	-6	-5,5		
20	Impacts on livelihoods of landowners.	Operation	-6	-5,5		
21	Influx of people	Construction	-6	-5,5		

#	Impact	Phase	Pre-mitigation Environmental Risk	Post-mitigation Environmental Risk	Description and Preliminary Mitigation	Further Assessment
					required to make use of a certain proportion of local labour – it is acknowledged that not all skills will be available locally. Jobs should be advertised in a way that is accessible to all members of society and labour desks should be established in accessible areas. 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.	

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 23 below provides a breakdown of the sensitivity rating and weightings applied to determine the sensitivity score of each aspect. Figure 22 presents the preliminary combined sensitivity map for the project. This map will be updated for the EIA phase of the project once detailed specialist studies are completed.

Table 23: 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
Very High	The proposed development will have a very high significant negative influence on the current status of the feature.	3

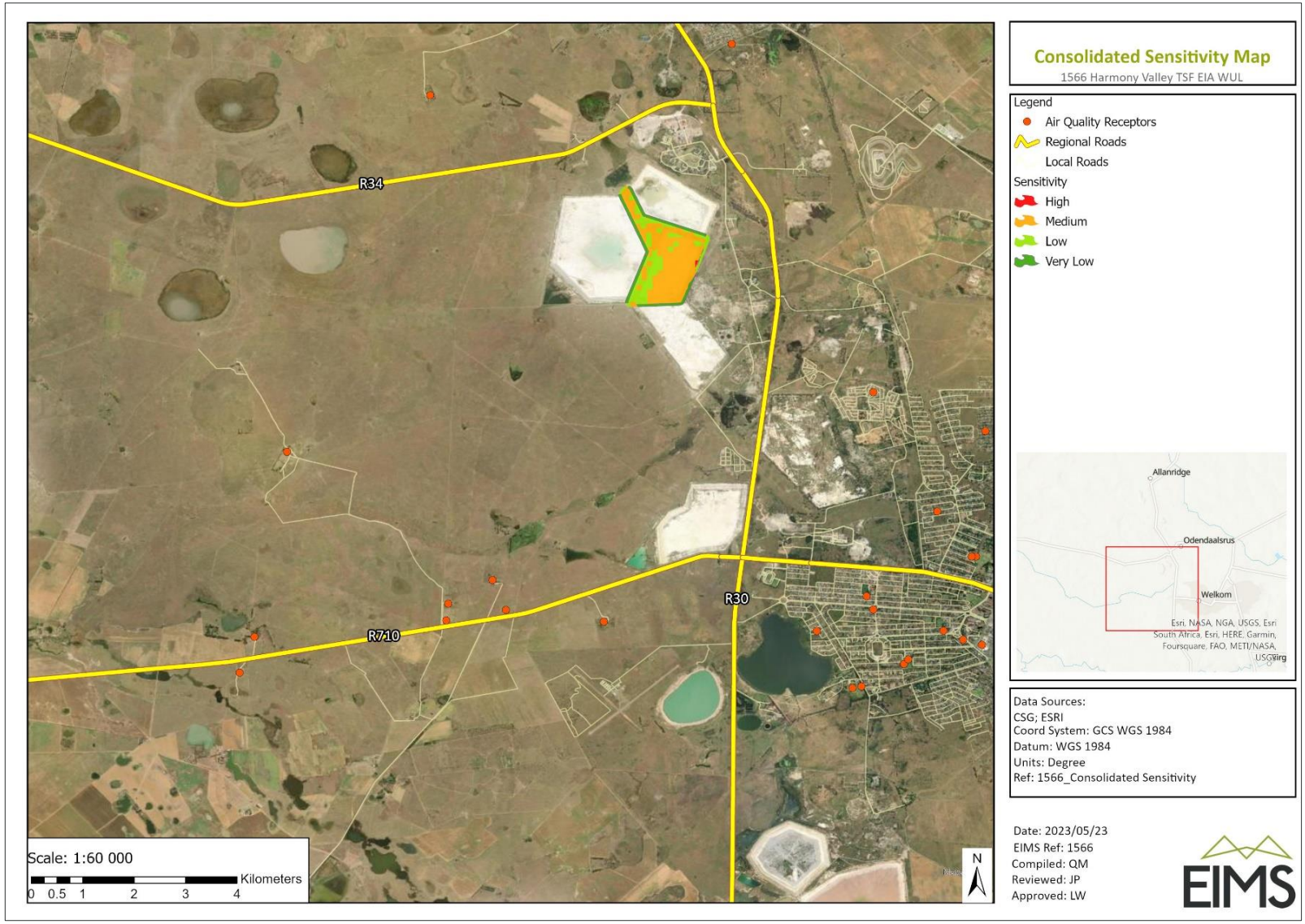

Figure 22: Combined scoping sensitivity map

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 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 will be planned to avoid any no-go areas identified from the various specialist studies, if required, and the design, including the height and slope of the TSF, will cater for the volume of tailings required; otherwise apart from the design requirements no additional alternatives are considered applicable to this application.

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:

- Biodiversity (Terrestrial);
- Aquatics and Wetlands;
- Heritage;
- Agriculture Potential, Soils and Land capability;
- Geohydrology;
- Air quality;
- Palaeontology;
- Visual;
- Health Risk and Radiological; and
- Closure Costing.

The following aspects will be disregarded at scoping:

- Social impacts; and
- Noise impacts.

11.3 ASPECTS TO BE ASSESSED BY SPECIALISTS

Table 24 below details the various aspects of the project to be addressed in the EIA phase through detailed specialist studies.

Table 24: 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	Hanlie Liebenberg-Enslin	The following will be undertaken as part of the EIA phase study: • 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
Visual	Visual Impact Assessment	Environmental Planning and Design	Graham young	The following will be undertaken as part of the EIA phase study: • Site visit; • Baseline Mapping; • Viewshed and Building of Computer Model; and • Compilating of an impact assessment report.
Biodiversity (Terrestrial)	Terrestrial Biodiversity Compliance Statement	The Biodiversity Company	Andrew Husted	The surveys will include the following: • A survey for Red and Orange Data plant species; • Vegetation units will be identified, classified and delineated; and • Habitat types will be classified and delineated. The floristic survey should be conducted during the growing season (the rainy season when most plants are in flower or seeding), over the project areas. These will give an indication of the actual species present on site and will be discussed in context of plant communities (should the area support distinct communities) within the ecosystem of the area.

Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				Protected, endemic, exotic, alien invasive and culturally significant species will also be discussed as separate issues and related back to relevant legal requirements. Furthermore the identification of red data and protected species as listed according to the IUCN List, NEMBA and other Provincial and National legislation will be completed. Depending on the vegetation and terrain, the timed meander sampling could be used during vegetation assessments, however should dominant vegetation types require other methods be used, then these shall be motivated. The surveys will include the following: • The identification of these features and delineation thereof; and • The location of any unique or protected habitat features. 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. A terrestrial ecological assessment report will be written. This report will be compiled according to the necessary requirements and standards.
Biodiversity (Aquatic) and wetlands	Aquatic and Wetland Biodiversity Assessment	The Biodiversity Company	Andrew Husted	The areas will be traversed on foot to identify local freshwater resources. The following will be achieved to supplement the approach: • 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.

Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				The "Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries" (Macfarlane, et al., 2014) will be used to determine the appropriate buffer zone for the proposed activity. 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). An aquatics and wetlands assessment report will be written. This report will be compiled according to the necessary requirements and standards.
Agriculture Potential, Soils and Land capability	Soils Compliance Statement	The Biodiversity Company	Andrew Husted	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. 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. Land use will be identified using aerial imagery and then ground-truthed while out in the field. The land use categories are split into: • Cultivated; • Grazing; • Natural; • Mines; • Urban Built-Up; and • Waterbodies.

Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				The agricultural theme sensitivity for the site is classified as medium and low sensitivity. Based on this, it is proposed that a compliance statement be submitted as opposed to a full report.
Heritage	HIA	PGS Heritage	Wouter Fourie	The following is included in the HIA for the EIA phase of the project: • 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	PIA	Banzai	Elize butler	The following is included in the PIA for the EIA phase of the project: • 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 Biljoen	The aim of the geohydrological study is to assess the following: • 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.

Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				• Recommended management measures to mitigate potential impacts. The study will include the following: • Desktop study of existing information. Conceptual model of the groundwater system. • Numerical groundwater flow and mass transport model. • Risk assessment and reporting.
Health Risk and Radiological	Health Risk and Radiological Assessment	AquiSim Consulting	Japie van Blerk	The overall framework within which the radiological public safety and impact assessment will be consistent with international practice, the following logical elements will be included in the scope of the assessment: • 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 defined for the workers and public, both for the operational and post-operational periods.

Aspect	Component	Company Responsible	Consultant	Scope of Work / Terms of Reference
				• Interpretation of the results: During this step, the results will be interpreted in terms of the assessment context defined in the first step.
Closure and Rehabilitation	Engineering Designs and Financial	MineLock Environmental Engineers	Johann Le Roux	A closure plan and 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, The closure costing will be calculated according to the escalated DMRE rates since the NEMA Financial Provision regulations have not yet come into effect.

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 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 draft EIA/EMPr will be determined at a later date and communicated to all registered I&APs 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.

11.8 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 DMRE, DESTEA and the 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 DESTEA and DMRE for adjudication and decision making.

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.
- This study is not based on any engineering designs as these designs are still being completed. The designs will be made available to all specialists at the outset if the EIA phase of the project.
- The majority of detailed specialist studies will only be conducted during the EIA phase of the project, therefore much of the information included in this Scoping level report is not sourced from specialist reports but rather from available baseline data and desktop information available to the EAP, as well as baseline information and constraints compiled and identified by the specialist team. Identified impact significance ratings and mitigation measures will be further refined based on specialist input during the EIA phase.

13 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

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 from stakeholders and Interested and Affected Parties has been correctly recorded in the report where applicable.

Signature of the EAP

Date: 2023/06/08

14 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I **John von Mayer** herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with Interested and Affected Parties and stakeholders has been correctly recorded and reported herein.

Signature of the EAP

Date: 2023/06/08

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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: DEA Screening Tool Report

Appendix G: Site Selection Summary Report